

# Adaptation and validation of the telepharmacy service adoption behavior questionnaire during the COVID-19 pandemic crisis

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## ABSTRACT

Telepharmacy is an online application used to provide pharmaceutical services in the modern era. Therefore, this study aims to develop a questionnaire on a research model that integrates three well-known theories, namely the unified theory of acceptance and use of technology (UTAUT), the protection motivation theory (PMT), and the DeLone and McLean information success model, to determine factors that influence people's behavior towards the adoption of telepharmacy services. A cross-sectional observational method was used with the purposive sampling technique. A total of 118 participants who were at least 18 years old received the questionnaire. They were selected using convenience sampling from a variety of population groupings. Data analysis was then performed with the exploratory factor analysis (EFA). Factor extraction was carried out using principal component analysis and varimax rotation. The results show 8 factors consisting of social influence and support 15.54%; understanding of proficiency, confidence and quality of information 11.06%; condition of facilities and skills 6.64%; severity and suffering 7.87%; time opportunity support and system quality 7.74%; intention to adopt telepharmacy 7.34%; perceived vulnerability 6.80%; and attitude 6.37%. Furthermore, the overall construct formed can explain 72.40% of the total variance. These results indicate that the telepharmacy service adoption behavior questionnaire is valid and reliable.

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## 1. INTRODUCTION

COVID-19 has been declared a global pandemic by the World Health Organization (WHO) in 2020, and it has rapidly spread to several countries. On March 28<sup>th</sup>, 2020, it was included in the "Very High" category based on the WHO risk assessment with a total of 571,678 cases and 26,494 death. Furthermore, these numbers have increased to 693,224 cases and 33,106 death as of March 30<sup>th</sup>, 2020. Reports also revealed that Europe and North America had become the epicenter of the COVID-19 pandemic, where the infection and mortality rates are higher compared to China. The United States has the highest number of positive patients with an average of 19,332 new cases. COVID-19 was first reported in Indonesia on March 2020 with two infected patients [1]. As of March 31<sup>st</sup>, the virus had infected 1,528 people with 136 deaths [2]. The COVID-19 mortality rate in Indonesia was 8.9%, which is the highest in Southeast Asia [1].

In early March 2021, the government implemented a new policy to limit the level of direct interaction [3]. Telemedicine based on information and communication technology (ICT) is not limited to only when patients are in the hospital. A previous study revealed that the scope of ICT in telemedicine increased along with the level of acceptance and supporting tools. This technology provides an opportunity in supporting health care efforts for patients [4]. According to the Indonesian Ministry of Health 2016, some of the fields of telemedicine include teleradiology, telecardiology, and telepharmacy. One of the strategies that can be used during the pandemic is the implementation of telemedicine health services, which is beneficial to patients and doctors [5], [6]. Furthermore, COVID-19 is a deadly and contagious disease, hence, preventive measures, such as human distancing can save patients. Previous studies revealed that healthy people were affected during hospital visits [7]. A report released by [8] also showed that doctors and paramedical staff were exposed to COVID-19 with several death cases due to the infectious nature of the disease. Therefore, an alternative healthcare system in the form of telemedicine is needed to overcome these problems. In Africa, health systems based on telemedicine were successful in providing, reporting, and tracking patient healthcare services for Malaria and Ebola [9]. The WHO also confirmed that the use of e-health applications is efficient and cost-effective for surveillance [10].

Online application-based services have great potential to be implemented. The pharmaceutical industry can also implement COVID-19 health protocol as well as seek improvement in the business aspect using telepharmacy service. However, the biggest challenge is the adoption of these applications and websites. Telepharmacy is described as “the delivery of pharmacist care by licensed pharmacists and pharmacies to patients at a distant location through telecommunications” [11]. Medication selection, order review and dispensing, patient counseling and monitoring, as well as clinical service delivery are some of the services that have been integrated in the technology [11], [12]. By establishing remote dispensing stations, it can be successfully utilized in community pharmacy settings. The growing attention from the state government through regulations demonstrates the popularity and growth of telepharmacy [6].

Several theories, such as protection motivation theory (PMT) and theory of planned behavior (TPB) have been used to explain the influenza vaccine [13] as well as nation intention, and behaviors. Factors influencing the acceptance of work-from-home (WFH) technologies during the COVID-19 pandemic were studied by [14] using the extended unified theory of acceptance and use of technology (UTAUT) model and employing environmental concern with a 57.4% acceptance level. The DeLone and McLean IS Success Model is often used for IS research papers as a valid model and framework for complex dependent variables [15]. Furthermore, this model was developed and proposed to information systems to study user behavior as well as provide an explanation through the use of the technology. Several components can influence adoption behavior of technologies [16], [17]. This survey tool has also been administered to European and American populations, where different socio-demographic and cultural factors influenced adoption behaviour. The existing questionnaire shows an inadequate validity and reliability profile. Some of the limitations of previous measurement instruments were addressed by providing a brief, contemporary, comprehensive, valid, and reliable self-report assessment. Therefore, this study aims to develop a questionnaire on a research model that integrates three established theories, namely the UTAUT, the PMT, and DeLone and McLean information success model, to determine factors influencing people’s behavior towards the adoption of telepharmacy services.

## **2. RESEARCH METHOD**

### **2.1. Study design and tools**

A mixed study methodology was used to construct and validate the questionnaire. Phase 1 consisted of a literature review and qualitative study, which was carried out to identify the constructs and items. Phase 2 involves a quantitative study, which was performed to validate the questionnaire. Ethical permission was granted by the Ethics Commission of the Faculty of Medicine, Universitas Islam Sultan Agung with reference number 201/VI/2022/Commission on Bioethics. The study participants were asked to fill an informed consent online through a google form in Central Java, Indonesia.

### **2.2. Survey development**

The development of the questionnaire was carried out using a methodological process consisting of four basic steps, namely literature review, focus group discussions, expert evaluation, and pilot testing [18]. Furthermore, a thorough literature review was performed as the initial phase to generate items for electronic search engines. A total of 13 factors and 44 items were identified based on previous studies Seethamraju *et al.* [19] dan Gao *et al.* [20], [21] Sun [22]; Bossen [23], [24]. One specialist from the field of linguistics, five experts from pharmaceutical academics, and information technology experts, examined the questionnaire developed to assess its validity, content, and critical appraisal. Data face validity from 10 respondents was

collected in June 2022 through a web-based questionnaire using google forms. The data obtained was used to measure the simplicity, clarity, overlapping responses, balance, use of jargon, the accuracy of responses, use of technical language, application, and relationship to problems. Final field study, information was collected with a web-based survey using a google form in July 2022. A total of 118 respondents who were at least 18 years old filled the questionnaire. The participants were selected using convenience sampling from a variety of population groupings to achieve the greatest possible diversity.

### 2.3. Data analysis

The data transcription model at the focus group discussion (FGD) stage in this study is a verbatim transcript containing the name of the informant, profession, gender, interview time, and the content of the interview. Furthermore, the transcription process was carried out using Ms. Word and data encoding was created with NVivo 12 Plus software. The coding was produced with nodes in the NVivo software, where the code was adjusted to the theme or the UTAUT method, the PMT, and the DeLone and McLean information success model. The internal consistency was tested using Cronbach's alpha scale, where a score of 0.7 or above was considered favorable [25]. An exploratory factor analysis with varimax rotation was carried out to investigate the domain structure [26]. The Kaisere Mayere Olkin (KMO) measure was used to determine the adequacy levels of a sample, where values greater than 0.5 indicates that the data were eligible for factor analysis. p-values of less than 0.05 were significant, and the IBM SPSS statistics 24 software was used to examine the data.

## 3. RESULTS AND DISCUSSION

### 3.1. Content validity

The results of expert judgment involving five academics had a 100% response rate, and the formula produced values ranging from +1 to -1. Furthermore, the positive value showed that half of the panelists assessed the item as important/essential. The larger the distance of the Content Validity Index (CVI) from 0, the more "important" and higher the validity of its content. Expert validation results show that all items have an average content validity index value of more than 0.80.

### 3.2. Face validity

The data face validity from 10 respondents was collected in July 2022 through a web-based questionnaire using a google form. The data obtained were used to measure the simplicity, clarity, overlapping responses, balance, use of jargon, the accuracy of responses, use of technical language, application, and relationship to problems. Based on the assessment results, all the items met the face validity criteria.

### 3.3. Final field study

In this phase, information was collected with a web-based survey using a google form in July 2022. A total of 118 participants who were at least 18 years old filled the questionnaire. The participants were selected using convenience sampling from a variety of population groupings to achieve the greatest possible diversity. The description of the respondents characteristics are presented in Table 1.

The questionnaires developed in this study were distributed to 118 respondents. Furthermore, 83.1% of them in the phase 2 pilot test were women, of which 60% were in the productive age and 50.8% had a Diploma degree. A total of 24% of the income was between the range of IDR 1,000,000-IDR 2,500,000. The majority of respondents worked in other sectors, namely 29.73%, while the application that is often used to find health information was HaloDoc, as stated by 58% of the population.

### 3.4. Bias prevention

The interpretation of study results can be negatively affected by several factors, including biased estimates of the validity and reliability, as well as inaccurate estimations of the correlations between components, which has an effect on the hypothesis testing. Several preventives, investigative, and remedial strategies that can be used to lessen worries regarding the potential effects of typical techniques were implemented to obtain the observed results. The most preferred method is the Harman Single Factor approach [27]. Table 2 shows the results of the Harman single factor technique, which estimated the variance of the general method, namely 35.85%. Furthermore, this was less than the maximum accepted threshold of 50% [27]. This indicates that the general method has no bias problem in the dataset of this study.

Table 1. Distribution of respondents' characteristics in phase two of the trial based on age, gender, education, occupation, and income

Characteristics	Frequency	Percentage (%)
Age		
18-24 years	73	60
25-44 years	41	35
45-64 years	4	4
Gender		
Male	20	16.9
Female	98	83.1
Education		
Senior high school	40	33.9
Diploma	60	50.8
Bachelor	7	5.9
Master	10	8.5
Doctoral	1	0.8
Occupation		
Private employee	22	18.6
Student	61	51.7
Government officer	4	3.4
Jobless	6	5.1
Entrepreneur	25	21.2
Income (IDR)		
Not yet earning	22	18.6
<IDR 1,000,000	32	27.1
IDR 1,000,000-IDR 2,500,000	24	20.3
IDR 2,500,000-IDR 3,500,000	15	12.7
>IDR 3,500,000-IDR 5,000,000	11	9.3
>IDR 5,000,000-IDR 10,000,000	10	8.5
>IDR 10,000,000	4	4
Types of application		
Alodokter	20	16.9
Pharmacies	1	0.8
Grab health	2	1.7
Halodoc	69	58.5
K24 online	12	10.2
Klikdokter	1	0.8
Shopee	11	9.3
Tokopedia	2	1.7

Table 2. Result analysis common method bias

Total	Variance (%)	Cumulative (%)
15.77	35.85	35.85

### 3.5. Construct validity

Exploratory factor analysis (EFA) was carried out with the principal component approach and the varimax rotation method. The adequacy of the sample was evaluated using the Kaiser-Meyer-Olkin (KMO) test and Bartlett's test of sphericity. The analysis results revealed that the KMO value was 0.868, which indicated that the data was adequate for the factor analysis [28]. The EFA of the main components with varimax rotation was used to build the structure and test the construct validity of an instrument. Factors with eigenvalues >1 or cumulative contribution rates >70% were retained and selected for interpretation [29]. In the first round, thirteen factors with eigenvalues greater than 1 were extracted, as shown in Figure 1. They can also explain 69.88% of the total variance of the hospital outpatient service model. However, these items have a low loading factor value of <0.5, which is known as cross-loading due to several considerations. The items were also not arranged as expected, hence, the structure extracted in the first round was not acceptable. After the process, 5 items were eliminated from the analysis, namely CSEF1, EFEX2, PEEX1, PEEX2, and PEEX3. The EFA was then repeated to obtain an acceptable structure. In the second round, factor extraction was carried out through principal component analysis and varimax rotation. This process produced 8 factors solution consisting of 15.54% social influence and support; 11.06% understanding of proficiency, confidence and quality of information; 6.64% condition of facilities, skills; 7.87% severity and suffering; 7.74%-time opportunity support and system quality; 7.34% telepharmacy adoption intention; 6.80% perceived vulnerability; 6.37% attitude. All the constructs formed were able to explain 72.40% of the total variance, as shown in Figure 1. The outcome demonstrated the same factor structure as the initial scale for the purpose of validating our one-factor

solution derived from EFA. Similarly written items, content overlaps, demand features, acquiescence, and reading difficulty are methodological effects that contribute to these associated errors [30].

The validity analysis using the principal component analysis approach produced 39 items with eigenvalues greater than 1. The results of the principal component analysis were not equal to that of the original study. This was because it lacked the tools to match the findings of this current study. However, the questionnaire has only one single-factor because the key element assessment showed that every article in the screen-plot analysis has an initial component and an obvious pattern [31].

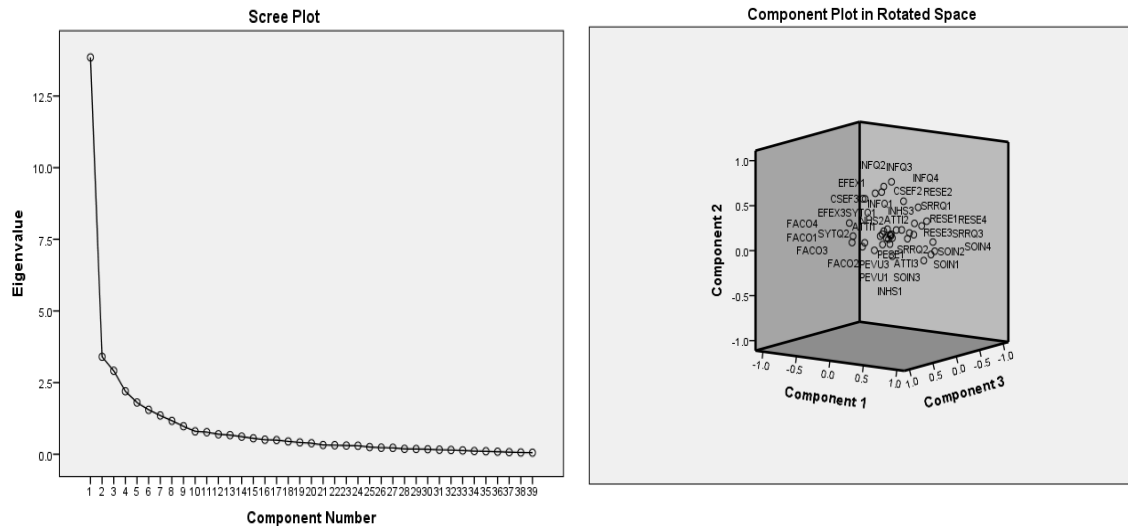


Figure 1. Scree plot EFA second round

Table 3 shows the results of the validity test using the principal component analysis approach on all variables. The loading factor value of all items was above 0.50 and each group of variables was in one component. Furthermore, all the question items were in their groups, which indicates their validity.

Table 3. Result of convergen validity test

Factor	Name of the construct	Item code	Loading factor	Factor	Name of the construct	Item code	Loading factor
1	Efficacy response, social influence, and support	RESE1	0.665	5	Support, promised time, system quality	SRRQ2	0.527
		RESE2	0.568			SRRQ3	0.561
		RESE3	0.594			SYTQ1	0.630
		RESE4	0.698			SYTQ2	0.794
		SOIN1	0.823			SYTQ3	0.686
		SOIN2	0.819				
		SOIN3	0.742				
		SOIN4	0.788				
2	Understanding, proficient, confident, and information quality	SRRQ1	0.556	6	Intention to adopt telepharmacy	INHS1	0.835
		CSEF2	0.623			INHS2	0.805
		CSEF3	0.578			INHS3	0.795
		EFEX1	0.666				
		INFQ1	0.601				
		INFQ2	0.766				
		INFQ3	0.715				
3	Facilitating condition, easy skillful	INFQ4	0.572	7	Perceived vulnerability	PEVU1	0.894
		EFEX3	0.626			PEVU2	0.875
		FACO1	0.682			PEVU3	0.893
		FACO2	0.800				
		FACO3	0.750				
4	Severity and suffer	FACO4	0.708	8	Attitude	ATTI1	0.758
		PESE1	0.860			ATTI2	0.679
		PESE2	0.898			ATTI3	0.722
		PESE3	0.888				
		PEVU4	0.591				

### 3.6. Reliability test

Table 4 shows that the lowest Cronbach Alpha value was 0.778, while the highest was 0.926, which indicates the reliability of all the variables. The overall Cronbach alpha of the variables in this study was 0.87. For factors 1 to 8, values of 0.926, 0.887, 0.852, 0.867, 0.880, 0.899, 0.892, and 0.778 were obtained, respectively. The calculation of the coefficient alpha provides information on the scale's dependability. Therefore, Cronbach alpha is often used to assess the validity of study's items. It is also a reliable coefficient that shows the relationships between elements in the collection that are proportionally associated to one another. Based on the assessment results, reliability score below 0.60 was regarded as weak [32].

Table 4. Result of reliability test

Factor	Name of the construct	Cronbach alpha value	Cut-off value
1	Efficacy response, social influence, and support	0.926	
2	Understanding, proficient, confident, and information quality	0.887	
3	Facilitating condition, easy skillful	0.852	
4	Severity and suffer	0.867	>0.70
5	Support, promised time, and system quality	0.880	
6	Intention to adopt telepharmacy	0.899	
7	Perceived vulnerability	0.892	
8	Attitude	0.778	

Although efforts were made to cover a varied population, this study's drawbacks include its inability to show predictive and concurrent validity, which requires a lengthy follow-up, as well as its inadequate representativeness of lower socioeconomic strata. Therefore, more studies are needed in several societal sectors and geographical areas. The eight constructs of telepharmacy service adoption were examined in this study using a 39-item scale. Confirmatory factor analysis must be carried out on the same scale with a bigger sample to further validate the study instrument. This measure needs to be improved and tested in other contexts to determine the generalizability.

## 4. CONCLUSION

A valid and reliable questionnaire was developed in this study, which can be used to assess the behavior of telepharmacy adoption during the COVID-19 pandemic crisis. It can also highlight the various factors associated with adoption behavior, thereby assisting pharmacists and government authorities to work towards successful digitization of pharmaceutical services by building telepharmacy literacy.

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