
Telemedicine Adoption during Pandemic Covid19 in Indonesia

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Abstract

This research will investigate adoption of telemedicine in Indonesia during pandemic COVID-19 by modifying Unified Theory of Acceptance and Use of Technology (UTAUT). Variables used in this research are performance expectancy, effort expectancy, social influence, attitude and facilitating conditions as moderating variables that use to analyze use behavior of telemedicine in Indonesia. The survey conducted on 317 telemedicine user in Indonesia and analysis using moderated regression analysis. Based on the results of data analysis, as many as 4 hypotheses were rejected while only three were accepted. The accepted hypotheses state that performance expectation and attitude, as well as the moderating effect of facilitating conditions, have an impact on the influence of social influence on telemedicine usage behavior. Meanwhile, the rejected hypotheses are those which state that there is a direct influence of effort expectancy, social influence, attitudes towards telemedicine usage behavior and moderating effects of facilitating conditions on the effect of performance expectancy and attitudes towards telemedicine usage behavior. As implications, telemedicine must be designed to offer greater benefits than conventional medical services, such as time savings and cost savings. Furthermore, despite the lack of a direct physical examination in telemedicine, the results of the diagnosis are expected to be accurate, resulting in the patient being more productive and healthy as a result of adopting telemedicine

Keywords: unified theory of acceptance and use of technology, performance expectancy, effort expectancy, social influence, attitude, facilitating condition

Introduction

The national health service crisis in Indonesia is one of the reasons for the high COVID-19 mortality rate. The limited number of medical staff and hospital capacity are unable to cope with the dramatic growth in patient numbers. According to a World Bank report from 2010 to 2017, Indonesia has the second lowest doctor-to-population ratio in Southeast Asia, trailing only Cambodia (0.4:1,000). (Jayani, 2020). This ratio does not meet the standards applied by WHO of 1:1,000 population (Kumar & Pal, 2018). Furthermore, Indonesia's Intensive Care Unit (ICU) ratio is 2.7 per 100,000 people, implying that for every 100,000 Indonesians, there are at least three ICU beds. This figure is much lower than Malaysia (3.4), Thailand (10.4), and Brunei Darussalam (13.1) (Phua et al., 2020)

Utilizing information and communication technologies in the medical service industry, such as telemedicine, is one of the most promising strategies for overcoming the issue (Kalenzi, 2021; Sze-Yunn, 2020). Telemedicine is defined as a medical practice that uses information and

communication technology to diagnose, consult, educate, and transfer medical data (Rahi et al., 2021).

According to the Ministry of Communication and Information of the Republic of Indonesia, the number of users of Indonesian telemedicine applications has surpassed 15 million during the pandemic. This means that the number of users has increased by more than thrice from the previous 4 million (Ministry of Communication and Information of the Republic of Indonesia, 2020).

Previous research has showed the effectiveness of telemedicine in dealing with outbreaks comparable to COVID-19, such as the Ebola Contact Tracing (ECT) smartphone application, which was introduced to track and monitor patient contacts during the Ebola outbreak in Africa. Telemedicine has also been used to deal with SARS and H1N1 outbreaks in Taiwan, H7N9 in China, and MERS in South Korea (Ohannessian, 2015).

On the other hand, other studies claim that the usage of telemedicine is less successful. According to Healy (2008) dan Van Dyk (2013) dalam penelitian Alaboudi dkk., (2016), approximately 75 percent of telemedicine adoptions failed, this percentage even rose to 90% in developing countries. Likewise with the research of Kijisanayotin dkk., (2009), more than 40% of information technology development in various sectors including medical services ended up being neglected. As a result, study about the adoption of telemedicine during the COVID-19 pandemic is a topic that needs to be researched.

There are some theories that are commonly used by experts to figure out why people accept or reject technology, such as Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB), Motivation Model (MM), a combination of TAM and TPB (C-TAM-TPB), Model of PC Utilization (MPCU), Innovation Diffusion Theory (IDT), and Social Cognitive Theory (SCT). However, these theories are only able to explain between 17% to 53% of the variance of intention to use technology (Venkatesh dkk., 2003). According to Wang dkk., (2021) there is another theory that is considered more comprehensive to explain human behavior in adopting technology, namely the Unified Theory of Acceptance and Use of Technology (UTAUT).

UTAUT was developed by Venkatesh dkk., (2003) by combining eight theories above into a new theory. According to UTAUT, there are four variable structures that influence a person's interest and behavior to adopt technology, namely, performance expectancy, effort expectancy, social influence, and facilitating conditions. This theory is considered capable of explaining up to 70% variance (adjusted R^2) of technology acceptance (Venkatesh et al., 2003). In addition, Venkatesh also analyzed the effect of behavior on someone's intention in using technology

UTAUT has been widely analyzed in a number of research related to the use of information and communication technologies in the medical field (e-health). Among others (Adenuga et al., 2017; Alam et al., 2018, 2020; Baudier et al., 2021; Cimperman et al., 2016; Gao et al., 2015; Garavand et al., 2019; Hoque & Sorwar, 2017; Kijisanayotin et al., 2009; Napitupulu et al., 2021; Ndayizigamiye et al., 2020; Qi et al., 2021; Shiferaw et al., 2021; Wang et al., 2021; Yamin & Alyoubi, 2020). However, among these literatures, gaps related to a person's behavior in the application of information and communication technology in the medical field are found.

Some of the gaps that are found on previous research include contradictory research results regarding the effect of performance expectancy on technology adoption. The performance

expectancy variable is proven to have a strong and significant effect on technology adoption according to the results of research conducted by Kijisanayotin dkk., (2009) dan Baudier dkk., (2021). However, the study conducted by Garavand dkk., (2019), Ndayizigamiye dkk., (2020), dan Shiferaw dkk., (2021) did not find any significant effect of performance expectancy variable to the adoption of medical technology.

Another gap that emerges from previous research findings is the impact of social influence on technology adoption. Various social influence studies have found that using medical information and communication technology has a significant positive effect (Alam et al., 2018, 2020; Bawack & Kala Kamdjoug, 2018; Hoque & Sorwar, 2017; Kijisanayotin et al., 2009; Yamin & Alyoubi, 2020). On the other hand, other studies concluded that social influence had no significant effect on the use of medical information and communication technology (Adenuga et al., 2017; Baudier et al., 2021; Cimperman et al., 2016; Garavand et al., 2019; Napitupulu et al., 2021; Wang et al., 2021).

Third, in the majority of the research literature it is found that facilitating conditions have been widely analyzed as an independent variable that has a direct influence on technology usage behaviour (Garavand et al., 2019; Hoque & Sorwar, 2017; Kijisanayotin et al., 2009; Ndayizigamiye et al., 2020). Theoretically, the findings are in line with the model described in UTAUT (Venkatesh et al., 2003). However, there are not many studies that analyze the role of facilitating conditions as an aspect that strengthens or weakens the relationship between technology adoption. Therefore, in this study the author tries to examine the role of facilitating conditions as a moderating variable.

As a result, based on the research background described above, this study aims to analyze the UTAUT model in analyzing the adoption of telemedicine applications in Indonesia during the COVID-19 pandemic.

Hypotheses Development

Use Behavior

Black (1982) dalam penelitian Park, (1998) defines usage behavior as a form of ongoing commitment to a product. The frequency or intensity with which an individual uses a technology is referred to as usage behavior in the context of technology (Venkatesh et al., 2003).

Usage behavior on technology has been studied empirically as the dependent variable in many scientific literatures on technology adoption. Furthermore, a person's desire in using technology has a direct impact on their usage behavior towards technology (Davis et al., 1989; Venkatesh et al., 2003, 2012; Venkatesh & Morris, 2000).

Performance Expectancy

Performance expectancy is how far an individual believes that using telemedicine can improve his or her job performance (Venkatesh et al., 2003; Yamin & Alyoubi, 2020). Performance expectancy indicates a subjective assessment that using telemedicine can improve the user's health quality (Napitupulu et al., 2021).

Research done by Alam dkk., (2018) dan R. Hoque & Sorwar, (2017) tentang *mobile health*, in the field of mobile health, states that performance expectancy has a significant positive effect on technology adoption. Research by Kijisanayotin dkk., (2009) about the adoption of health information systems and Baudier dkk., (2021) about patient perceptions of teleconsultation during

COVID-19 show that performance expectancy has a significant positive effect on the adoption of medical technology. Furthermore, the study discovered that performance expectancy is the most significant factor in determining the adoption of medical technology. Therefore, based on the theory and previous studies above, the proposed hypothesis is as follows:

H₁: Performance expectancy has a positive effect on telemedicine usage behavior in Indonesia.

Effort Expectancy

The degree of ease associated with the use of a system is referred to as effort expectancy (Venkatesh et al., 2003). According to Cimperman dkk., (2016) research on the usage of home telehealth for the elderly in Slovenia, effort expectancy has a significant positive effect and is the most crucial factor in determining the adoption of home telehealth for the elderly. Selaras dengan Cimperman dkk., (2016), Similar findings may be found in a study conducted by Alam dkk., (2018) on the factors that influence mobile health service acceptance in Bangladeshi society, which agrees with Napitupulu dkk., (2021) discovered that effort expectancy is the most important factor in determining consumer decisions to adopt telehealth. Based on the results of these studies, the proposed hypothesis is as follows:

H₂: Effort expectancy has a positive effect on telemedicine usage behavior in Indonesia.

Social Influence

According to Venkatesh dkk., (2003) social influence refers to an individual's perception that other influential individuals believe he or she should use a new system. Yamin & Alyoubi, (2020) found that social influence has a significant positive effect on technology adoption when it comes to telemedicine in the form of wireless sensor network applications.

Furthermore, according to Ndayizigamiye dkk., (2020) social influence has a significant effect on the adoption of mobile health applications that promote physical activity in South African society. Similarly, research on the adoption of wearable medical technology devices shows that social influence has a significant positive effect in determining users' decisions to use technology (Gao et al., 2015). Based on the results of these studies, the hypothesis proposed in this research is:

H₃: Social influence has a positive effect on telemedicine usage behavior in Indonesia.

Attitude

Attitude is a combination of the formation of experience, social conditions and a person's personality. Attitude is a positive or negative feeling that a person has towards an object or behavior (Dale, 2003). Attitude is an aspect of action taken in certain social situations. The effect of attitudes on usage behavior is shown by research conducted by Lin (2007), Bhattacharjee (2000), Chau et al. (2001), Lee (2009), Shanmugham and Ramya (2012), Shih and Fang (2004), Ramayah et al. (2009), Yaghoubi et al. (2010). Based on the results of these studies, the hypothesis proposed in this research is:

H₄: Attitude has a positive effect on telemedicine usage behavior in Indonesia.

Facilitating Conditions

Facilitating conditions are defined as the degree to which individuals believe that the existence of organizational and technical infrastructure can support the use of a system (Venkatesh et al., 2003).

Several studies have stated that the implementation of telemedicine in Indonesia is hampered by the availability of inadequate infrastructure facilities (Deloitte, 2018; Sianipar, 2020; Wiweko et al., 2016). Facilities related to telemedicine, according to Yamin & Alyoubi, (2020) are the extent to which users perceive that telemedicine service providers can give technical infrastructure support in using telemedicine applications. This means that telemedicine requires access to supporting technologies like internet connections, computers, and smartphones (Napitupulu et al., 2021).

Without a supporting infrastructure, no matter how advanced a technology is created, its existence will remain foreign to society (Datta, 2011). Thus, facilitating conditions are objective conditions that can improve the adoption of new technology (Datta, 2011).

Research conducted by Datta, (2011) shows that facilitating conditions positively moderate the relationship between performance expectancy and social influence on technology adoption behavior in e-commerce technology. In addition, referring to the indicators that will be studied, in this study it is assumed that the ease of access to medical services in telemedicine technology supported by infrastructure can strengthen the behavior of adopting telemedicine technology itself. Therefore, based on the description of the theory and the results of the previous research, the proposed hypotheses are:

H₅: Facilitating conditions moderate the relationship between performance expectancy and telemedicine usage behavior in Indonesia.

H₆: Facilitating conditions moderate the relationship between social influence and telemedicine usage behavior in Indonesia.

H₇: Facilitating conditions moderate the relationship between attitudes and telemedicine usage behavior in Indonesia.

Research Method

This is a quantitative study that used a survey method and a questionnaire to collect data. The sampling method used in this research is nonprobability sampling method, specifically convenience sampling method with population of Indonesian telemedicine application users who had been registered with the Indonesian Ministry of Health. To test causal relationship in this research, moderate regression analysis was used.

Data Analysis Result

The study was conducted on 317 respondents from various regions in Indonesia, with 36.3% (115) men and 63.7% (202) women, with 71.6% (227) of the respondents being between the ages of 17 and 25 years old, 21.8% (69) were between the ages of 26 and 35, 5.0% (16) were between the ages of 36 and 55, and 1.6% (5) were over 55. Based on domicile, respondents were from Banten province with 5.7% (18), DKI Jakarta with 17.7% (56), West Java with 31.2% (99), and Central Java with 29.3%.

The following results were obtained as a result of the research data analysis:

Table 1. Hypotheses testing results

Hypotesis	t count	Sig	Decisions
H ₁	5.988	.000	Accepted
H ₂	0.411	0.682	Rejected
H ₃	1.729	0.086	Rejected
H ₄	3.970	0.000	Accepted
H ₅	-0.807	0.421	Rejected
H ₆	2.303	0.023	Accepted
H ₇	1.372	0.172	Rejected

Based on the results of data analysis, as many as 4 hypotheses were rejected while only three were accepted. The accepted hypotheses state that performance expectation and attitude, as well as the moderating effect of facilitating conditions, have an impact on the influence of social influence on telemedicine usage behavior. Meanwhile, the rejected hypotheses are those which state that there is a direct influence of effort expectancy, social influence, attitudes towards telemedicine usage behavior and moderating effects of facilitating conditions on the effect of performance expectancy and attitudes towards telemedicine usage behavior.

Discussion

The process of adopting technology in the medical sector such as telemedicine is a difficult challenge for developing countries like Indonesia (Deloitte, 2018; Sianipar, 2020; Wiweko et al., 2016). As a result, it is important to analyze the adoption of telemedicine technology in Indonesia. The author attempted to investigate the adoption process using UTAUT theory in this study. This study succeeded in answering one of the gaps related to differences in research results that occurred in the UTAUT constructs (performance expectancy and social influence).

The results of data analysis show that performance expectancy has a significant positive effect on telemedicine usage behavior (H₁). This study shows that if people believe that adopting telemedicine applications will improve their ability to access health care, they will use the technology to satisfy their medical needs. This shows that the telemedicine application benefits users by increasing health productivity and greater accessibility during the COVID-19 pandemic, when everyone must limit direct contact with others.

Various research in the medical technology sector have found that performance expectancy has a significant positive effect on technology usage behavior. Thus, the findings of this study are in line with those of HH. Wang dkk., (2021) pada teknologi *online hospital*, Baudier dkk., (2021) pada teknologi *teleconsultation*, Cimperman dkk., (2016); Napitupulu dkk., (2021) pada teknologi *telehealth*, Adenuga dkk., (2017); Yamin & Alyoubi, (2020) pada teknologi *telemedicine*, Kijsanayotin dkk., (2009) pada *health information technology*, dan Gao dkk., (2015) pada *health wearble technology*.

From the viewpoint of convenience, it was discovered in this study that effort expectancy has no effect on telemedicine usage behavior (H₂). Despite the fact that effort expectancy is frequently mentioned as a key factor in technology adoption, the findings of this study are consistent with those of other earlier studies on medical technology adoption (Baudier et al., 2021; Gao et al., 2015).

The author assumed that effort expectancy becomes irrelevant for users who are already accustomed to using technology. According to Gao dkk., (2015) research on the adoption of health wearable technology, effort expectancy becomes insignificant for experienced users. As for new users, effort expectancy has a significant effect.

According to the demographic age of the respondents in this study, 71.6% were between the ages of 17 and 25. Respondents with that age are categorized as Gen Z who were born in the digital era (Francis & Hoefel, 2018; Seymour, 2019). So that they can understand easily how to use telemedicine applications. Furthermore, the operation of telemedicine applications is fundamentally comparable to the operation of other well-known applications such as e-commerce and online transportation.

The next result is that social influence has no effect on telemedicine usage behavior (H₃). Telemedicine applications are still considered new technology by some users. This is proved by the increase in new users that occurred during the COVID-19 pandemic (Ministry of Communication and Information of the Republic of Indonesia, 2020). As a result, the recommendation of telemedicine applications for the purpose of accessing health services during the pandemic by significant persons such as family, friends, and medical personnel motivates users to adopt telemedicine applications. Furthermore, government intervention, such as the implementation of *Pemberlakuan Pembatasan Kegiatan Masyarakat* (PPKM) or public activity restrictions to regulate mobility and reduce community physical contact, has indirectly created social pressure for people not to visit public health facilities like hospitals and clinics. As a result, people are being encouraged to use telemedicine applications. These findings are supported by various previous studies such as Alam dkk., (2018); Gao dkk., (2015); R. Hoque & Sorwar, (2017); Kijisanayotin dkk., (2009); Ndayizigamiye dkk., (2020); dan Yamin & Alyoubi, (2020)

In this study, the author tried to identify the role of facilitating conditions as a moderating variable. Research shows that facilitating conditions do not moderate the relationship between performance expectancy and attitudes toward telemedicine usage behavior (H₅, H₇). The results of this study are not in line with those predicted by Datta, (2011).

The facilitating conditions aspect studied in this research focuses on the dimension of accessibility in the form of technical resources and infrastructure such as mobile phones and internet networks. Mean while according to Datta, (2011) on the e-commerce sector analyzed four dimensions of facilities in describing the facilitation conditions variables, namely the policy dimension, social dimension, accessibility dimension, and economic dimension (Kirkman et al., 2002). Datta, (2011) research, in general, examines the role of facilities and infrastructure in a country in a more comprehensive way, which covers more aggregated problems in a country. So that it is able to answer to the role of facilitating conditions in facilitating the adoption of technology in developing countries. In contrast to this study, which only analyzed facilitating conditions based on the dimensions of personal accessibility.

Furthermore, as previously stated, the majority of respondents in this study were part of Gen Z. The author assumed they would be unaware of the importance of technological and infrastructure resource needs and their impact on telemedicine adoption. This is due to the fact that the technical and infrastructure resources referred to in the form of mobile phones and internet networks have become part of the daily life activities of Gen Z.

Conclusion

This research was conducted to examine the effect of performance expectancy, effort expectancy, social influence and attitude on telemedicine usage behavior and also tested the effect of facilitating condition as variable that can strengthen or weaken the effect of performance expectancy, social influence and attitude on telemedicine usage behavior. Based on the results of hypothesis testing that has been done, it can be concluded that performance expectancy and attitude have a positive effect on telemedicine usage behavior in Indonesia, however effort expectancy and social influence have no effect on telemedicine usage behavior. Meanwhile, facilitating conditions do not moderate the influence of the relationship between performance expectancy and attitudes towards telemedicine usage behavior in Indonesia.

Implication

According to the findings of the study, attitudes and perceptions of usefulness (performance expectancy) influence telemedicine usage behavior. During the COVID-19 pandemic, telemedicine is in great demand by the public as an alternative to conventional health services because visiting a hospital or clinic in a pandemic condition is an action that can increase the risk of spreading the virus. The usefulness of telemedicine must be underlined by health care providers as a key factor to consider.

Telemedicine must be designed to offer greater benefits than conventional medical services, such as time savings and cost savings. Furthermore, despite the lack of a direct physical examination in telemedicine, the results of the diagnosis are expected to be accurate, resulting in the patient being more productive and healthy as a result of adopting telemedicine.

Telemedicine service providers should also consider the influence of social impact in determining patient adoption of telemedicine. The role of social influence in informing the general public about telemedicine as a new technology is very important. As a promotional strategy, companies can include customer testimonials into online media such as websites and social media.

Failure in some hypotheses result can be opportunities for next researcher to reexamine or analyze another factors that can affecting telemedicine usage behavior in same fields. To achieve more comprehensive research results, future research should conduct a deeper analysis by including other moderating variables such as age, gender, experience, and volunteerism as moderating variables. Secondly, the dimension of facilitating conditions in this research was only accessibility dimension, further research needs to examine more in facilitating conditions based on other dimensions such as the policy dimension, social dimension, accessibility dimension, and economic dimension as stated in the literature of Kirkman dkk., (2002).

Third, this study was limited to the telemedicine adoption phenomenon that happened during the COVID-19 pandemic. As a result, more study in the post-pandemic period is needed, taking into consideration that different situations will have different effects on research findings.

Fourth, young age groups who are already familiar with digital technology made up the majority of respondents in this study. Future research could look into the adoption of telemedicine technology from the perspective of elderly.

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