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Patients' Acceptance of Telemedicine Technology: The Influence of User Behavior and Socio-Cultural Dimensions

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Abstract

Background: Over the years, the role of startups has experienced a significant increase in healthcare delivery, particularly in telemedicine. However, there are still some inherent challenges, including cultural factors, lack of digital literacy, and uneven internet network infrastructure that must be considered during implementation. Previous reports also showed that there was a knowledge gap regarding the factors influencing acceptance of telemedicine.
Objective: This study aimed to introduce and investigate an adjusted model based on Technology Acceptance Model (TAM) to assess the influence of user dimensions, technological aspects, and socio-cultural elements on the intention to adopt telemedicine services.
Methods: The hypothesized relationships between latent variables were examined through Structural Equation Modeling (SEM). In addition, data analysis was carried out using Partial Least Squares-Structural Equation Modeling (PLS-SEM).
Results: Self-efficacy (β=-0.272, P=0.013), perceived usefulness (β=0.355, P=0.000), facilitating conditions (β=0.425, P=0.000), and cultural factors (β=0.421, P=0.001) were found to exert a significant influence on the intention to adopt telemedicine services. Meanwhile, trust, the variables of perceived ease of use, and social influence had no significant influences.
Conclusion: This study emphasized the significance of comprehending the factors influencing the adoption of telemedicine services. In addition, the results showed that the extended TAM was applicable in assessing acceptance of telemedicine services.

Keywords: acceptance, telemedicine, TAM, SEM, intention to use

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I. INTRODUCTION

In recent years, the global pandemic has compelled a widespread digital transformation across various industries in most countries around the world. This transformation has catalyzed substantial growth in the adoption of telehealth or telemedicine in healthcare and IT sectors [1]. In addition, the development of Information and Communications Technology (ICT) and telecommunications infrastructure plays an essential role as facilitators for the rise of digital startups in healthcare sector. The synergy between technology and healthcare sector has yielded significant advancements, with telemedicine emerging as a key player. Several studies reported the various benefits of telemedicine, including improved healthcare maintenance and reduced healthcare costs, thereby altering the landscape for patients. Accessing healthcare services has become more streamlined and convenient, reshaping individuals' lifestyles in maintaining health [2].

Several studies explored the widespread adoption of telemedicine, such as Rouidi et al. [3] which conducted an in-depth exploration of acceptance, focusing on physicians' perspectives. The report categorized the constructs employed into 3 dimensions, including individual, technological, and organizational contexts. In addition, an extended Unified Theory of Acceptance and Use of Technology (UTAUT) model was used with the incorporation of various variables, including perceived incentive, level of IT use, and compatibility into the proposed framework. Kuo et al. [4] also carried out a similar investigation, aiming to identify factors influencing physicians' perceptions of telemedicine adoption using Theory of Planned Behavior (TPB). Moreover, Ly et al. [5] assessed the individual and contextual determinants of telemedicine usage using a comprehensive framework spanning micro, meso, and macro levels,

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adapted from the social-ecological framework. The descriptive study obtained insights from both physicians and project managers, contributing valuable perspectives to the discourse.

Compared to previous studies, Song et al. [6] introduced a theoretical model, aiming to predict and elucidate patients' intention to persist in using mobile health services for chronic condition self-management. In addition, a hybrid model was tested by merging the information system continuance with the information system success model. The results revealed that factors, such as health status, user satisfaction, and perceived usefulness significantly influenced patients' intention to consistently use mobile health services. In another recent investigation, Zobair et al. [7] explored the determinants of health seekers' acceptance and adoption of telemedicine services in a rural public hospital setting in a growing economy. The study extended and adapted Technology Acceptance Model (TAM), introducing new variables, such as privacy data security, and service quality. The results showed a significant influence of these variables on patients' behavioral intention (BI) to embrace telemedicine healthcare services in rural areas. Furthermore, Alexandra et al. [8] conducted a comprehensive survey on acceptance model of hospital telemedicine, examining the influence of user behavior and technological dimensions on user intention. A modified TAM was used, which categorized variables into 2 dimensions, namely user and technological. Primary TAM variables in the proposed model comprised perceived ease of use, perceived usefulness, behavioral intention, and actual use (AU). Although this study introduced additional variables as part of the model modification, socio-cultural dimension, particularly user perspective on the adoption of telemedicine service platforms was not considered.

Considering the gap in the literature, the primary objective of this current study is to enhance the comprehension of acceptance of telemedicine service platforms. In addition, it was posited that exploring user intention towards using telemedicine service platforms, with a focus on socio-cultural factors, represents a crucial avenue of investigation. In the socio-cultural context of this study, the social influence exerted by user immediate environment to promote telemedicine usage was explored. The influence of cultural norms or individuals' tendencies to consult with a doctor in person was also assessed. Based on a previous study, a considerable number of individuals still prefer direct, face-to-face consultations with a doctor. However, a cultural barrier arises from the degree of societal receptivity and endorsement of innovative technology, such as telemedicine. To analyze acceptance of telemedicine, this study adopted TAM. Furthermore, TAM has been extensively used in several studies to explore acceptance of telemedicine and digital health [9][10]. For instance, in a comprehensive review, Garavand et al identified TAM and extended TAM as the predominant models in previous reports [11]. The versatility of TAM is also evident, as it can be easily modified to incorporate or expand upon other factors based on the current requirements. In addition, this study integrates specific elements from Unified Theory of Acceptance and Use of Technology (UTAUT) model, particularly facilitating conditions and social influence, which were expected to exert an influential role in shaping the behavioral intention to adopt telemedicine.

II. LITERATURE REVIEW

A. Telemedicine

Telemedicine comprises leveraging information and communication technology to enhance patient outcomes through expanded access to healthcare and medical information [12]. In addition, it provides remote health services that engage health professionals, specifically doctors and patients [11]. According to previous studies, a total of 4 elements are related to telemedicine, including providing clinical support, useful for overcoming geographical and distance barriers, aiming to improve public health, and comprising the use of a variety of information technology devices. [12]. Previous studies categorized telemedicine into several types, including telemedicine services, tele-consultation, mobile health, telerehabilitation, telehomecare, telemonitoring, and teleneonatology [11]. These terms are in the context of digitizing healthcare which provides various benefits, such as enhancing community access to health services, boosting the efficiency of human resources, elevating service quality, and lowering healthcare costs [13].

In line with previous reports, telemedicine could be a solution to problems in today's healthcare sector, particularly in developing countries, regarding accessibility, financial benefit, healthcare cost, and recent technology advancements. In addition, it plays an essential role in the plan and is supported by governments across the country [14]. Telemedicine can reach and distribute health services to a large portion of the population residing in both rural and urban areas [15]. This indicates that it holds the potential to tackle diverse healthcare challenges and transform public health significantly. Moreover, the introduction of telemedicine in developing nations is considered as a significant innovation, comprising technological and social aspects in healthcare system.

B. Hypotheses Development and the Proposed Model

TAM model is an extensively used framework for assessing perceptions and elements that influence the adoption of emerging technology. In addition, it was first introduced by Davis in 1985 and identifies behavioral intention as a key driver prompting users to embrace technology, a motivation shaped by the attitude. In the context of attitude formation, the 2 principal factors influencing individuals' willingness are perceived ease of use and perceived usefulness [16]. TAM is also a fundamental and flexible model, which can be changed or expanded by combining it with other models. Consequently, various modifications have emerged with the aim of analyzing telemedicine technology. Several studies also explored the application to different environments and different contexts, with acceptable results, such as reports on the hospital's teleconsultation application [8], acceptance of telehealth services [17], and the adoption and use of telemedicine technology by healthcare professionals [3].

1) Trust (TR)

Several studies incorporated risk and trust factors into TAM model to elucidate acceptance of IT-based technology, as demonstrated by Pavlou [18]. Trust is an essential factor that has been extensively used to comprehend technology acceptance in healthcare sector [10]. In addition, it plays a crucial role in the ongoing intention to use mHealth services [19]. According to Kamal et al., it positively influences the intention to adopt telemedicine services [20]. Ahlan et al. expanded the model in developing country contexts, introducing trust, which directly contributed to the expected usefulness (convenience) and expected ease of use of a self-diagnosis application [21]. Based on the results, this current study suggests that user perceptions of trust in the technological infrastructure must enhance the intention to use telemedicine. Consequently, the following hypothesis was formulated:

H1: Trust has a significant influence on Behavioral Intention.

2) Self-efficacy (SE)

Self-efficacy is related to individuals' assessment of the ability to effectively use a system for a specific task. The influence of this factor on behavioral intention can manifest through the perceived ease of use and perceived usefulness of telemedicine [22]. Several studies revealed that computer self-efficacy plays a role in fostering acceptance of telemedicine among both individuals and organizations [23][14]. Consequently, this study posits that self-efficacy significantly influences acceptance of telemedicine.

H2: Self-efficacy has a significant influence on Behavioral Intention.

3) Perceived Usefulness (PU) and Perceived Ease of Use (PEOU)

Perceived usefulness and perceived ease of use are the two primary factors influencing user acceptance, as postulated in Davis' study. Perceived usefulness refers to individuals' confidence in a specific system enhancing the job performance [16]. In the context of health technology and telemedicine, it was redefined by Kamal et al. as the utility of the system for patients, acknowledging that its significance could differ from other studies. Patients perceive telemedicine as useful when it offers quicker healthcare services at reduced costs, improved documentation, and a decrease in service time [20]. Meanwhile, perceived ease of use is defined as the extent to which individuals believe that using technology could minimize the effort and costs. Given this interpretation, it was assumed that patients embraced and used telemedicine services more readily when the technology was expected to yield superior services and outcomes. Consequently, the following hypotheses are posited:

H3: Perceived Usefulness has a significant influence on Behavioral Intention.

H4: Perceived Ease of Use has a significant influence on Behavioral Intention.

4) Facilitating Conditions (FC)

The facilitating conditions determinant is not part of the original TAM framework. In addition, this determinant is described as individuals' belief in the existence of organizational and technical support infrastructure for system usage [23]. The presence of IT equipment, infrastructure, and knowledge of technology use plays an essential role in supporting telemedicine use [24]. The effective use of these services is largely dependent on the availability of adequate technological infrastructure. The successful integration of telemedicine comprises collaborative efforts among healthcare professionals, service providers, and patients located in remote areas [20]. Consequently, this study aims to verify whether there is a substantial correlation between facilitating conditions and user intention to adopt a specific telemedicine application. Based on the results, the following hypothesis is posited:

H5: Facilitating conditions have a significant influence on Behavioral Intention.

5) Social Influence (SI)

Social influence is the degree to which individuals believe others expect them to use the new system [23]. Previous studies have affirmed that social influence, expressed through subjective norms and images, directly contributes to the

intention to adopt new technology [25]. Or and Karsh conducted a study predicting patient behavior concerning acceptance or rejection of health information technology. The results showed that social factors, particularly the influence of physicians, home care nurses, children, or grandchildren, played a crucial role [26]. In developing countries, where individuals often reside in interdependent extended families, both socially and economically, the opinions of those around them significantly influence the use of telemedicine services. Whether the influence is encouraging or discouraging, it has a significant on the decision to use technology [20]. In the context of this study, social influence was proposed to comprise factors that either promote or deter individuals from using telemedicine. Therefore, the following hypothesis was formulated:

H6: Social Influence has a significant influence on Behavioral Intention.

6) Culture (CU)

Based on the results, there are limited studies examining culture as a factor in telemedicine acceptance. The work of Mansouri-Rad [27] becomes relevant when culture is viewed as an indirect precursor to the successful adoption of telemedicine. According to other studies, patients using telemedicine in rural areas believe that practitioners familiar with culture are generally preferred [5]. In addition, Jang-Jaccard et al. stated that cultural factors were one of the barriers to delivering telehealth in rural Australia [28]. Nwabueze et al. reported that cultural influences on users influenced the adoption of telemedicine. However, cultural factors influence behavioral intention only for prospective users and not for actual users [29]. Culture in this study is defined as individuals' habits in consulting doctors and considered to be closely related to user resistance towards new technology, such as telemedicine. Culture is also the level of user acceptance of changes in health services from previously conventional to the use of telemedicine applications, which is a new technology for consulting with doctors online. Therefore, the following hypothesis was proposed:

H7: Culture has a significant influence on Behavioral Intention.

7) Behavioral Intention (BI)

Behavioral intention refers to a situation where individuals consciously intend to perform or abstain from a specific behavior in the future [30]. In the context of this study, the behavioral intention to use denotes individuals' intention to utilize telemedicine services. According to TAM, the actual usage of a system is shaped by the behavioral intention to use [31]. Furthermore, this factor can be characterized as the inclination to persist in applying technology [16]. Based on the results, the following hypothesis was formulated:

H8: Behavioral Intention has a significant influence on Actual Use.

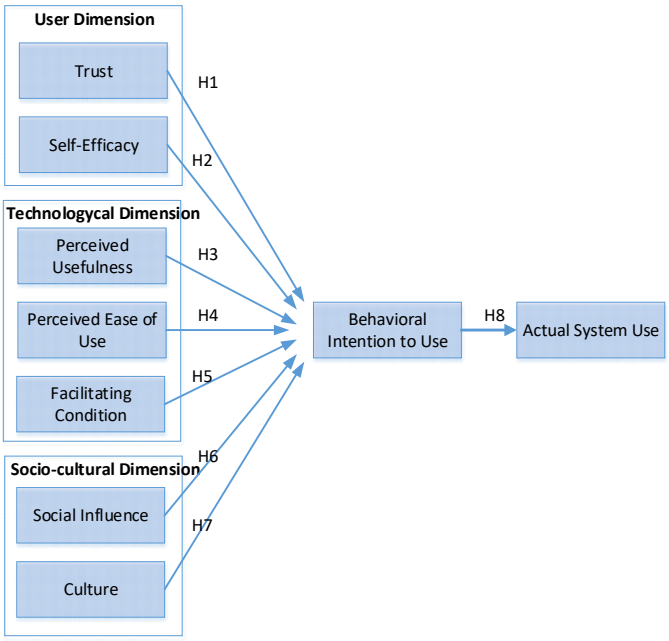

Fig. 1 The Proposed Model on User Acceptance of Telemedicine Service

C. Conceptual Framework

This study examines acceptance of telemedicine technology among patients, specifically focusing on telemedicine service platforms in Indonesia. Building upon insights from previous studies, the proposed model extends TAM by incorporating additional variables. For the original TAM, variables of perceived usefulness, perceived ease of use, and behavioral intention to use were included. This was because these variables garnered the highest level of support in previous studies. Furthermore, recognizing the limited exploration of the relationship between the behavioral intention to use telemedicine services platforms and socio-cultural factors in previous studies, the socio-cultural dimension was introduced in the proposed model. This study formulated 8 hypotheses, outlined in the proposed model illustrated in Fig. 1.

The current variables are categorized into 3 dimensions, namely user, technological, and socio-cultural dimensions. The user dimension comprises aspects directly associated with telemedicine users, influenced by trust and self-efficacy. The technological dimension included the existing technical infrastructure, such as hardware and software to facilitate telemedicine use. This dimension is influenced by perceived ease of use, perceived usefulness, and facilitating conditions. Meanwhile, socio-cultural dimension is an external factor influencing patient adoption of telemedicine, comprising social influence and culture.

III. METHODS

A. Data Collection

This study used a quantitative method through an online questionnaire. The questionnaire to be shared was first subjected to a readability test to ensure comprehension among respondents before the distribution as shown in Table 1. The sample population comprised individuals who were knowledgeable about or had previous experience with telemedicine application. The readability test was carried out for one week with 10 respondents who provided critiques or suggestions. The questionnaire received feedback on the use of standard language, consistency of terms, identification of typos, and enhancements to sentence structure for improved respondent understanding by conducting the readability test. Furthermore, the feedback served as a guide for refining the questionnaire.

TABLE 1
STUDY INSTRUMENTS

Latent Variable	Item	Measurement	Source
PU	PU1	Employing telemedicine could enhance the quality of my healthcare.	[20]
	PU2	Using telemedicine could enhance my access to healthcare services.	[20]
	PU3	Incorporating telemedicine would be beneficial in my daily activities.	[20]
PEU	PEU1	I am confident that using telemedicine application is straightforward for me.	[8][22]
	PEU2	I am confident in my ability to easily engage with doctors through telemedicine application.	[8]
	PEU3	I am confident in my comprehension of how to interact with telemedicine application.	[8]
FC	FC1	I would have access to all essential resources for using telemedicine services.	[20]
	FC2	I possess IT proficiency to operate telemedicine application.	[8]
	FC3	In case of challenges with using telemedicine application, I can seek assistance from others.	[8]
SE	SE1	I could use telemedicine with previous experience in similar technologies.	[14]
	SE2	I could employ telemedicine after observing someone else using it before trying it myself.	[14]
	SE3	I could use telemedicine independently, even in the absence of guidance from others.	[14]
	SE4	I could operate telemedicine solely with manuals as references, even if there were no one around to guide me.	[14]
TR	TR1	Telemedicine provider is dependable.	[19]
	TR2	Telemedicine provider provides information that can be relied upon.	[19]
	TR3	Telemedicine service provider upholds and fulfills promises and commitments.	[19]
SI	SI1	Individuals who hold considerable significance to me would appreciate my use of telemedicine services.	[20]
	SI2	Those who have a substantial influence on my behavior would favor my adoption of telemedicine services.	[20]
CU	CU1	I believe there are many advantages and benefits of using telemedicine applications.	[29][32]
	CU2	I am open to using new technologies such as telemedicine applications.	[29][33]
	CU3	I accept the change in health services from previously conventional to the use of telemedicine applications, because this is something new.	[29]
BI	BI1	If provided with the opportunity to access telemedicine, I plan to avail telemedicine services.	[20]
	BI2	In the event of requiring remote medical care from professionals, I would willingly use telemedicine services.	[20]
	BI3	I plan to communicate information about telemedicine to my relatives and friends.	[20]
AU	AU1	I frequently utilize telemedicine.	[34]
	AU2	I plan to continue using telemedicine for as long as it is necessary.	[34]
	AU3	I regularly make use of telemedicine.	[34]

In Partial Least Squares Structural Equation Modeling (PLS-SEM), determining the minimum sample size was an essential consideration. The "10-times rule" method was widely employed in PLS-SEM based on the principle that the sample size must exceed 10 times the highest number of inner or outer model links directed at any latent variable [35]. Based on this guideline, the minimum sample size for this current study was set at 70 respondents. In addition, data collection was carried out using an online survey created with Google Forms and distributed to a total of 105 respondents. In this study, respondents were selected randomly by selecting patients who had used telemedicine applications, such as Halodoc, Alodokter, Good Doctor, and other similar variants. Halodoc, the prominent health tech startup in Indonesia, was joined by others, including Alodokter and Klikdokter. These platforms offered a range of services, including online consultations, pharmacy delivery, online drug purchases, doctor and hospital bookings, fertility and pregnancy calendars, and a comprehensive directory of diseases and drugs [36]. Among the 105 questionnaires distributed, 70 were selected for data analysis, while the remaining incomplete variants were excluded. Table 2 presents an overview of respondents' demographics, such as gender, age, educational background, employment status, and the types of telemedicine applications used.

B. Instrument Development

The survey was developed in the Indonesian language and comprised 2 sections. Part A focused on gathering basic demographic information about respondents, including gender, age, education, and employment status. Meanwhile, part B included questions related to various factors outlined in the proposed model. A six-point Likert scale, ranging from "strongly disagree" to "strongly agree," was used in the questionnaire. The use of a six-point Likert scale was designed to mitigate neutral response bias. This bias could occur when respondents opt for the midpoint without careful consideration. The six-point scale encouraged a thoughtful consideration of each question and the selection of option that leaned either positively or negatively. The questionnaire, consisting of 27 questions, incorporated items from previously validated studies, modified to suit the context of this current study.

IV. RESULTS

PLS based on SEM was used to test the model, as it provided various valuable statistics and was considered a more suitable approach for several reasons [37]. Data analysis was carried out using Smart PLS v.4.0.9.8 software. The analysis process comprised 3 stages, and in the first, measurement model for all variables and indicators in the questionnaire was evaluated to assess convergent validity, discriminant validity, and construct reliability. The second stage comprised evaluating the structural model to ascertain the relationships between factors and elucidate causality, while the final stage consisted of hypothesis testing.

TABLE 2
RESPONDENT DEMOGRAPHIC

Population Characteristic	Classification	Frequency	Percentage
Gender	Male	49	70.0
	Female	21	30.0
Age	20-29	17	24.3
	30-39	38	54.3
	40-49	13	18.6
	50-59	1	1.4
	>59	1	1.4
Education Level	Associate Degree	6	8.6
	Bachelor	32	45.7
	Master	28	40.0
	Doctoral	4	5.7
Employee Status	Student	4	5.7
	Employee	58	82.9
	Self-employed	8	11.4
Telemedicine Applications	Halodoc	58	82.9
	Alodokter	16	22.9
	Good Doctor	1	1.4
	Klikdokter	6	8.6
	Tanyadok	2	2.9

A. Respondent Demographics

This survey comprised the participation of 70 respondents with varying educational and professional backgrounds. The majority of respondents were male, accounting for 70.0% of the total population. In addition, the age range varied from 20 to over 59 years, with the highest proportion falling in the 30 to 39 years age group, constituting 54.3% of the population. Based on the data, the majority of respondents were employees in companies/organizations/government. A total of 82.9% of them used telemedicine application Halodoc, which was popularly used, followed by others, such as Alodokter (22.9%), Good doctor (1.4%), Klikdokter (8.6%) and Tanyadok (2.9%).

B. Assessment of Measurement Model

In the examination of measurement model, the reliability and validity was evaluated, specifically convergent validity, discriminant validity, and construct reliability. Convergent validity assessed the interconnectedness of questions in a latent factor by verifying the factor loadings, adhering to the rule of thumb of 0.7. Through adjustments to the indicators, all loading factor values were increased to surpass 0.7. In addition, convergent validity was assessed using Average Variance Extracted (AVE), where AVE values exceeding 0.5 were considered acceptable. Discriminant validity showed the distinctiveness of a given construct from other latent constructs. This validity was established when the square root of AVE for each latent variable surpassed the correlations between latent variables [38]. Another approach to confirm discriminant validity was by ensuring that an indicator's loading was higher than all of the cross-loadings [35]. Meanwhile, construct reliability, indicating the internal consistency of the indicators forming a variable, was evaluated through Cronbach's alpha (CA) and composite reliability (CR). For reliability, both Cronbach's alpha (CA) and composite reliability (CR) values must exceed 0.7.

TABLE 3
THE SQUARE ROOT OF AVE

	AU	BI	CU	FC	PEU	PU	SE	SI	TR
AU	0.909								
BI	0.734	0.909							
CU	0.566	0.788	0.838						
FC	0.471	0.720	0.698	0.828					
PEU	0.578	0.726	0.788	0.659	0.877				
PU	0.692	0.775	0.686	0.626	0.786	0.886			
SE	0.460	0.584	0.662	0.813	0.751	0.601	0.742		
SI	0.339	0.462	0.590	0.557	0.449	0.456	0.534	0.922	
TR	0.510	0.639	0.749	0.578	0.723	0.656	0.591	0.589	0.930

TABLE 4
RELIABILITY & VALIDITY TEST

Latent Variable	Item	Loading Factors	Average Variance Extracted (AVE)	Cronbach's Alpha (CA)	Composite Reliability (CR)
CU	CU1	0.873	0.702	0.788	0.876
	CU2	0.784			
	CU3	0.855			
FC	FC1	0.919	0.842	0.813	0.914
	FC2	0.917			
PEU	PEU1	0.863	0.768	0.850	0.909
	PEU2	0.913			
	PEU3	0.853			
PU	PU1	0.898	0.784	0.863	0.916
	PU2	0.886			
	PU3	0.873			
SE	SE3	0.912	0.866	0.847	0.928
	SE4	0.949			
SI	SI1	0.931	0.850	0.824	0.919
	SI2	0.913			
TR	TR1	0.926	0.866	0.923	0.951
	TR2	0.936			
	TR3	0.930			
BI	BI1	0.919	0.826	0.894	0.934
	BI2	0.907			
	BI3	0.900			
AU	AU1	0.937	0.827	0.897	0.935
	AU2	0.888			
	AU3	0.903			

The convergent validity assessment revealed a robust correlation between the indicator and the relevant construct or latent variable, with a minimum loading factor of 0.70, affirming that the indicator effectively measured the targeted construct. This assertion was reinforced by an acceptable AVE value exceeding 0.5, indicating satisfactory convergent validity. The discriminant validity test further validated the adequacy of measurement model. In addition, it was asserted that the square root of AVE for each latent variable must surpass the correlations among the latent variables, as shown in Table 3.

To assess the reliability of measurement model or construct reliability, the examination comprised evaluating the parameter values of Cronbach's alpha and composite reliability, with a criterion of being equal to or greater than 0.70. The test results indicated that both Cronbach's alpha and composite reliability in this study met these specified criteria, as shown in Table 4. Consequently, it could be inferred that measurement model employed was both valid and reliable.

C. Assessment of the Structural Model

The evaluation of the structural model was dependent on the assessment of R-Squared (R^2) and Q-squared (Q^2) values, which were both essential in determining the model's goodness of fit. R^2, a statistical metric in regression models, assessed the proportion of variance in the dependent variable that the independent variable could account for, with values ranging from 0 to 1. A higher R^2 indicated a greater extent of variability explained by the model. Meanwhile, Q-squared (Q^2) evaluated how effectively the observed values was consistent with the model and the parameter estimates. A Q^2 value exceeding zero for a specific reflective endogenous latent variable indicated the path model's predictive relevance for a particular dependent construct [39]. The R^2 and Q^2 values for behavioral intention and actual use variables are presented in Table 5.

TABLE 5
STRUCTURAL MODEL MEASUREMENT

Parameter	R^2	Effect Size	Q^2
BI	0.790	strong	0.733
AU	0.539	moderate	0.398

Based on Table 5, the R^2 value for behavioral intention construct was 0.790, indicating a robust effect size, which was classified as strong. This value indicated the capacity of exogenous constructs in this study to elucidate the endogenous construct. The results showed that perceived usefulness, perceived ease of use, facilitating conditions, self-efficacy, trust, social influence, and culture collectively accounted for 79.0% of the variance in behavioral intention. Meanwhile, the R^2 value for actual use variable was 0.539, denoting a moderate effect size. All the Q^2 values for the endogenous constructs exceeded zero, indicating the path model's predictive relevance for each specific dependent construct. The results showed that the model could accurately forecast the values of the dependent variables using the independent variables.

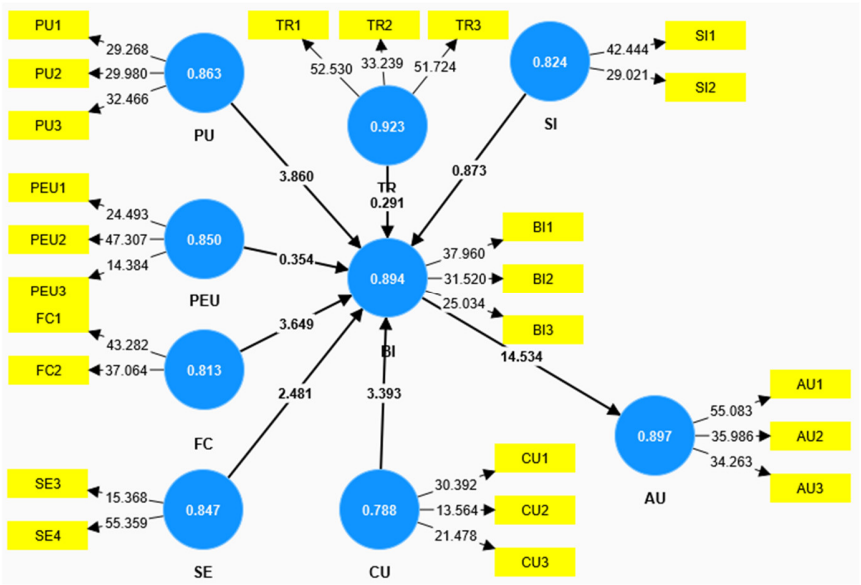

Fig. 2 Measurement Model

D. Hypothesis Testing Result

The examination of hypothesis measurements was based on the assessment of the p-value. To ascertain the significance of the hypotheses, a bootstrapping procedure was employed with a two-tailed t-distribution, and the analysis was conducted at a significance level of 0.05. The results are presented in Fig. 2 and summarized in Table 6.

According to Table 6, a total of 5 hypotheses had been validated, specifically H2 (SE → BI), H3 (PU → BI), H5 (FC → BI), H7 (CU → BI), and H8 (BI → AU). Meanwhile, 3 hypotheses were refuted, namely H1 (TR → BI), H4 (PEU → BI), and H6 (SI → BI).

TABLE 6
STRUCTURAL MODEL MEASUREMENT

Hypotheses	Relationship	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistic	P Values	Status
H1	TR→BI	0.029	0.027	0.100	0.291	0.771	Rejected
H2	SE→BI	-0.272	-0.270	0.110	2.481	0.013	Accepted
H3	PU→BI	0.355	0.354	0.092	3.860	0.000	Accepted
H4	PEU→BI	0.050	0.060	0.142	0.354	0.724	Rejected
H5	FC→BI	0.425	0.424	0.116	3.649	0.000	Accepted
H6	SI→BI	-0.071	-0.061	0.082	0.873	0.383	Rejected
H7	CU→BI	0.421	0.407	0.124	3.393	0.001	Accepted
H8	BI→AU	0.734	0.733	0.050	14.534	0.000	Accepted

V. DISCUSSION

1) Hypothesis Measurement Results

In this study, self-efficacy (β= -0.272, P = 0.013) had a significant influence on individuals' intention to use telemedicine. The result was consistent with previous studies [10], [22], [40], where it played an essential role in influencing acceptance of telemedicine services. In healthcare context, Garavand et al. [11] and Jung et al. [22] identified self-efficacy as a key determinant influencing technology acceptance, particularly from the perspective of healthcare professionals, such as physicians. According to previous studies, telemedicine is an emerging technology, which requires a certain level of digital competency [41]. In this digital era, healthcare technologies are available to make it easier for patients to access health facilities. The level of digital literacy ability greatly determined the use of telemedicine applications by individuals. At present, Indonesians, specifically those in urban and suburban areas, were more familiar with technology and frequently used digital devices and platforms to facilitate the daily activities [42]. Consequently, individuals were less likely to encounter problems when using digital technology. The results were inconsistent with previous reports, which concluded that self-efficacy did not make substantial contributions to predicting user behavioral intention regarding the adoption of telemedicine healthcare services [7].

The testing of hypothesis H3 yielded results indicating a significant relationship between perceived usefulness (β= 0.355, P = 0.000) and the prediction of behavioral intention. The result was in line with other studies by Zobair et al. [7], Or et al. [43], and Jung et al. [22], highlighting the substantial influence of perceived usefulness in telemedicine adoption. Furthermore, the significance of this influence could be attributed to patients' motivation to engage with technology driven by the perceived convenience it offered. Patients anticipated that using telemedicine could enhance the access to healthcare services, thereby contributing to an improved quality of life. This perspective was reinforced by Song et al. [6] which found that the variable positively influenced participants' intention to continue using mobile health services. Consequently, decision-makers must prioritize ensuring that telemedicine technology was in line with the evolving needs of modern healthcare [15].

The outcomes of H5 indicated a significant influence of facilitating conditions (β= 0.425, P = 0.000) on behavioral intention to adopt telemedicine. The result was consistent with a previous study by Binyamin et al., which obtained similar results [34]. In the context of telemedicine, facilitating conditions assessed whether users possessed the necessary resources for using telemedicine services. This factor was considered essential and had been validated as a precursor to user behavior in accepting technology [34]. Facilitating conditions also ensured the availability of resources, including time and financial means, along with technical resources, such as Internet connectivity and mobile devices [24]. The prevalence of smartphone ownership and widespread internet access in Indonesia served as an encouraging factor for the adoption of mobile health and telemedicine applications [42]. In addition, the development of healthtech startups, specifically telemedicine in Indonesia, such as Halodoc and Alodoc, had changed the lifestyle of modern society. Halodoc and Alodokter were two of Indonesian largest telemedicine application players [44]. Moreover, the digital literacy skills of most Indonesians were quite mature, indicating the absence of constraints by technical problems in accessing these applications [45], [46]. Compared to previous studies by Kifle et al. [14] and

Alviani et al. [47], concluded that facilitating conditions did not exert a significant influence on acceptance, this study found a different trend. This suggests that not all regions within a country, particularly rural areas, benefited from comprehensive internet coverage. Consequently, the limitation emerged as a hindering factor in the widespread adoption of technology.

This study also revealed the significant influence of culture (β= 0.421, P = 0.001) on individuals' intentions to use telemedicine. The result was consistent with the observations made in a recent report by Nwabueze et al. [29], asserting that culture played a substantial role in shaping individuals' intentions to adopt new technology, particularly before becoming accustomed. In the Indonesian context, one effective method of introducing new technologies comprised promotion through the Internet and social media channels [48]. Indonesia has 191.4 million active social media users [49], hence, leveraging these platforms becomes an essential strategy for technology adoption. Individuals were likely to become interested by offering the benefits and advantages of telemedicine. Indonesians typically have an open character, and easily accepted and followed new technology, indicating that this method was considered the most effective way to get a response from the community. Meanwhile, Alajlani et al. [33] stated that lack of awareness was a major barrier to acceptance of new technology, such as telemedicine. This was due to several factors, including the resistance of people to telemedicine because of the lack of advocacy related to the great benefits. Based on these results, it was important to increase public awareness regarding the use of new technology.

The results of the H8 test revealed a significant influence, with behavioral intention (β=0.734, P = 0.000) significantly influencing actual use of telemedicine applications. This was consistent with the results of Alexandra et al. [8], asserting the essential role of behavioral intention in the practical adoption of telemedicine in Indonesia. In line with Manda and Salim [50], attitudes toward the use of Halodoc teleconsultation application significantly influenced the actual usage. Abdool et al. [51] also demonstrated in a previous study that behavioral intention served as a robust and significant predictor of the effective use of telemedicine. Furthermore, Hoque et al. [52] proposed that a positive intention to use these applications had a favorable influence on the practical adoption.

Based on the results, study trust, perceived ease of use, and social influence did not exert significant influences on behavioral intention in the proposed model (H1, H4, and H6 lack support). The results were consistent with previous studies where constructs, such as social influence [8], [53], perceived ease of use [7],[43], and trust failed to significantly contribute to predicting user behavioral intention in adopting telemedicine healthcare services. In a previous investigation by Alexandra et al. [8], social influence associated with hospital telemedicine applications in Indonesia did not have a significant influence. This assertion was also corroborated by Lestari and Rofianto [53] in the results, where external cues to actions did not positively influence the intention to adopt mobile health. External cues to actions were essentially interpreted as prompts or stimuli promoting individuals to embrace mobile health. In essence, external cues to actions shared a similar meaning with social influence. Furthermore, Zobair et al. [7] discovered that perceived ease of use did not make significant contributions to predicting user behavioral intention regarding the use of telemedicine services. Furthermore, it was logically sound to conclude that trust did not exert significant influences on behavioral intention. Trust could be understood as user belief in the capability of telemedicine services to provide improved online health services in the future. In developing countries, such as Indonesia, individuals still feel hesitant to use these services due to thoughts about the associated advantages. Therefore, telemedicine providers must strive to build trust in users through the promotion of the services and benefits offered. However, this outcome was inconsistent with previous studies that recognized trust, social influence, and ease of use as key factors influencing the adoption of telemedicine [20], [47].

B. Contributions and Implications

This study made a valuable contribution to the existing body of literature on telemedicine acceptance. The results explored the connections between various constructs and identified factors shaping individuals' decisions to engage with virtual healthcare services. In addition, a significant theoretical contribution was made by introducing an extensive set of dimensions to forecast the behavioral intention to adopt telemedicine using an extended TAM framework for describing and predicting system usage. In terms of theoretical advancement, this study aimed to innovate by incorporating a socio-cultural dimension into the framework, comprising social influence and culture as 2 distinct constructs. The results showed the influence of culture on intention to use telemedicine, with social influence demonstrating no significant influences.

The results offered useful implications for telemedicine providers by identifying various factors that must be considered. These providers must take several steps to persuade users to use telemedicine services. Ease of using the application was a priority for patients during usage. Telemedicine providers could also promote the services by offering convenience and various benefits when using the applications. This included furnishing thorough descriptions of the benefits of the provided features and instructions on how to use the application [47]. Meanwhile, internet

connections also required more attention because it was one of the key factors in accessing virtual healthcare services [42].

C. Limitation and Future Study

This study had several limitations, including the sample size, which remained comparatively modest. The population exclusively consisted of respondents from urban and suburban areas, and there was a sole concentration on user or patient viewpoint. Future studies were advised to examine the prevalence of telemedicine services using study samples that were more representative of the study population. Furthermore, there was a need to explore the perspective of physicians or health professionals regarding the implementation of telemedicine services.

VI. CONCLUSIONS

In conclusion, this study formulated and scrutinized an extended TAM framework, showing the essential understanding of factors influencing acceptance of telemedicine. The results indicated that self-efficacy, perceived usefulness, facilitating conditions, and culture were crucial factors significantly influencing the intention to use telemedicine services. Meanwhile, trust, perceived ease of use, and social influence did not yield significant influences. The results suggested that in Indonesia, patients exhibited a heightened interest in employing telemedicine applications as these platforms were perceived to enhance healthcare accessibility and improve overall health quality. The burgeoning presence of numerous telemedicine startups offering convenient consultations with healthcare professionals further propelled the increased use of the services. This study also showed the significant role of culture in shaping individuals' intentions to embrace telemedicine, signifying a lack of resistance to new technology. Furthermore, behavioral intention served as an essential predictor, significantly influencing the actual usage of telemedicine applications. This supported the notion that the inclination to use telemedicine applications profoundly influenced the practical use.

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Animal Subjects: There were no animal subjects

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