

## FACTORS INFLUENCING BEHAVIORAL INTENTION TO USE TELEMEDICINE SERVICES: MODIFIED-UTAUT3 MODEL

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**Abstract.** Covid-19 has prompted digitalization in many aspects of people's lives. Digitalization not only disrupts human interaction but also many forms of services, including health. Digitalization in the health sector has been developing telemedicine – a digital system that provides many forms of services such as consultation with medical professionals from afar. Telemedicine services have been growing in Indonesia these late years, although Indonesia still deals with an inadequate healthcare system. Therefore, this study examines factors influencing behavioral intention to use telemedicine services on Indonesians by using a modified UTAUT-3 model. A total of 350 participants answered the questionnaire form. The result of the PLS-SEM method reveals that social influence, facilitating conditions, price value, habit, and personal innovativeness positively influences behavioral intention to use telemedicine services. The study also found that the duration of use above two years moderate the relationship between social influences and behavioral intention to use. The research implication would be beneficial for the policymakers, researchers, as well as telemedicine industry in implementing and promoting telemedicine usage, especially in the developing countries.

**Keywords:** telemedicine, UTAUT-3, behavioral intention to use, Indonesia, health care.

### I. INTRODUCTION

Telemedicine has been developing in these recent years as technological advancement has contributed to the transformation of healthcare services. The Covid-19 outbreak fosters the global trend of telemedicine usage. During the recent outbreak, people avoid direct contact due to fear of infection, hence telemedicine enables them to connect with medical professionals by a single app. The development of telemedicine also has been accompanied by the high investment in this sector. The investment in digital healthcare service providers has been rising more than doubled in 2020 to USD 21.6 billion, while telemedicine investment alone totaled USD 4.3 billion—a 139% jump from 2019 [1]. Asia Pacific is a promising region that paves the way for the digital health ecosystem. In Southeast Asia, the use of telemedicine applications jumped 4.5 times in March 2020 during the peak of the outbreak compared to the early year [2]. A report states that there are six factors that influence the change: demographic movement, the shifting consumers' expectation, technology innovation, and limited health infrastructure [3]. A survey also reported that 46% respondents would use telemedicine in the next five years [4]. Asia's digital health platforms collectively are expected to reach a value of USD 100 billion in 2025, up from USD 37 billion in 2020 [3]. In Indonesia, although telemedicine had already been existing prior to the pandemic, it has become more relevant because the pandemic outbreak has been the key catalyst in shifting people's consultation method to telemedicine [5]. There have been many application-based telemedicine services operating such as Halodoc, Alodokter, KlikDokter, and many more. During the pandemic, the

increasing trend of telemedicine use shows in the increasing number of users. Halodoc reported a 10-fold increase in active users per month during the pandemic compared to the Q4 of 2019, and Alodokter experienced a 1.5-fold increase in users compared to the Q4 of 2019 before the outbreak [2].

However, more than a half of population (58.2%) of Indonesia are still unfamiliar with it [6]. Since the pandemic has been controlled now, understanding the factors that drive the intention to use telemedicine is important. Telemedicine demand remained relatively high even after the relaxation of the mobility restriction [7]. Moreover, telemedicine can help improve health care services by improving access and quality of care [8], [9], [10]. Indonesia's healthcare and technology infrastructure is still underdeveloped—as people still deal with uneven access and poverty. Indonesia deals with inadequate healthcare systems such as insufficient health workforce and a lack of investment in healthcare facilities in remote areas [11], [12]. There are some studies that examine factors influencing the adoption of telemedicine services or mobile health (mHealth) applications during the Covid-19 pandemic [13], [14], [15]. Some studies related to mobile health, digital health, telemedicine, and telehealth adoption also provide foundation in exploring the factors that contribute in intention to use both in the context of end-users and physicians (Alam et al., 2020 [13]; Alam et al., [16]; Hoque & Sorwar, [17]; Palas et al. [18]; Schmitz et al. [19]; Zhu et al., [20]. However, the health-related technology studies rarely consider the role of moderating factors. There was a study that found gender's significance as moderator on mHealth services adoption in some cases (Alam et al. [13]). Moreover, it's also important to consider how the

duration of use moderates some factors on behavioral intention to use. Thus, this study aims to explore multiple factors from UTAUT-3, including the effect of health consciousness, as well as moderating factors in influencing the behavioral intention to use telemedicine services in Indonesia especially after the Covid-19 outbreak.

This empirical study applies UTAUT model as a theoretical foundation because of its relevance in exploring technology adoption. In the health sector, this framework of UTAUT has been used to investigate intention and usage behavior towards the adoption of mobile health, e-health, and telemedicine services (Alam et al. [13], 2020; Alam et al. [16]; Hoque & Sorwar [17]; Palas et al. [18]; Zhu et al. [19]). Hence, this study also incorporates constructs from UTAUT-2 model and personal innovativeness in IT developed from the UTAUT-3 [22], [23], [24]. UTAUT-3 needs to be adapted in different contexts since it is still mainly used in educational or e-learning contexts. Therefore, this study examines the adoption of health-related technology and considers adding moderating construct of gender as suggested by the original UTAUT and UTAUT-2 model and also the duration of use since it applies the context of post-Covid-19 pandemic situation.

The following section consists of the variables that constitute the modified research model, as well as the following hypotheses. Performance expectancy is coined as to an extent to which the individual believes that using technology will help to improve job performance goals [23]. In the mobile health service context, it enables the user to have a real-time health data, receive health feedback, and also can help to save time and medical costs [25]. A study found that the use of mHealth apps for health management is partially effective [26]. MHealth apps also may reduce the costs burden and improve the quality of care [27]. Furthermore, some studies proved that health-related services can offer advantages in the management of health issues, ranging from cardiovascular disease to musculoskeletal disorders [28], [29], [30]. Some previous studies suggested that performance expectancy positively influences the user behavior of health services technology adoption and also the intention to use the services on end-users [13], [19], [21]. Thus, this study suggests the hypothesis as follows:

H1: Performance Expectancy positively affects behavioral intention to use telemedicine services

Effort expectancy is termed as degrees of ease correlated with a system usage [23]. This variable is considered as the end-users believe that using telemedicine services to manage their health issues is easy or require little effort. Care quality could be improved by applying and using disease-specific mHealth application [31]. Both consumers and staffs have a positive attitude towards mobile health application, in which its ease of use is one of the advantages [32]. Previous studies indicate the significant factor of effort expectancy in influencing usage intention of health-related digital technology services [13], [17], [33]. Therefore, it is hypothesized that:

H2: Effort Expectancy positively affects behavioral intention to use telemedicine services

By the definition, social influence is the extent to which an individual perceives the importance of others believing that

he or she should use or adopt a system [23]. Prior to becoming a formative construct within the UTAUT framework, social influence has been considered as a predictor in influencing one's technology adoption [34]. In technology adoption, the effect of social influence in various contexts has been investigated [35], [36], [37]. The intention to adopt a health care system is affected by social influences and other people's perceptions (Alam et al. [13][16]; Rajak & Shaw [38]). In a more specific context, social influences confirmed to have an effect on the use of health education mobile-based website. [33] Thus, this study suggests this hypothesis:

H3: Social Influence positively affects behavioral intention to use telemedicine services

Facilitating conditions are the degree to which an individual believes that organizational and technical infrastructure is in place to support the use of the system [23]. It is also perceived as consumers' beliefs about whether they have easy access to computer-related resources they need to drive the adoption or use [34]. Therefore, the facilitating conditions consist of two aspects: one is associated with resource factors such as time and money, and the other is associated with technology compatibility issues [39]. In a few research studies, it influences behavioral intention to use mHealth service positively, especially in developing countries (Alam et al. [13][16]). Hence, the postulated hypothesis is:

H4: Facilitating Conditions positively affects behavioral intention to use telemedicine services

Hedonic motivation defined as the enjoyment or pleasure when using a technology [24]. This construct is sometimes excluded in empirical studies that use UTAUT-2 framework [40]. This factor still needs to be considered because it was found to have an effect on some technology adoptions [41], [42], [43], [44]. An empirical study that examined the construct found that it also predicts the intention to use technology mHealth technology [13], [18], [19]. The postulated hypothesis is:

H5: Hedonic motivation positively affects behavioral intention to use telemedicine services

Price value is also another predictor developed from the UTAUT-2 model. It is conceptualized as the consumer's cognitive trade-off between the perceived benefits of the applications and the costs of using them [24]. This research considers in adding the price value variable because currently telemedicine services in Indonesia charge fees for the users. When the benefits of using telemedicine outweigh the cost, the price value is perceived as positive and hence it influences the intention to use. Price value has affected the intention to use telemedicine in an empirical study [18]. The postulated hypothesis is as follows:

H6: Price Value positively affects behavioral intention to use telemedicine services

Habit has been perceived as an extent people tend to act automatically as a result of learning [45]. Habit has been a predicting factor in users' intention to use some technology [33], [43], [46]. Due to the Covid-19 pandemic, this research study explores whether people's habits in using health services have been changing or shifting to be more connected or dependent on information technology. A study found habit's

significant role in adopting the latest technological advancements [22]. A recent study on mHealth also found a positive, significant influence on the users' intention [18]. The hypothesis is:

H7: Habit positively affects behavioral intention to use telemedicine services

The new construct developed from the UTAUT3 model was perceived to have a strong connection with the technology adoption. Personal innovativeness in IT refers to the willingness to adopt the latest technological tools or to perform risk-taking behavior by trying new IT features and advancements [47]. Although the UTAUT3 application is still limited to academic or educational context, individual characteristic also plays a significant role in influencing the intention to use the advanced technology [22], [48], [49], [50]. In the mobile health adoption context, personal innovativeness also found to be the predictor that positively affect intention to use [51]. Therefore, the hypothesis is:

H8: Personal Innovativeness positively affects behavioral intention to use telemedicine services

Health consciousness is defined as a cognitive tendency regarding the significance of health rather than actual behavior [13]. A high sense of health consciousness could drive an individual to have a high demand for health issues information that will enable them to perform health promotion [52]. Few studies suggest that health consciousness as a cognitive factor has an effect on the use of mHealth [13], [53]. Thus, the hypothesis is:

H9: Health Consciousness positively affects behavioral intention to use telemedicine services

Gender is moderating variable used both in the UTAUT and the UTAUT-2 [23], [24]. In the UTAUT framework, the gender effect is stronger on men in the influence of performance expectancy on behavioral intention, meanwhile stronger on women in the influence of effort expectancy and social influence on behavioral intention (Venkatesh et al. [23]). In the UTAUT-2, its effect will be stronger on men in moderating hedonic motivation and habit on behavioral intention, however stronger on women in moderating facilitating conditions and price value on behavioral intention (Venkatesh et al. [24]). Research studies empirically proved that gender moderates the mHealth services adoption (Alam et al. [13]; Hoque [17]).

Thus, the postulated hypothesis is as follows:

H10: Gender will moderate the effect of Performance Expectancy on behavioral intention to use telemedicine services

H11: Gender will moderate the effect of Effort Expectancy on behavioral intention to use telemedicine services

H12: Gender will moderate the effect of Facilitating Conditions on behavioral intention to use telemedicine services

H13: Gender will moderate the effect of Price Value on behavioral intention to use telemedicine services

Telemedicine's users have been developed in numbers especially since the outbreak of the Covid-19. During the pandemic, the government of Indonesia imposed policy to use telemedicine services to consult with medical professionals because of the social mobility restriction. For those who are

tested positive, the government delivered consultation facilitation and medication for free through telemedicine cooperated with some service providers. The package is an advantage for the patients, bearing in mind that the fee charges for consultation and medicines without subsidy are not little. The flow of the telemedicine use during the pandemic was also designed concise so it would not complicate the users.

Therefore, experiences in the telemedicine facilitation can be considered as one of the variables whether it affects the individual intention on using the service especially after the new normal applied and the pandemic status revoked. Experience in the duration of using telemedicine is considered in this research based on the use since the pandemic—which means the use has been more than two years—and the post-pandemic use—which means less than two years. The group which has been using the telemedicine for more than two years are classified into the early adopter, while the other one classified into the late adopter. A study found that early adopter is the highly active user of a service since the life cycle of a product in terms of information searching and the product use [54]. Another study also found that early adopter are better in developing the learning scheme and tend to need less cognitive efforts in understanding and evaluating the new product or system [55]. It also found that the high degree of openness that an early adopter has will positively and significantly affect the information sharing [56], so that it can influence the adoption of a system by individuals surrounding.

The hypothesis therefore formulated as follows:

H14: Duration of use will moderate the effect of Effort Expectancy on behavioral intention to use telemedicine services

H15: Duration of use will moderate the effect of Social Influence on behavioral intention to use telemedicine services

H16: Duration of use Duration of use will moderate the effect of Facilitating Conditions on behavioral intention to use telemedicine services

## II. RESEARCH METHODS

The target population of this study is Indonesian citizens aged minimum of 17 years old who have experienced in using telemedicine services. The sampling applies purposive sampling technique because the purpose of this study is to examine samples who can deliver information that could answer the research questions. Data collected by conducting and distributing research questionnaire to social media platforms such as WhatsApp, Telegram, Twitter, and Instagram. The research questionnaire consists of three sections. Section one comprises of demographic information of the respondents such as age, gender, recent academic degree, and job sector. Section two comprises of questions related to respondents' experiences in using telemedicine services. The last section contains 10 dimensions which comprises of 35 questions.

This research study adopts measurement items from UTAUT-3 framework as the model research basis. In UTAUT-3, the predictors of the users' behavioral intention are performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, price value, habit,

and personal innovativeness in IT [22], [23], [24]. Health consciousness factor is also considered as a measurement [13]. Therefore, the modified research model is shown in Figure 1. This study uses Likert 5-Scale from scale 1 to scale 5 (1 = “very disagree”; 3 = “neutral”; 5 = “very agree”). Respondents’ answers will show the tendency of behavioral intention in each question. The statistical analysis uses PLS-SEM software to validate the contents of the proposed research model and the relationships among the hypothesized variables.

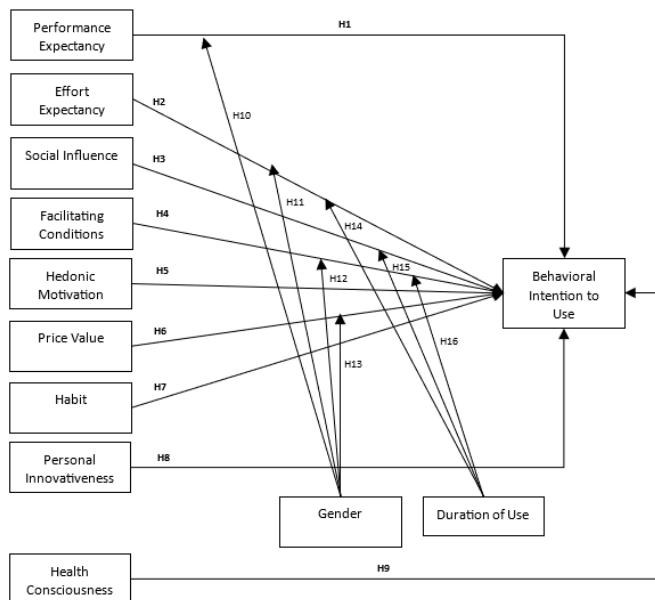


Figure 1. Research model

### III. RESULT AND DISCUSSION

Drawing based on the modified research model, this study investigated factors that contribute to behavioral intention to use telemedicine services in the context of Indonesian users especially after the revoke of the large scaled social restriction policy. In addition to the UTAUT-3 model, this study also included health consciousness in predicting the behavioral intention to use. Moreover, this study also incorporated gender and duration of use as moderating variables. The empirical findings revealed that social influences, facilitating conditions, price value, habit, and personal innovativeness are the determinant factors of behavioral intention towards telemedicine services.

Unexpectedly, *Performance Expectancy* has no significant effect on behavioral intention to use. It contradicts with the earlier studies that found its significance on intention to use (Alam et al. [13]; Alam et al. [16]; Rahi et al. [15]; Schmitz et al. [19]). This result could be caused by the lack of information and knowledge about telemedicine services in Indonesia. In the country, the majority of Indonesians still deal with unequal access to health care services and technology infrastructure which is crucial to the development of the services. *Effort expectancy* was also found to be insignificant. This result is consistent with a study in the context of Bangladesh that the majority of the respondents are from Generation Y (Millennial) to Generation Z (Alam et al. [13]).

Consistent with (Alam et al. [13]; Alam et al. [16]), *Social Influence* is found to be significant on behavioral intention to use. It is obvious that the influence of the people surroundings could encourage an individual to have an intention to use the telemedicine services. *Facilitating conditions* also played a positive, significant role in intention to use. It is consistent with the previous studies that found adequate facilitation as an important predictor (Alam et al., [13]; Alam et al. [16]). However, the result revealed that *Hedonic Motivation* could not predict behavioral intention to use telemedicine services significantly. It is inconsistent with the previous studies that supported the UTAUT-2 construct’s role [13], [18], [19].

In shaping behavioral intention to use, *Price Value* also played a significant role. This is also consistent with a previous study that also took the context of mobile health system [18]. *Habit* was found to have a positive, significant effect on behavioral intention to use telemedicine services. Therefore, it is consistent with the former studies related to health technology [18], [33]. This result could be based on the idea that habit is an accumulation of experiences or feedback from the past usage that could instill a cognitive, positive belief towards a tool, hence it affects the next performative action [18]. As a construct from the UTAUT-3 framework, *Personal Innovativeness in IT* has a positive, significant effect. It is consistent with some previous studies that adopted the framework in different context [22], [49]. Nonetheless, *Health Consciousness* as an additional variable did not show any positive, significant effect on behavioral intention to use telemedicine. It did not confirm the findings of the previous, related studies. [13], [53]. On the relationships of the moderating variables, the path analysis found that gender has no moderating effect on intention to use telemedicine. This study contradicted with some studies that considered the moderating role of gender [21], [59]. Thus, the result did not confirm the UTAUT model’s moderating effect [23], [24]. It might be based on the fact that gender is not suitable for telemedicine context since its segmentation is too general. However, the duration of use for more than two years confirmed a positive, significant effect on the relationship between social influences and behavioral intention to use. This result proved a point from previous studies that early adopters which are mainly the users that adopted the system for more than two years have tendency to be more active and conduct the information sharing [54], [56].

### IV. CONCLUSIONS

As telemedicine services have been relevant and promoted by multi sectoral parties, it is also crucial to understand the acceptance by how are the users’ stance on intention to use its services. Health sector has been developed in adapting to the new era of technology advancement as it is also found to be helpful to broaden the access to healthcare. The Covid-19 pandemic has been a catalyst in encouraging the shift of people’s medical consultation from the conventional ones to the more advanced, digital ones. Moreover, the high investment in this sector indicates a more serious trajectory for digital



health market. The outcome of this study can be considered by the app developers and providers of telemedicine services in Indonesia and other countries to promote the awareness and usage among the society. The implementation could consider the role of the salient predictors of behavioral intention for using telemedicine services. Social influence found to be significant as the important people to individual can play an important role in encouraging an individual to use a service. Therefore, the telemedicine service provider should consider to take advantage of the power of word-of-mouth (WoM) both offline and online, cooperate with influencers or public figures for promotion, and strengthen its public marketing communication in improving the intention to use the services, which eventually affects the actual usage. Facilitating condition as a predictor is also a key point that needs to be highlighted in terms of health care facilitation's improvement. The study also revealed that the more the knowledge and skill someone has, the more they intend to use telemedicine services. Hence, the service providers should prepare and support in facilitating the infrastructure or tool to promote the use of telemedicine in many areas, especially in those which still needs access and adequate healthcare services. Price value was found to be positively significant as hypothesized. Therefore, the free charges should be considered well especially in winning the market of telemedicine. After the pandemic, it is still debatable whether the Indonesian users still want to use the technology-based medical consultation or not. The Indonesian users still deal with the unequal internet access and underdevelopment of healthcare facility in many areas. Moreover, the people are mostly still unfamiliar with the service. Consequently, the telemedicine providers need to formulate a strategic promotion and strategic pricing which meets the demand of the users so that the service can be sustainable in the long run. It is also evident that habit could play a role in determining intention to use telemedicine services. It implies that the users have been used to telemedicine services and tend to reuse it again. Therefore, telemedicine service providers need to strengthen its customer relationship management (CRM) by providing a professional, reliable, and responsive Customer Relations to fulfill users' needs and to improve its performance so that the users will always go back to use the services. This research also found the significance of personal innovativeness on the adoption. Hence, an individual tendency to use the telemedicine service influenced by their openness in trying the information and communication technology advancement. By this finding, the telemedicine providers should take opportunity to develop and upgrade their application's design. Individuals with the high personal innovativeness characteristic are commonly young individuals from the Gen Z or millennials. Therefore, application design can be an indicator for the advancement and the innovation of the service that can draw more users from both generation groups.

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