Analysis of Consumer Reuse Intention for Digital Healthcare Application Using The Extended TAM Approach

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Abstract. The technological disruption and conventional health services that required consumers to meet directly with health practitioners can now be accelerated through health service technology known as digital healthcare applications. In Indonesia, the use of digital healthcare applications increased rapidly when the Covid-19 pandemic hit the world. Therefore, the conventional health care service no longer suits the current market of health care. This study aimed to examine the factors in determining their influence on consumer reuse intentions in using digital healthcare applications. The methodology used is a quantitative method, with data collected by an electronic survey of customers using health care applications. Data is analyzed using SEM PLS. The finding showed that perceived usefulness, trust, privacy, and PEOU have and provide a positive influence on re-usage intention in reusing digital healthcare applications. However, this study did not test the mediation or moderation of the variables. Therefore, external variables limited to trust and privacy need to be explored further so that other external variables that might affect the use of digital healthcare applications can be obtained.

1 Introduction

Current technological developments have changed all industrial and economic activities in Indonesia. One industry that has felt the impact of technological disruption is the health industry. With this technological disruption, conventional health services that require consumers to meet directly with health practitioners can now be accelerated through health service technology known as digital healthcare applications. Digital healthcare application uses digital telecommunications tools to provide health information and services with a broad scope to increase health consumption. Digital healthcare applications enable health practitioners to monitor and offer health checks remotely without compromising the quality of health services (time-saving, flexible, and high-quality services)

Indonesia faces challenges in deploying health professionals and providing health services throughout the province. This unequal distribution creates barriers to accessing healthcare facilities. The uneven distribution of health professionals and the long distances consumers travel to health facilities is the main factor for Indonesia's low health services.

In Indonesia, the use of digital healthcare applications increased rapidly when the Covid-19 pandemic occurred. The Ministry of Communication and Information noted that digital healthcare applications increased by 443%. In line with the above, as we all know that health services in Indonesia are not evenly distributed. These conventional health services have not been able to reach all levels of society in all levels of the region and still need the same quality, facilities/infrastructure, and service standards. The solution to overcome this is to increase health service centers in areas that do not yet have health services and use digital healthcare applications as one the intermediaries to get health services according to existing standards.

This study examines the factors in determining their influence on consumer reuse intentions in using digital healthcare applications. Therefore, the current research is expected to assist digital health service providers in choosing optimal strategies to improve health services for consumers, both new consumers and retaining existing customers. This research focuses on respondents who have used digital healthcare application services. The period of this research is the last year of the use of digital healthcare applications. In terms of testing variables, researchers only focus on examining the effect of one variable on another, not testing the mediating or moderating effects.

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expected to assist digital health service providers in choosing optimal strategies to improve health services for consumers, both new consumers and retaining existing customers.

2 Literature review

The level of use of digital healthcare applications depends on the intention to reuse consumers. Sengupta and Williams [1] further argue that in various fields, sustainable use intentions have been shown to influence consumers in information technology adoption. Several factors influence consumer reuse intention to use digital healthcare applications. These factors include trust, privacy, perceived ease of use, and perceived usefulness [2] and [3].

These factors have been widely studied using various research models, where the Technology Acceptance Model (TAM) is one of the models most commonly explored and utilized by Information Science (IS) researchers [4]. TAM forms a very close relationship between ease of use, usefulness, and intention to use [5]. TAM concluded that usability and ease of use are the main determinants of user intention to use information technology [6].
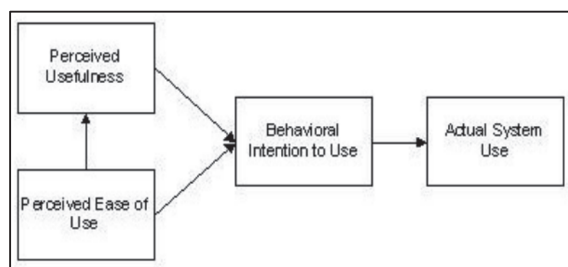

Fig. 1. The original Technology Acceptance Model [5].

Furthermore, Saade & Kira [7] developed and expanded the TAM model, where several external variables were added to the TAM, which aims to overcome the diversity that occurs in the context of technological objects. The TAM research model has proven applicable to explain consumer attitudes, intentions, and behavior in various contexts, such as e-learning, financial technology, and digital healthcare applications.
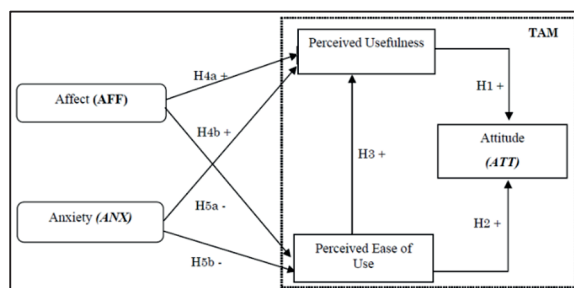

Fig. 2. Extended TAM framework [7].

Several studies have explored the impact of technology on aspects such as quality, efficiency, and cost of healthcare. However, researchers still focus on design and implementation from a service provider perspective. The existing research literature needs to be more comprehensive in understanding how consumers perceive technology use and how technology correlates with aspects of reuse intention. Health services that are expensive, complex, and universally used are also the reasons for the need to build and maintain trust and ensure privacy which is very important for consumer sustainability in the health service delivery system. Consumers are often concerned about the possible unintended economic and social consequences of misusing their health-related information. Several studies have added to the TAM model to include reuse intentions, especially in health services [8]. Other studies have also focused on a qualitative exploration of challenges associated with technology adoption without taking up relevant quantitative analysis [9]. However, detailed empirical studies devoted to examining the nuances relating to consumer adoption of technology concerning privacy and trust in healthcare, especially from a centric (as opposed to a service provider-centric) perspective, are the main contribution of our research. For this purpose, based on a comprehensive review of the existing literature, we propose extending the TAM by integrating two latent external behavioral variables: trust and privacy.

The results of previous research conducted by [3] concluded that trust influences the use of sustainable digital health services. [10], regarding the adoption of consumer acceptance of digital healthcare applications, explain that the variables perceived usefulness, trust, privacy, and ease of use are proven to be related, correlated, and support consumer acceptance using digital healthcare applications. [11] in their research, also stated that trust has a significant correlation with privacy or vice versa with consumer intentions in using technology in the health sector. Evaluation of the relationship between perceived usefulness, perceived ease of use, trust, and privacy on technology adoption in health services has a dominant influence.

Several variables are explained in the context of digital healthcare applications. Reusage intention is defined as continued use intention referring to the level of user perceptions about the willingness of continued use behavior [12]. [1] further argue that in various fields, sustainable use intentions have been shown to influence consumers in information technology adoption. Perceived usefulness is consumer perceptions of how the internet and technology can add value and competence while using digital healthcare applications. Trust is the level of consumer confidence and the belief that what they do about it is in the best interest and will produce positive results [13]. privacy is a fundamental human right recognized and determined based on culture and consumer characteristics. Still, there are also general matters, such as the inviolability of personal information and its protection [14]. Perceived Ease of Use (PEOU) or perceived ease of use is a situation where consumers can use digital technology or systems without requiring them

to expend more effort and not feel bothered when using these digital technologies or systems [15].

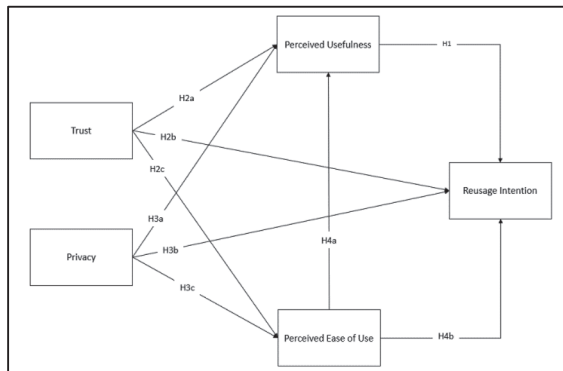In this study used the following research model:

Fig. 3. Research model.

2.1 Research model using extended TAM

Based on the research model, the hypothesis is formulated as follows:

H1: Perceived usefulness positively influences re-usage intention to use digital healthcare applications.

H2a: Trust positively influences perceived usefulness for using digital healthcare applications.

H2b: Trust positively influences re-usage intention to use digital healthcare applications.

H2c: Trust positively affects perceived ease of use for digital healthcare applications.

H3a: Privacy positively affects perceived usefulness for using digital healthcare applications.

H3b: Privacy positively influences re-usage intention to use digital healthcare applications.

3 Research method

This study uses survey research, a mechanism for collecting various information from respondents, which can then be processed into new information that can describe and become new knowledge [16]. This study uses a cross-sectional time horizon where it is possible to use two or more data sample groups from a population and retrieve information from each data group simultaneously [17].

This study has several sections of questions, such as general information from respondents, elimination questions, and questions for hypothesis testing. Each unit has a different type of measurement scale. To be able to produce quantitative data to be used for PLS-SEM data analysis, a standard measuring tool is needed. This study used a Likert scale as an option in the research questionnaire. Each question in the questionnaire can be answered using a Likert scale of 1 (strongly disagree), 2 (disagree), 3 (neutral), 4 (agree), and 5 (strongly agree). Variable Measurement

In this study there are five variables, consisting of two independent variables, two mediating variables and one dependent variable. The independent variables, Trust was measured by five dimensions namely ease of access in using the service, Service technology, product reliability, service situation and quality of service. These dimension is then measured by five indicators. The independent variable of Privacy was by four dimensions namely ease of access personal information, quantity of personal information, control over personal information, and use of personal information. Again, these dimension is then measured by five indicators. Perceived Usefullness as mediating variable was measured by four dimensions namely ease of use, ease of interacting with doctors, ease of understanding the consultation, ease of understanding the application. These dimensions was then measured by four indicators. Finally the dependent variable Reusage Intention was measured also by four dimensions namely intention to reuse, planning to reuse, service recommendation and customer feedback which have measurement of four indicators

The sampling technique for this research uses purposive sampling, which is a sampling technique that is easy to obtain and produces valid data [17]. The respondents of this research have been digital healthcare application users in the last twelve months.

Data analysis in the study used SmartPLS, an application using the PLS-SEM (Partial Least Square) approach. In the PLS-SEM test, there are two test models, namely the outer model and the inner model, along with the external model and internal model parameters:

Table 1. Outer model.

No	Measurement	Indicator	Cut-off Value	Source
1	Convergent Validity	Outer loading	$\geq 0,7$	Hair, et al. 2017
2	Discriminant Validity	HTMT	$<0,9$	Hair et al., 2017
3	Interval Consistency	Cronbach's Alpha	$\geq 0,7$	Malhotra, 2010

According to Table 1, we found all of our outer model meet the standard.

Table 2. Inner model.

No	Measurement	Cut-off Value	Source
1	Path Coefficient	P value < 0,05	Hair et al., 2017
2	R-Square	Substantial (0,75) Moderate (0,50) Weak (0,25)	Hair et al., 2017

According to Table 2, the inner model also meet the standard to further analysis.

4 Result

Respondents were dominated by ages 26-31 at 27.4% and 21-25 at 26.9%. This is because digital healthcare applications are more easily adopted by the younger generation, who quickly learn new technologies. As many as 64.87% use the Halodoc application—the domicile of most respondents residing in DKI Jakarta as much as

29.15%. As many as 49.33% have an income of IDR 5,000,000-IDR 9,999,999.

Based on the test results, it can be seen that all indicator items have outer loadings values above 0.7 so all question items used in this study are valid.

Table 3. Outer loadings.

Variable	Item Code	Outer Loadings	Explanation
Trust	TU1	0.886	Valid
	TU2	0.853	Valid
	TU3	0.882	Valid
	TU4	0.876	Valid
	TU5	0.835	Valid
Privacy	PI1	0.887	Valid
	PI2	0.891	Valid
	PI3	0.892	Valid
	PI4	0.870	Valid
Perceived Usefulness	PU1	0.911	Valid
	PU2	0.843	Valid
	PU3	0.821	Valid
	PU4	0.897	Valid
Perceived Ease of Use	PEOU1	0.918	Valid
	PEOU2	0.880	Valid
	PEOU3	0.864	Valid
	PEOU4	0.896	Valid
Reusage Intention	RU1	0.876	Valid
	RU2	0.902	Valid
	RU3	0.871	Valid
	RU4	0.871	Valid

According to Table 3, all outer loadings were valid, and therefore may follow further analysis.

Table 4. Results of HTMT test.

Variable	TR	PR	PU	PEOU	RU
TR	0.867				
PR	0.604	0.885			
PU	0.556	0.616	0.869		
PEOU	0.561	0.757	0.625	0.890	
RU	0.668	0.787	0.792	0.791	0.880

In Table 4, the discriminant validity test uses the HTMT test, which has a threshold measurement value of <0.85 with a tolerance value of >0.85 but <0.90. The following is a table related to the results of the HTMT matrix test.

Table 5. Result of R-Square.

Variable	R Square	R Square Adjusted
Perceived Usefulness	0.473	0.466
Perceived Ease of Use	0.590	0.586
Reusage Intention	0.819	0.815

Based Table 5, the R^2 value for perceived usefulness is 0.473, which means variables in the research model can explain 47.3% of perceived usefulness. As for the rest, it is defined outside of this study. It can be concluded that trust, privacy, and PEOU considerably impact perceived usefulness.

Table 6. Result of model.

Hypothesis	Original Sample (O)	Sample Mean	Std Deviation	P Value	Decision
H1	PU→RU	0.379	0.388	0.072	0.000	Accepted
H2a	TR→PU	0.237	0.242	0.102	0.021	Accepted
H2b	TR→RU	0.147	0.148	0.059	0.013	Accepted
H2c	TR→PEOU	0.164	0.172	0.082	0.046	Accepted
H3a	PR→PU	0.235	0.229	0.086	0.006	Accepted
H3b	PR→RU	0.252	0.247	0.060	0.000	Accepted
H3c	PR→PEOU	0.658	0.647	0.076	0.000	Accepted
H4a	PEOU→PU	0.314	0.317	0.112	0.005	Accepted
H4b	PEOU→RU	0.281	0.273	0.076	0.000	Accepted

In Table 6, we may found the hypothesis relationship through PLS-SEM aims to determine the significance of the latent variables proposed in this study.

Many factors make perceived usefulness positively and significantly correlated with re-usage intention, such as service quality, features, products, and reliability. Most respondents use the Halodoc application (64.86%), the pioneer digital healthcare application in Indonesia. With scalability and application development supported by adequate medical personnel, it provides a positive experience for respondents.

The campaign ensures that users have confidence in the health services provided by Halodoc. Such a strategy can increase respondents' confidence in the application used. Previous research conducted by [11] also stated that trust positively and significantly influences perceived usefulness due to several factors, including the service provider's policy towards services and the security of managed health data.

Trust will arise due to many factors. The importance of a digital healthcare application pays attention to aspects that can increase trust so that it can be maintained. Respondents who are dominated 26-31 years old (27.35%) are very easily influenced by changes in external services and information, such as reviews on social media, therefore trust is an essential aspect as a predictor of user intentions in using digital health services.

Trust is proven to affect the perceived ease of use for consumers in using digital healthcare applications, therefore trust refers to consumers' judgments or expectations that the usability, reliability, and functionality of specific technologies will support them in their work, and [18] who also concluded that affective trust and cognitive trust have a significant effect on continuing intention to use digital healthcare application services.

On the other hand, consumers are far more worried about the tendency for information to leak and the misuse of the benefits of this information when it is done in conventional methods, such as interacting directly with the hospital administration, which has the potential to share patient information with other parties.

Privacy has been proven to influence re-usage intention for consumers in using digital healthcare applications, following the statement of [19], who found that the privacy aspect is higher and attracts attention to users of fitness tracking technology, and those who also concluded that when individuals face risk, satisfaction is

also positively related to continued use intention, with solid evidence and magnitude is also controlled by privacy concerns.

One of the factors why users want to use digital healthcare applications is due to privacy issues where their data is contained in the application. If they feel that their data is safe in the digital healthcare application, they can accept the application easily. This is supported by research from [20], which states that adopting technology acceptance through the privacy variable is a powerful influence on the ease of consumer reuse of digital healthcare applications.

The ease of reusing digital healthcare applications is one of the factors where users want to use these applications in the future. If users find it difficult to reuse the digital healthcare application, it is possible if they think not to use it again. Therefore, the application owner should consider making applications easy for users to feel happy and comfortable using the application again.

5 Conclusion and Recommendation

Based on the results of the research that has been done, nine hypotheses are accepted, where it is found that perceived usefulness, trust, privacy, and PEOU have and provide a positive influence on re-usage intention in reusing digital healthcare applications. This research also makes a different contribution compared to similar previous studies in digital healthcare applications. In the study by [21], the results of the study show that perceived usefulness does not affect usage intention in reusing digital healthcare applications. In contrast to the results of our research, where perceived usefulness influences re-usage intention in reusing digital healthcare applications.

Based on the results of this study, it can be concluded that when consumers want to reuse a digital healthcare application, what is a concern for consumers is how consumers can feel the benefits, trust, feel effortless, and feel that their private data is safe when they reuse the digital healthcare application. Perceived usefulness is essential in increasing the intention to reuse digital healthcare applications. The benefits consumers feel are also positively influenced by consumer confidence in reusing digital healthcare applications. The better consumer perceptions of the benefits of using digital healthcare applications, the greater consumer confidence will ultimately encourage consumers' intention to reuse digital healthcare applications.

On the other hand, consumers will be more satisfied with online services if they find it easy to use the application and have much higher trust. Other aspects, such as privacy and convenience in digital healthcare applications, are also important. With security in maintaining consumer privacy (data/information), consumers will be more inclined to reuse the digital healthcare application because privacy becomes an essential aspect for consumers to use, which can indirectly increase the benefits and ease of reuse of the digital healthcare application. Then, the ease of use (perceived ease of use) is also essential for consumers. When consumers find it easy to reuse digital healthcare applications, their interest in using them again will increase. Moreover, if consumers can feel the benefits of these applications, the tendency for consumers to continue to reuse digital healthcare applications will increase.

In terms of limitations to the research, the final respondents of this study were primarily consumers of digital healthcare application service users who had used the service in the last 12 months. Although the concentration of research respondents was only carried out on consumers in Java Island, the involvement of other research study populations, especially in regions outside Java Island, will be able to provide much more accurate results. In addition, this study did not test the mediation or moderation of the variables. External variables limited to trust, and privacy need to be explored further so that other external variables that might affect the use of digital healthcare applications can be obtained.

Based on the limitations of this study, suggestions for further research can:

1) Sampling more respondents from consumers spread across provinces outside Java, such as the islands of Sumatra, Kalimantan, Sulawesi, to Papua. This is done so that further research can produce far more accurate data.

2) Construction of additional variables, such as self-efficacy and innovation, needs further investigation to reveal more reliable findings from the proposed model for adopting digital healthcare applications. This follows research conducted by [2] on the people of South Korea, who stated that self-efficacy and innovation had a positive and significant effect on the perceived ease of use of digital healthcare applications. [22] also said in their research on Finnish society that self-efficacy is a significant contributor to influencing consumer reuse intentions towards digital healthcare applications.

Acknowledgement

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