

Moderate Effect of Financial Literacy during the Covid-19 Pandemic in Technology Acceptance Model on the Adoption of Online Banking Services

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Abstract

This research explored the factors that have a significant effect on the adoption of online banking services using the Technology Acceptance Model (TAM) theory, both directly and moderated by financial literacy. This quantitative study used a single cross-sectional research design to collect data from 100 respondents using Google Form. The collected data were analyzed using Structural Equation Modeling-Partial Least Square (PLS-SEM). The results showed that the perceived usefulness directly had a positive and significant impact on the adoption of online banking services. Likewise, the perception of ease of use shows that it directly has a positive and significant effect on the adoption of online banking services. The results also prove the moderating effect of financial literacy on the correlation between predictors and adoption of online banking services. This finding serves to inform managers and policymakers to design effective strategies by capturing customers' desire to use and experience using e-banking during the COVID-19 pandemic and economic globalization.

Keywords

TAM; adoption; digital banking; financial literacy



I. Introduction

The global economy is undergoing a major transformation. Globalization, expansion of global trade, and increasing international competitiveness have resulted in no country being completely isolated from other countries. This results in competition in all fields, including in the field of business or business. On the other hand, the 2019 coronavirus disease (COVID-19) outbreak that hit almost all countries, caused many businesses to be affected and not a few went into bankruptcy.

In order to survive in these conditions, the company must be able to compete wisely. Innovation is a wise way to deal with changes that occur. Entrepreneurs and companies must be able to generate new ideas. They must be able to innovate in order to keep up with the times and technological advances. In facing business competition, there are three main innovations that need to be considered, namely product innovation, service innovation, and technical innovation.

The outbreak of this virus has an impact of a nation and Globally (Ningrum *et al.*, 2020). The presence of Covid-19 as a pandemic certainly has an economic, social and psychological impact on society (Saleh and Mujahiddin, 2020). Covid 19 pandemic caused all efforts not to be as maximal as expected (Sihombing and Nasib, 2020).

The development of digital technology is marked by the ease with which people access the internet. This has a transformational impact in all lines of people's lives, where people are starting to recognize online transactions, online shopping and so on. Consumption and consumer behavior are important factors in society, especially during

COVID-19 in 2020. Digitalization has become a major factor of consumer behavior that has led to a new way of life.

The growth of the Internet in Indonesia has driven e-commerce from 2013 to 2020. The number of e-commerce users in Indonesia increased from 34% of the total population in 2015 to 53% in 2020 (McKinsey, 2020). Indonesian consumers are very receptive to new products in the digital economy sector. The growth of the financial technology product market in Indonesia shows an increasing trend, as evidenced by the increase in transaction value and the number of start-ups (Barata, 2019). The largest digital transactions in Indonesia come from retail (28%), transportation (27%), food orders (20%), e-commerce (15%), and bill payments (7%) (International Trade Administration, 2020).

With the increasing adoption of online services, e-services are becoming more feasible, along with the expansion of supplier reach and network size (Li, Miroso, & Bremer, 2020). The emergence of digitalization through the internet has accelerated the flow of globalization and payment systems from manual to online transactions. The increasing number of internet users in Indonesia is an interesting phenomenon that provides opportunities for banks to provide digital solutions to their customers.

Responding to the prospect of digital technology development in Indonesia, banks have implemented internet-based banking systems in recent years to improve operations and cut costs. Online services are one type of service offering that commercial banks in Indonesia have begun to offer. The online services provided by the bank are internet banking, sms banking, phone banking, mobile banking (Financial Services Authority, 2020). Many bank customers in Indonesia are starting to use online service facilities in banking transactions for convenience and benefit. Banking transactions can be completed anytime and from anywhere.

However, the ease of transacting online opens up opportunities for cybercrime to occur. Especially in the banking world, there are many crimes that are very detrimental to customers, which are currently rife, namely, theft of customer personal data in the form of user IDs, customer account numbers known as phishing crimes, illegal transfers and others. Trust in the bank concerned will undeniably affect the desire of a customer to use the products offered by the bank concerned, as well as the risk factors perceived by the customer greatly affect the desire to use the products of the bank.

Banks as banking service providers must respond wisely in order to gain customer trust to use digital banking products issued by banks. Changing the mindset and perspective of customers to switch to digital banking is a difficult task that requires in-depth study to fully understand customer desires. So that good financial literacy is needed to be able to increase customer desire to adopt banking services through digital.

The TAM model is a way of thinking about how to adopt and use new technologies. It is derived from a psychological theoretical approach to explaining user ideas, attitudes, and interests, as well as user behavior relationships. It is said that if there is an increase in interest it will always increase the adoption of a person to accept the technology. Because of this basis, financial literacy is needed to strengthen the prediction of adoption in this study by asking for perceptions from customers who have used online services. So that it is expected to get suggestions and input from these customers related to improving online services to increase the number of users.

One effort that can be made to find out the cause of the small number of online service users is to evaluate what factors have a significant effect on the adoption of online banking services to maintain the existence of e-banking service products. This study aims to analyze the effect of perceived benefits and perceived ease of use on the adoption of online banking services, either directly or by moderation of financial literacy.

II. Review of Literature

2.1 Basic theory

In various literatures and references to the results of studies in the field of information technology, there have been several models built to examine and understand the elements that influence the acceptance of the use of technology such as Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), and Technology Acceptance Model (TAM).

The theory of planned behavior (TRA) is widely applied to explore individual adoption behavior of information systems. This theory upholds intention to perform behavior based on various consumer attitudes and can be predicted accurately using attitude, social influence, and perceived behavioral control.(Ajzen & Fisbein, 2002). This theory is extended to the Technology Acceptance Model (TAM) to specifically emphasize the critical and contingent factors in predicting the behavior of intention to use technology especially from the consumer's point of view.(Davis, 1989). Two key TAM constructs that influence a person's behavioral intention to use technology are perceived usefulness and ease of use.

This theory has been applied in many studies on consumer adoption of information and communication technology in the Industrial Revolution 4.0, such as mobile phones, e-wallet, and internet banking.(Rahi, Mansour, Alghizzawi, & Alnaser, 2019), as well as virtual technology for online purchase intentions(Chandra & Kumar, 2018). Thus, this study has investigated several constructs of customer desire to adopt e-banking through the TAM dimension. To better understand customer desires, as a moderating variable of e-banking adoption, it is moderated by financial literacy.

In the current era of the Industrial Revolution 4.0, the emergence of e-banking as the preferred mode of transaction in banking in the digital age. The digital marketplace has quickly turned into a mainstream mode of online service due to its convenience and ease of use(Ajmera & Bhatt, 2020). Therefore, banks must understand the importance of measuring customer attitudes towards e-banking in influencing behavioral outcomes, such as intention, retention, and loyalty to repurchase.

For effective e-banking adoption of customer attitudes, banks should consider both (perceived usefulness and perceived ease of use) as factors to intensify consumer intentions. (Chandra & Kumar, 2018). Given in TAM has been theorized to influence behavioral intentions to use technology, while behavioral intentions and facilitating conditions determine technology use. In this study, financial literacy is included to determine customer decision making in adopting the use of technology as a moderating variable.

Thus, this study analyzes perceived usefulness and perceived ease of use to determine customers' desire to adopt online banking services moderated by financial literacy.

2.2 Factors Affecting Online Service Adoption

a. Benefit Perception

Perceived usefulness refers to a person's belief that using the system will improve job performance (Lwoga & Lwoga, 2017). Basically, it describes the user's cognitive expectations about system performance. Therefore, customers believe that using such a system can fulfill their financial and lifestyle needs, in addition to increasing efficiency in conducting various transactions. Moreover, perceived benefits have been shown to show a positive effect on the willingness to use e-payments in uncertain conditions (Liu & Tai,

2016). This utility can add other services to ensure customers enjoy using e-banking as an alternative to transactions, especially to curb the spread of COVID-19.

Previous studies have reported perceived usefulness as a predictor of consumer behavioral intentions (Intarot & Beokhaimook, 2018). The digital infrastructure contributes to the information delivery system, thereby increasing the effect of the perceived usefulness of the system on the intention to use the technology. Thus, the following hypothesis is proposed:

Hypothesis 1 (H1). Perceived benefits have a significant positive effect on the desire to adopt online banking services.

b. Perception of Ease of Use

The main determinant of user attitudes and behavioral intentions to accept and use technology is perceived ease of use (Chawla & Joshi, 2020). It is evident that perceived ease of use is important in influencing consumer intention to purchase. As a result, previous purchase experience may influence customers' perceptions of ease of use regarding e-banking. Therefore, perceived ease of use reflects the ease of using technology to access online (Grover, Kar, Janssen, & Ilavarasan, 2019).

The use of technology is more profitable for online users; In other words, the easier application of technology will make it the preferred method for consumers to conduct banking transactions. Thus, the following hypothesis is proposed:

Hypothesis 2 (H2): Perceived ease of use has a significant positive effect on customers' willingness to adopt online banking services.

c. Online Service Adoption

Adoption is described as acceptance and willingness to continue using a product (Abu-Assi, Al-Dmour, & Zu'bi, 2014). Knowledge, persuasion, choice, execution, and confirmation are all steps in the adoption process. Before the customer is ready to adopt a product or service, the consumer goes through a process of learning, persuasion, decision, and confirmation.

Before deciding whether to accept (adopt) or reject an invention, potential adopters go through a series of steps. If a person has to carry out the behavior to be decided, his attitude or behavior is his positive or negative feeling (Davis, 1989). The perceived usefulness (PU) and perceived ease of use (PEU) of a technology or system influence a person's attitude towards using/adopting it (PEOU). TAM claims that when consumers are introduced to a new technology, they consider various criteria when deciding how and when to use it.

Individual or group decision making is initially examined from a knowledge perspective to build attitudes towards the innovation, make an acceptance or rejection decision, generate a concept for adoption, and confirm the decision taken. (Abu-Assi, Al-Dmour, & Zu'bi, 2014).

The quality of a new product can affect how quickly it is adopted. If a product has relative benefits or can be described as different from other products, the product will be easily accepted. The behavior will be long term if new acceptance or adoption is based on information, awareness, and good attitude (Suryani, 2017).

Customers obtain information and electronic transactions when using online services. Customer acceptance of digital services who will use them is referred to as online service adoption (Al-Fahim, 2013). In the TAM model, the word adoption is not used but the term 'Actual System Use' is used, namely the use of the system, but in this study, the adoption of

online services is intended as the use of an online banking service system or digital banking.

d. Financial Literacy

Financial literacy is the ability to read, analyze, manage, and communicate about personal financial conditions that affect material well-being (Anderson, Kent, Lyter, Siegenthaler, & Ward, 2000). It involves the ability to make sound financial judgments, discuss money and financial matters without being inconvenient (or even inconvenient), prepare for the future, and respond skillfully to life events that affect day-to-day financial decisions.

Cutler and Devlin (1996) imply financial literacy as a dimension of knowledge and trust. Financial literacy is a function of the financial information that a person can access to get people to improve their financial behavior is by first providing them with information that they can then use to confidently engage in the desired behavior.(Cutler & Devlin, 1996). The combination of financial literacy is financial knowledge, financial attitudes, and financial behavior(Atkinson & Messy, 2012).

Hypothesis 3 (H3). Financial literacy has a significant positive effect on the effect of perceived benefits on the desire to adopt online banking services.

Hypothesis 4 (H2): Financial literacy has a significant positive effect on the effect of perceived ease of use on customers' desire to adopt online banking services.

III. Research Method

3.1 Data Collection and Sample Design

This quantitative research was conducted once in a period (single cross sectional design) using a google form survey for data collection. Questionnaires were socialized from April to July 2021 to bank customers in Indonesia who have used online services to conduct banking transactions. There were 100 responses to the questionnaire that were eligible for statistical analysis. Google forms are used because they are a practical sampling method for carrying out data collection (Akbar, 2020), especially in the conditions of the COVID-19 pandemic.

3.2 Measurement Scale

All scale items for this study were derived from previously validated instruments. The three items in the perceived benefit variable are taken from (Gefen, Karahanna, & Straub, 2013; Yahyapour, 2008) with indicators of increasing productivity, making work more effective and work faster. While the four items in the perceived ease of use variable are taken from (Davis, 1989) with indicators easy to learn, flexible, can control the work, easy to use. Furthermore, the three items in the adoption variable are obtained from (Abu-Assi, Al-Dmour, & Zu'bi, 2014) with indicators of knowledge of a system, trust in a system, a positive attitude towards a system. While the three items in the financial literacy variable are taken from (Atkinson & Messy, 2012) with indicators of financial knowledge, financial attitudes, and financial behavior.

3.3 Data Analysis Method

Quantitative analysis uses Partial Least Square (PLS-SEM) to estimate a complex causal relationship model with latent variables. The contrast variance-based approach to structural equation modeling was found to be suitable for assessing construction sequences

and complex conceptual models with moderating effects. The PLS-SEM technique through WarpPLS is used to test the hypotheses (H1-H4) proposed in the research model.

IV. Results and Discussion

4.1 Results

a. Demographic Characteristics

Table 1 shows the demographic profile of the respondents in this study. Characteristics of respondents who participated in filling out a google form with a profile composition based on gender, age or age, occupation, bank, type of digital banking product, and frequency of use of online services in 1 week. Of the 100 respondents there are respondents with male gender (63%) more than women (37%). Most of the respondents were 20 to 30 years old (49%), followed by 31 to 40 years old (44%). Respondents are dominated by work as employees or employees (53%). The banks used by the respondents were BCA (38%), Bank Mandiri (27%), BRI (21%) and BNI (14%). Meanwhile, the most widely used online service or digital banking product is mobile banking (86%).

Table 1. Characteristics of Respondents

Respondent Profile	Frequency (n)
Gender	
Man	63
Woman	37
Age	
Under 20 years	2
20 to 30 years	49
31 to 40 years old	44
41 to 50 years old	4
over 50 years	1
Work	
Student	7
entrepreneur	38
Employee/Employee	53
Other	2
Bank	
BNI	14
BCA	38
Mandiri Bank	27
BRI	21
Types of Digital Banking Products	
Mobile banking	86
Internet banking	12
Cash Management System	2
Frequency of Using Online Services in 1 week	
under 3 times	14
3 to 5 times	15
6 to 10 times	36
More than 10 times	35

b. Partial Least Square Analysis

1. Evaluation of the Measurement Model (Outer Model)

The measurement model includes the evaluation of construct reliability, indicator reliability, convergent validity, and construct discriminant validity. Construct reliability was determined using composite reliability (CR) and Cronbach's alpha (CA). The criterion is that the CR value must exceed 0.60 to indicate adequate construction reliability (Nunnally, 1978). The results of the measurement model, as tabulated in Table 2, show that the obtained CR value for now is greater than 0.60, thus confirming the adequate reliability of the construct. Furthermore, the reliability of the indicator is assessed through CA, where the CA value must be higher than 0.60(Nunnally, 1978). Therefore, the CA for all factors in this study is acceptable.

Convergent validity of the constructs was determined using the average extracted variance (AVE), which should exceed 0.50(Fornell & Lacker, 1981). Since the results revealed that all constructs had a substantial AVE, the convergent validity of the constructs for this study was verified. The CA, CR, and AVE values are depicted in Table 2.

Table 2. Outer Model

Construct/Variable	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)	Items (Indicators)	Outer loading
Perception of Benefits (X1)	0.884	0.929	0.813	X1.1	0.912
				X1.2	0.935
				X1.3	0.856
Perceived Ease of Use (X2)	0.898	0.929	0.767	X2.1	0.889
				X2.2	0.821
				X2.3	0.889
				X2.4	0.903
Online Banking Service Adoption (Y1)	0.810	0.888	0.725	Y1	0.860
				Y2	0.835
				Y3	0.859
Financial Literacy (Y2)	0.926	0.953	0.871	Z1	0.907
				Z2	0.961
				Z3	0.932

Source: WarpPLS output (processed data)

Assessment of the measurement model includes evaluating the discriminant construct validity based on outer loading with a valid loading factor value above 0.70(Hair, Black, Babin, & Anderson, 2008). The results of the factor loading given in Table 2 indicate adequate discriminant validity of the measurements. Therefore, this study confirmed the discriminant validity of the constructs.

2. Evaluation of the Structural Model (Inner Model)

The results of the structural model shown in Figure 1 reveal that the causal relationship between perceived benefits and ease of use is directly related to the adoption of online banking services during the COVID-19 pandemic. In addition, the moderating effect of financial literacy is expected to strengthen the effect between exogenous and endogenous variables.

The results of the evaluation of the structural model show that the predictive relevance of the model can verify the integration of predictors towards the adoption of online banking services. This indicates that the customer's desire to adopt online banking services is quite large. In addition, all exogenous showed a substantial degree of predictive relevance to the endogenous variables.

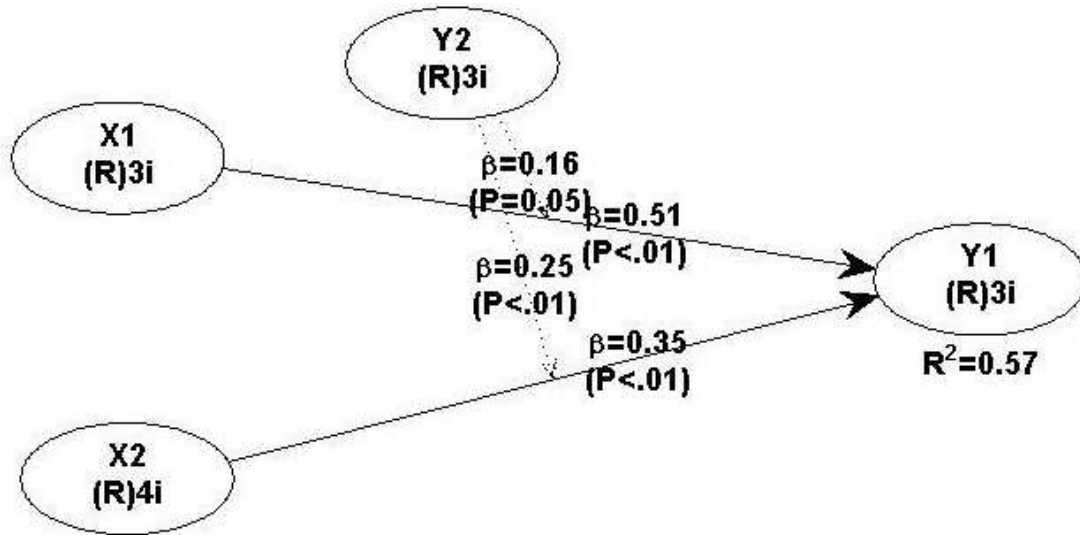


Figure 1. Structural Model

The structural model obtained in Figure 1 shows a significant effect if the p-value < 0.05 , and vice versa does not provide a significant effect if the p-value > 0.05 . Perceptions of benefits and ease of use have a positive and significant effect on the adoption of online banking services directly, with contributions of 0.51 and 0.35 with p-value < 0.01 . This means that directly perceived benefits and perceived ease of use can have a significant influence on customer adoption of online banking services.

Likewise, the moderating effect of financial literacy in strengthening perceptions of benefits and ease of use with a significant effect on creating customer desire to adopt online services. The contribution of financial literacy moderation effect to 0.16 (p-value = 0.05) and 0.25 (p-value < 0.01). This shows that financial literacy will strengthen customers' desire to adopt online banking services.

Furthermore, the results of the effect size in this study are tabulated in Table 3 which shows that all constructs in this study have a large enough value to see the size of the effect on the customer's desire to adopt online banking services. R2 (R-square) is used to measure the level of variation of changes in the independent variable to the dependent variable. The predictive relevance of the model was calculated collectively by Q2 (Q-square), including all factors and at the individual level (single factor).

Table 3. Inner Model

Variable	R2	Q2
X1 Benefit Perception	-	-
X2 Perception of Ease of Use	-	-
Y1 Adoption of Online Banking Services	0.570	0.763
Y2 Financial Literacy	-	-

The value of R2 on the construct of online banking service adoption is 0.570 or 57%. This means that the proportion of endogenous variables (Adoption of Online Banking Services) that can be explained by exogenous variables (Perception of Benefits and Ease of Use) is 57%, the remaining 43% is influenced by other factors not included in this research model.

Likewise, the value of Q2>0 indicates that the inner model has predictive relevance. The value of Q2 on the construct of online banking service adoption is 0.763. The predictive capability of the model in this study is quite strong because all constructs have a Q2 value above 0.35(Ghozali, 2015).

c. Hypothesis Test

From the Partial Least Square analysis, table 3 can be obtained answers to the four hypotheses proposed in this study. All hypotheses were accepted as indicated by the p-value <0.05.

Table 4. Hypothesis Test Results

Hypothesis	Path	coefficients	p-value	Results
H1	X1 -> Y1	0.507	<0.001	Accepted
H2	X2 -> Y1	0.350	<0.001	Accepted
H3	X1*Y2 -> Y1	0.161	0.048	Accepted
H4	X2*Y2 -> Y1	0.248	0.005	Accepted

4.2 Discussion

This study explores the factors that influence the adoption of online banking or digital banking services with financial literacy moderating factors. From the results of data analysis verifying the significant positive effect shown by the perceived benefits of customers will foster a desire to adopt online banking services (H1). It is important to intensify customers' intention to use online services by providing more information about values and attitudes to create a positive mindset. As a result, consumers will consider online services as a useful option for transacting through banks and even in the future.

Perceived ease of use has a positive and significant relationship with customers' desire to adopt online banking services (H2). The desire to adopt these digital services is determined by consumers' perceptions of perceived ease of use of technology. This supports the findings (Chawla & Joshi, 2020). These findings suggest that banks should focus on the latest technologies that enable users to conduct transactions effectively and efficiently. This savings in time, cost, and ease of use will help in increasing benefits, because online banking services are considered easy to use by customers.

Financial literacy was found to have a positive and significant moderating effect on online service adoption. This study supports the findings (Lim, Ahmad, & Talib, 2019), which states that the adoption of online services is determined by the consumer's intention to use them. Thus, consumer intentions will provide understanding and knowledge about this cheaper, faster, and easier way through online transactions. This study supports the findings (Choi & Sun, 2016) it shows that the convenient use of online services has triggered customers to use them as an online transaction tool.

This research supports previous research (Cutler & Devlin, 1996) which revealed that financial literacy showed partial moderation to strengthen the relationship between predictors and adoption of online banking services (H3 and H4). Therefore, providing

knowledge to customers related to digital banking content will encourage customers to adopt online banking services.

V. Conclusion

From the results of hypothesis testing, it can then be concluded that the benefits that will be obtained by customers by using online services through their optimal features will be able to create customer desires to adopt online services. The customer's desire to use online services also depends on the ease with which customers use them. The easier it is for customers to operate the digital banking service, the more customers will want to adopt the service.

The role of financial literacy is considered important in determining the customer's desire to adopt online services. The ability of banks to provide good financial literacy to their customers can strengthen customers' desire to become users of digital banking services. This shows the high desire of customers which shows a strong tendency for customers to adopt online services either directly or moderated by financial literacy.

Recommendations

Based on some evidence of data analysis in this study, research findings are obtained that can recommend policy implications as input for banks. Some alternative suggestions that can be given are:

- a. With various restrictions on people's interactions and physical activities during the COVID-19 pandemic, it requires banks to provide solutions and convenience for customers to transact as a new form of adaptation by increasing productivity of online service technology through features that can provide positive benefits for customers and make customer work more effective and faster.
- b. Providing attractive promotional offers in transactions with online services, for example at low costs compared to conventional transactions or other programs that can increase customer desire to use them so as to motivate other customers to use online services.
- c. Build a user friendly online service system, a network friendly application system so that the operation is easy to learn and use, flexible and can control the work of online service users.
- d. Bank officers must foster customer interest in using online services by providing good financial literacy to customers. Banks need to provide clear and accurate information to increase customer knowledge of the online service system in the bank, increase customer confidence in the security of using it, and instill a positive attitude in order to adopt online services. This is because financial literacy can strengthen customers' desire to adopt online services.

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