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Research Article

Extending the Technology Acceptance Model for the Use of Online Health Applications in the Era of the Covid-19 Pandemic

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ABSTRACT

The Covid-19 pandemic has changed people's behavior in getting health services to switch to online ones. The study examines the extending of the Technology Acceptance Model (TAM) in using health applications. TAM is no longer relevant to be applied on the specific application studies. The carried out expansion adds the variables of social influence, feelings of anxiety, and availability of services in developing attitudes to influence behavioral intentions. Data collected using online questionnaires for users of the Halodoc application as many as 200 respondents. The results of hypothesis testing using the Structural Equation Modeling analysis with the AMOS method show that attitudes are the determinants in forming behavioral intentions. They are influenced by useful perception, ease of perception, social influence, and service availability, but not by the feelings of anxiety. The results indicate that individuals perceive Halodoc as providing benefits, easy to use, influencing environment, and well-available services. Therefore, it can ignore the anxiety by using the Halodoc application during the Covid 19 pandemic to get health services.

Keywords: *Behavioral Intentions, Attitudes, Useful Perception, Ease of Perception, Social Influence, Anxiety Feeling, Service Availability.*

Introduction

The Covid-19 pandemic has transformed the people behavior in obtaining health services. The transmission of Covid-19 through droplets from a person to others has an impact on individuals to be alert. One of the vigilances that individuals do is to get online health facilities from home. The online health application offers online doctor consultation, drug delivery, and on-demand laboratory tests. The online health service innovation is held through the use of information and communication technology in providing health information and education to the public. It can minimize the spread of Covid-19 (cnbcIndonesia, 2020). Consultations between doctors and users are carried out using the video call and voice call features. Nevertheless, negative reviews are found on this health application, including loss of privacy, services that are

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considered incomplete, and doctors providing poor services. Thus, it is necessary to study the behavior of using health applications to evaluate the system improvements.

The study uses the basic model of the Technology Acceptance Model (TAM) (Davis et al., 1989). This model explains two main variables, those are useful perception and ease of perception. However, previous studies explained that TAM is irrelevant to be applied to studies using new applications (Kucukusta et al., 2015; Klingberget al., 2020; Kamal et al., 2020). This is due to the lack of explanatory and limited predictive power and the practical value of TAM for testing new applications (Klingberg et al., 2020). The application of TAM to test new applications should be integrated into a broader model. It will include variables such as human and social change processes, as well as the adoption of innovati on models to predict determinant antecedents and adjust them to various technological contexts (Kucukusta, 2015; Klingberg et al., 2020). The extending of TAM with additional constructs is considered to be able to capture other explanatory factors in working on individual intentions to behave using information system technology

TAM in the context of the use of certain applications also has weaknesses such as the adoption of telemedicine services (Kamal et al., 2020). The weakness is that TAM cannot explain the role of social interaction in the acceptance of new technologies in developing countries (Kamal et al., 2020). For that it is necessary to modify it by adding social factors such as social relationships, feelings of anxiety, and availability of services in defining the formation of individual behavioral intentions in using online health applications for TAM weakness (Kamal et al., 2020; Askari et al., 2020; Sezgin et al., 2020). The social influences of individuals closest environment in developing countries are able to have an effect on individuals' positive attitudes towards online health applications (Rana et al., 2016; Mhina et al., 2019). This is because individuals need to evaluate the application based on the experiences of other individuals who have used the information systems first. Modification of TAM is also conducted by proposing a variable feeling of anxiety which is the awareness of individuals against threats from the applications that can result to negative attitudes (Rana et al., 2016). The last variable in modifying TAM is by proposing service availability variables in providing support for the use of applications that can increase individual positive attitudes to form new technology acceptance (Mhina et al., 2019).

Literature Review

Technology Acceptance Model (TAM)

Technology Acceptance Model (TAM) is a model developed to examine the use of information technology (Davis et al., 1989). This model uses the attitude construct to explain the intention to use in a better way. The theory was developed by Davis et al. (1989) which is based on two previous models, those are Theory of Reasoned Action (TRA) by Ajzen and Fishbein (1980) and Theory of Planned Behavior (TPB) by Ajzen (1985). The limitation of TRA and TPB in the application of the use of information systems is that they can only explain behavior that is voluntary in nature and already has experience of use. The limitation becomes the basis for developing TAM in the application of the use of information systems. It proposes two main constructs, those are usefulness perception and ease of perception in assessing obligatory behavior (Davis et al., 1989). As a research model, TAM is a 'robush' model in defining the acceptance of technology in various research objects.

Yet, TAM has weaknesses in its application including the uncontrolled user behavior. It has not explained trust in the use of information systems, and it is only applied to one information system (Venkatesh et al., 2003). With the weakness in the use of TAM as a basic model, it is necessary to develop it by making modifications that are adapted to the object of the research.

Behavioral intention

The basic concept of intention is explained as an individual's tendency based on his judgment to perform a particular behavior (Mobley

et al., 1978). Intention is also outlined as an individual's motivation that reflects his desire to behave that leads to certain actions (Unal et al., 2011; Yuzhanin and Fisher, 2016). The study uses an online health application research object. Behavioral intention to use health applications which is interpreted as an individual's desire to continually access and interact with health applications as well as using it is the goal of this study (Deng et al., 2018). The behavioral intentions maker to use the application are influenced by attitudes (Tran 2016; ALsswey et al., 2018; Askari et al., 2020). Attitude as a mediating variable is influenced by perceived usefulness, perceived ease of use, social influence, feelings of anxiety, and service availability (Mhina et al., 2019; Askari et al, 2020; Sezgin et al., 2018; Kamal et al., 2020).

Attitude toward using

Attitude is outlined as an individual evaluation that builds feelings in accepting or rejecting an object (Fishbein and Ajzen, 1975). Another study states that it is an individual's feeling of liking or disliking an object that leads to behavior (Lam et al., 2007). Attitude is an individual's overall assesment of an object (Chan et al., 2017). Previous studies found that consistent results of the attitudes effected on behavioral intentions (Rana el al., 2015; Guo et al., 2015; Wang et al., 2018). The high attitude has an influence on the individual's positive assessment of applications that are felt to provide benefits for users to continue using them (Liaw and Huang, 2003; Rana et al., 2015). Individuals who give a positive evaluation of the benefits of online health applications can encourage their intention to use them (Guo et al., 2015). They who experience many benefits in mHealth services will change their desire to continue using them (Wang et al., 2018). Therefore the proposed hypothesis is:

H_1: The higher positive attitude, the higher the behavioral intention to use the Halodoc application.

Useful perception

Perceived usefulness is explained as the extent to which individuals believe that using a technology will escalate their job performance (Davis et al., 1989; Wang et al., 2014). Useful perception in implementing the health applications is defined as an individual's belief that the use of online health services provides benefits in improving health conditions and quality of life through cheap, easy and fast health information (Deng et al., 2018; Kamal et al., 2020). Useful perception has a positive effect on attitudes that lead to the use of health applications. Individuals get benefit from online health applications that provide health information and physician consulting services. It makes their better condition (Shareef et al., 2014; ALsswey et al., 2018). Useful perception positively affects individual attitudes towards online health applications because the more perceived benefits made. It will make individuals interested in continuing to use online health applications (Klingberget al., 2020). Thus the proposed hypothesis is.

H_2: Useful perception has a positive effect on attitudes to using the Halodoc application.

Ease of perception

Ease of perception is explained as the extent to which individuals believe that using a technology will be free of effort (Davis el al., 1989). The ease of perception in its development is defined as the individual's perception that information technology can be used without the help of other individuals and it is free from more physical effort (Holden and Karsh, 2010; Wang et al., 2014). The application in the use of health applications indicates a strong influence of the ease of perception of attitude (Yusliza and Ramayah., 2012; Raza et al., 2017; ALsswey et al., 2018). Users of health applications perceive the effectiveness of its simple use in the consultation and treatment process provides convenience and speed of real time services (Yusliza and Ramayah, 2012, Zhao et al., 2018). Online health applications are perceived as it is easy to learn with a simple and clear application design that has an effect on increasing individual positive attitudes (Raza et al., 2017; ALsswey et al., 2018). Then the proposed hypothesis is:

H_3: Ease of perception has a positive effect on attitudes for the use of the Halodoc application.

Social influence

The extent to which individuals trust what other individuals, especially family, and close friends believe in using the new system is called as Social influence (Venkatesh et al., 2003). It is also defined as the role of most people in influencing others to use a system (Zhang et al., 2013; Cajita et al., 2017; Ndayizigamiye et al., 2020). It is gotten from other individuals who have experience to use of the relatively new health applications significantly and influences positive attitudes to accept certain health applications (Yusliza and Ramayah 2012; Li, 2013). Individuals need to asses based on the experience of other individuals who are professionals in using the information systems. This will have an influence on a positive attitude to use it (Rana et al., 2016; Ponce et al., 2017; Ojo et al., 2019). Then the proposed hypothesis is:

H_4: Social influence has a positive effect on attitudes to use the Halodoc application.

Anxiety feeling

Individual fear when he has to use of a system is called anxiety feeling (Simonson et al., 1987). This anxiety is an emotional aspect of the use and negative affective reactions in using information technology (Tsai et al., 2019). In the application related to information system, the feeling of anxiety is explained as an emotional condition in the form of individuals fear when they have to use an information system (Venkatesh et al., 2003; Rana et al., 2016). Anxiety about the information systems is due to the inability or lack of confidence of individuals in using information systems effectively. This causes low attitudes towards information systems (Tsai et al., 2019; Meng et al., 2020). The positive attitudes of users will be gained as the routine usage of information system and results to lower the anxiety (Werner and Karnieli, 2003; Rana et al., 2016). Related to the use of health applications, anxiety can be in the form of a fear of losing privacy because individuals feel that they cannot control all activities carried out on these online health application services. (Askari et al., 2020). Hence, this explanation means that individuals who have high feelings of anxiety about the use of online health applications tend to give negative evaluations.

H_5: Feelings of anxiety have a negative effect on attitudes to using the Halodoc application.

Service availability

Availability of services in the application of information systems is how the environment and equipment are considered capable of providing broad and timely connections to support the use of a system (Venkatesh et al., 2003; Hong and Kar, 2006; Wu et al., 2011). It has a strong role in forming individual attitudes towards the use of health applications. Relevant and effective sevices in the use of online health applications will lead to positive evaluation (Gulliford et al., 2002; Ayoet al., 2016). This means that individuals need adequate support in the use of online health applications and it increases positive attitudes to be able to continue using them (Mhina et al., 2019). Based on this statement, it can be concluded that services that can support the use of a system make individuals accept to use a system.

H_6: Service availability has a positive effect on attitudes to using the Halodoc application.

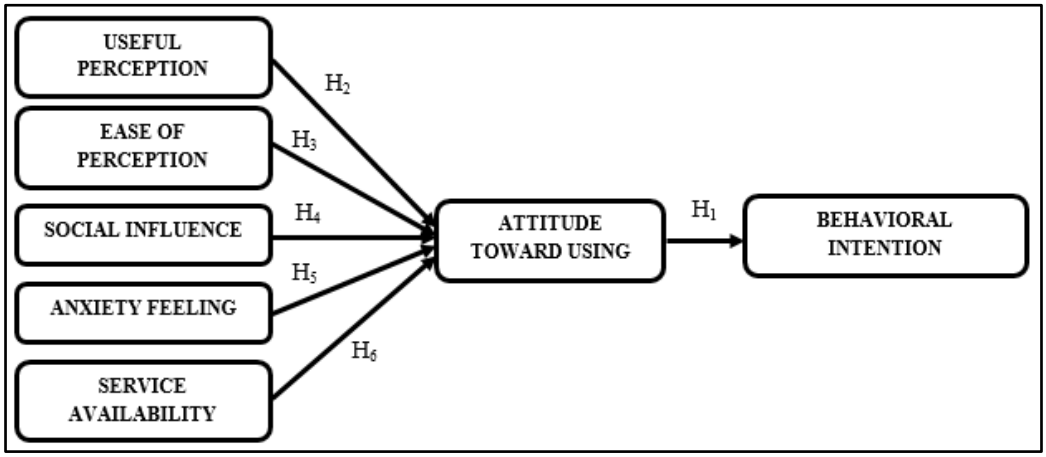

Figure 1. Research Model

Research Methods

This study is a causal study that evaluates the relationship between variables that affect the intention to use online applications. The sampling technique used in this study was non-probability sampling because there were unequal opportunities to select individuals in the large Indonesian population to be the sample. In this study, the sample is the the society who use the Halodoc application. The sampling technique used is a purposive sampling with 200 respondents. The study uses a survey technique in the form of a questionnaire to collect respondent data. The tool used for data collection is a questionnaire through self-filling with closed questions based on a 5-point Likert scale coding technique. The questionnaire items were adopted from the literature (see table 1). Questionnaire questions and answers are in Indonesian. The measuring instrument in this study uses the validity test and the reliability test uses the SPSS program. The hypothesis testing uses Structural Equation Model (SEM) analysis with the AMOS program.

Table 1. Variable Indicators, Validity Test Results, and Reliability

Variables	Indicators	Factor Loading	Cronbach Alpha Minimal = 0,60	Information
Behavioral Intention (Gardner dan Amoroso., 2004; Dou et al., 2017; Sezgin et al., 2018)	1. I intend to use the Halodoc application (INT1)	0,711	0,936	Valid and Reliable
	2. I would estimate to use the Halodoc app (INT2)	0,763		Valid and Reliable
	3. I plan to use the Halodoc app (INT3)	0,853		Valid and Reliable
	4. I will continue to use the Halodoc application in the future (INT3)	0,824		Valid and Reliable
Attitude toward Using (Guo et al., 2015; Al-Emran et al., 2016)	1. Using the Halodoc app is a good idea (ATT1)	0,774	0,949	Valid and Reliable
	2. Using the Halodoc app is fun (ATT3)	0,699		Valid and Reliable
	3. Using the Halodoc app is useful (ATT4)	0,711		Valid and Reliable
		0,726		Valid and Reliable

Variables	Indicators	Factor Loading	Cronbach Alpha Minimal = 0,60	Information
	4. Using the Halodoc application helps to access health services (ATT5)			
Useful Percption (Edmuns et al., 2010; Becker 2016; Kamal et al., 2020)	1. Using the Halodoc app makes life more effective (PU1)	0,715		Valid and Reliable
	2. Halodoc application can provide the information needed (PU2)	0,706		Valid and Reliable
	3. Using the Halodoc application can improve for the better life (PU3)	0,776		Valid and Reliable
	4. The Halodoc application can provide fast health service information (PU4)	0,820		Valid and Reliable
	5. Halodoc application can provide useful information (PU5)	0,660		Valid and Reliable
	6. Halodoc application can provide timely information (PU6)	0,690		Valid and Reliable
	7. Halodoc application can improve access to health services (PU7)	0,684	0,912	Valid and Reliable
	8. Using Halodoc application is useful in daily routine (PU8)	0,505		Valid and Reliable
Ease of Perception (Wang et al., 2014; Becker., 2016; Klingberg et al.,2020)	1. It is easy to use Halodoc app (PEOU1)	0,776		Valid and Reliable
	2. It is easy to get health information through the Halodoc application (PEOU2)	0,823		Valid and Reliable
	3. It is easy to get benefits from the Halodoc application (PEOU3)	0,701		Valid and Reliable
	4. Using the Halodoc application is not difficult (PEOU4)	0,817		Valid and Reliable
	5. Halodoc application is easy to operate (PEOU5)	0,776		Valid and Reliable
	6. Halodoc application is interactive, clear and easy to understand (PEOU6)	0,677	0,920	Valid and Reliable

Variables	Indicators	Factor Loading	Cronbach Alpha Minimal = 0,60	Information
Social Influence (Chang et al., 2017; Hoque dan Sorwar, 2017; Alam et al., 2020)	1. Friends influence to use the Halodoc application (SI1)	0,857	0,925	Valid and Reliable
	2. Friends help to understand using Halodoc(SI2)	0,894		Valid and Reliable
	3. Relatives support the use of the Halodoc application on a daily basis (SI3)	0,827		Valid and Reliable
	4. Other individuals suggest having to use the Halodoc app (SI4)	0,842		Valid and Reliable
Anxiety Feeling (Rana et al., 2016; Meng et al., 2020)	1. Fear of pressing the wrong button on the Halodoc app (ANX2)	0,625	0,859	Valid and Reliable
	2. Fear of making a fatal mistake on using the Halodoc application (ANX3)	0,781		Valid and Reliable
	3. Halodoc app is scary(ANX4)	0,763		Valid and Reliable
	4. Halodoc app makes nervous (ANX5)	0,810		Valid and Reliable
	5. Halodoc app makes anxiousity(ANX6)	0,793		Valid and Reliable
	6. Halodoc application makes uncomfortable (ANX7)	0,658		Valid and Reliable
	7. Using the Halodoc application is not easy (ANX8)	0,614		Valid and Reliable
Service Availability (Hong dan Kar., 2006; Wu et al., 2011; Askari et al., 220)	1. Halodoc application can be used anytime and anywhere (SA1)	0,845	0,918	Valid and Reliable
	2. Halodoc application is easy to access (SA2)	0,822		Valid and Reliable
	3. Halodoc application is available whenever it is needed (SA3)	0,819		Valid and Reliable

The test results on the thirty-six questions of the questionnaire items are valid with a factor loading value of more than 0.40 and there is no double value. There are three questionnaire items that are omitted, those are ATT2, SI5, and AXT1 which are invalid because the loading factor is smaller than 0.40 and has a double value (cross loading). Reliability testing using the Cronbach Alpha (α) method and the alpha coefficient value must be greater than 0.6. Based on the results of this study, the reliability value is more than 0.6. Thus it can be concluded that all questionnaire items are reliable to be used for data collection.

Table 2. Characteristics of Respondents

Characteristics	Classification	%	Characteristics	Classification	%
Sex	Male	41.5%	Monthly Income (IDR)	≤ 1 million	35.5%
	Female	58.5%		1 – 2 million	43.5%
Age (year)	<20yo	19.0%		2 – 3 million	12.5%
	21-30yo	79.5%		3 – 4 million	3.0%
	31-40yo	1.5%		>4 million	5.5%
Last Education	High School / Vocational High School/ Equivalent	63.5%	Domicile	Java	62.0%
	Diploma 3/ Diploma 4	18.5%		Sulawesi	36.0%
	Undergraduate	16.0%		Papua	1.5%
	Postgraduate	2.0%		Kalimantan	0.5%
Occupation	Student / Higher Education Student	75.0%	Frequency of Use	Once	23.5%
	Indonesian Military / Indonesian Police	2.0%		Twice	14.5%
	Civil Servant	3.0%		>twice	62.0%
	Leturer	0.5%			
	Private Sector Employee	16.0%			
	Businessman	2.5%			
	Teacher	0.5%			
	Others	0.5%			

Analysis Results

Hypothesis testing is performed by analyzing the causal relationship (causality) between variables with a model based on the value of its critical ratio (c.r). If the direction of the relationship is in accordance with the research hypothesis and supported by the c.r value that meets the requirements, it can be concluded that the hypothesis is supported. The results of hypothesis testing using SEM analysis with the AMOS application are showed the results in Figure 2 and Table 3.

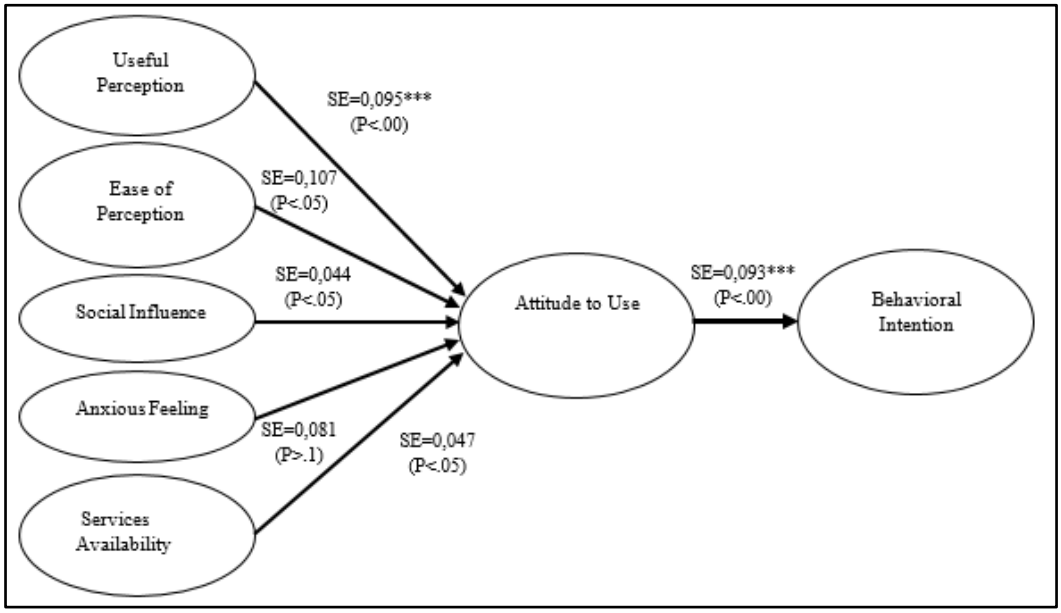

Figure 2. Hypothesis Test Results

Table 3. Hypothesis Test Results

Hypothesis	Estimate	S.E	C.R	P	Information
Attitude→Behavioral Intention	0,905	0,093	9,777	***	H1 Supported
Useful Perception→Attitude	0,499	0,095	5,261	***	H2 Supported
Ease of Perception→Attitude	0,268	0,107	2,516	0,012	H3 Supported
Soial influence→Attitude	0,088	0,044	2,027	0,043	H4 Supported
Anxious Feeling→Attitude	-0,005	0,081	-0,056	0,955	H5 Not Supported
Services Availability →Attitude	0,094	0,047	1,980	0,048	H6 Supported

Discussion

The test shows that there is a strong influence of attitude on behavioral intention. These results provide an explanation that evaluation of the benefits provided by online health applications that are considered positive can encourage individuals to use online health applications (Goyal et al., 2013; Guo et al., 2015). Individuals feel many benefits in mHealth services so that individuals will change a positive attitude into an intention to use mHealth services (Wang et al., 2018). This is because when individuals perceive the quality of mHealth services as having high quality, individuals tend to give good evaluations to continue using mHealth services (Guo et al., 2020).

The main constructs of TAM are the useful perceived and ease of perception that effect on individuals' positive attitudes towards online health services which are relevant to previous studies. The perceived usefulness after using an online health application can have an impact on an individual's positive evaluation of continuing to use it (Shareef et al., 2014). The same result was revealed by ALsswey et al (2018) who states that perceived usefulness significantly affects attitudes towards the use of mobile health applications. The perceived usefulness positively affects individual attitudes towards the online health applications due to the many perceived benefits that make individuals interested in continuing to use online health applications (Klingberget al., 2020). The second main construct of TAM, namely the perceived ease of use is also able to give an influence on increasing positive attitudes towards online health services (Yusliza and Ramayah, 2012; ALsswey et al., 2018; Klingberget al., 2020). This is because of the use of E-HRM technology which can be easily learned and felt to

assist individuals in using technology effectively and efficiently to continue using the application (Yusliza and Ramayah, 2012; Raza et al., 2017). Mobile health applications with simple, clear, and low-difficulty application designs will improve individual attitudes to use the applications (ALsswey et al., 2018; Klingberg et al., 2020).

The extending of TAM in this study proposes a construct of social influence and service availability which shows a strong influence on positive attitudes to continue the intend to use health applications. Individual encouragement to other experienced individuals can influence the individual's positive attitude in developing the individual's intention to continue using it (Rana et al., 2016; Ponce et al., 2017; Ojo et al., 2019). Another study by Klingberg et al. (2020) found that social influence has a positive relationship to attitudes due to the influence of other individuals who have used information systems in providing a positive assessment of continuing to use the application. The availability of services that are relevant and effective in their utilization will make individuals conduct positive evaluations for using health applications (Gulliford et al., 2002; Ayo et al., 2016). The support for adequate service availability in the use of applications can increase positive attitudes to use health applications (Mhina et al., 2019).

The surprising result is that there is no effect of feelings of anxiety on individual attitudes in the use of health applications. Feelings of anxiety in using health applications make individuals feel a loss of privacy and the spread of personal data which causes the individual to be unable to control all activities carried out by using health applications (Rana et al., 2016; Askari et al., 2020). Feelings of anxiety tend to decrease when the individual using the application has become a routine and a need and this has an impact on the positive attitude of the user (Werner and Karnieli, 2003). The results of the study are relevant to the current situation of the Covid-19 pandemic. People have a reluctance to get health services at available health facilities such as clinics and hospitals. The use of health applications during the Covid-19 pandemic is an individual choice to continue using in order to reduce mobility outside the home and to reduce the spread of the Covid-19 virus. As a result individuals ignore the feelings of anxiety that they get when using health applications.

Conclusions and Implications

The study was conducted to examine the determinants factors of intention using the Halodoc application. The test results found that attitude is a strong factor in developing behavioral intentions using the Halodoc application. Attitude as a mediating variable is influenced by perceivedusefulness, perceived ease of use, social influence, and service availability but not the feelings of anxiety. These results mean that behavioral intentions to use online health applications are formed by a positive attitude based on individual perceptions, the usefulness of the applications used, the ease of using the application, the encouragement from the surrounding environment and the availability of complete features in the application by ignoring the anxiety in use.

Halodoc application service providers should improve the usability of the application, provide the ease of use, and provide relevant services according to the needs of its users. Social media has an important role in informing the benefits and the ease of Halodoc application services to interact with its users. Consequently it can influence the user to continue to use it. More active interaction on social media will make users feel comfortable and it will increase the number of Halodoc users to continue using the application.

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