

Bridging TAM and e-Puskesmas: Measuring Perceived Ease of Use in Digital Health

Elia Hamda Humairo¹, Ratri Ciptaningtyas², Riastuti Kusumawardani³, Fajar Ariyanti⁴, Catur Rosidati⁵

Department of Public Health, Faculty of Health Sciences, Syarif Hidayatullah State Islamic University, Jakarta, Indonesia

Author Email: eliahamdach981@gmail.com¹, ratri.ciptaningtyas@uinjkt.ac.id², riastuti.wardani@uinjkt.ac.id³, fajar.ariyanti@uinjkt.ac.id⁴, catur.rosidati@uinjkt.ac.id⁵

Orcid: <https://orcid.org/0000-0003-4782-9687>²

Abstract. e-Puskesmas is an information system based on data and communication innovation in giving wellbeing administrations which is essential for the benefit of both patients and health care providers. However, the use of e-Puskesmas is still a challenge because some Puskesmas officers have difficulty in using e-Puskesmas. E-Puskesmas was introduced in 2016 and began to be used in Bekasi City Puskesmas in 2019. This study aimed to determine the intensity of e-Puskesmas use as reviewed from sociodemographic and user perception perspectives using the Technology Acceptance Model (TAM) concept. This study was a quantitative research with a cross-sectional design. The sampling method used was multistage random sampling, with a sample consisting of 214 health center officers from five health centers. The research instrument used was a Google Forms questionnaire. The data obtained were statistically tested using the chi-square test. The results showed that sociodemographic factors had a significant relationship with the intensity of e-Puskesmas use. In addition, there was a significant relationship between the perceived usefulness variable (0.018), perceived ease of use (0.014), and intensity of e-Puskesmas use.

Keywords: e-Puskesmas, *Technology Acceptance Model* (TAM), Sociodemography, Puskesmas, Puskesmas Officers

1 Introduction

Technology and information are two things that cannot be separated. Almost all fields of work use computer systems which play a crucial role in the development of company institutions, including in the health sector [1]. Health information systems are one form of using information systems to assist decision-making in the health sector [2]. According to Law Number 36 of 2009, health information is needed for effective and efficient health efforts. The Community Health Center (Puskesmas) is an institution that is required to carry out health information system activities in the form of a community health center information system [3].

In any activity, health centers must certainly adopt a good information system [4]. One of the Puskesmas management systems that is currently used and supports good essential health services is the e-Puskesmas application system [5]. The e-Puskesmas system is designed to facilitate the electronic and integrated storage and collection of patient data. This system aims to enhance the efficiency and accuracy of healthcare data management, and facilitates oversight for stakeholders, managers, and relevant agencies in utilizing public health data and information.

A factor that affects the effectiveness of e-Puskesmas is the degree of technology utilization by its users [5]. According to Venkatesh and Davis (2000), the acceptance of information technology is influenced by two main constructs, namely perceived ease of use and perceived usefulness; these two dimensions have a positive relationship in that any changes in the dimension of usefulness and the dimension of ease will also bring about changes in the other [6]. To determine and measure the extent of the benefits and usefulness of e-Puskesmas, the testing model that can be used is the Technology Acceptance Model (TAM) [7].

After being introduced by Davis in 1986, the TAM model was widely used and developed by other researchers. Therefore, in its development, it has undergone modifications, for example, the research conducted by Venkatesh and Davis (1996) [6]. This is like what Gahtani (2001) cited by modifying the TAM model by combining the variables of behavioral intention to use and actual system use into the acceptance variable [8]. The outcome of the information system will be accepted by users if the factors of usability and usefulness have been fulfilled. The intensity of the use of Puskesmas officers towards e-Puskesmas, as a system based on information and communication technology in providing healthcare services, is very important for service providers and patient service consumers, due to the rapid development of e-Puskesmas [7]. The readiness of the Puskesmas staff

is an important factor in the success of the e-Puskesmas implementation. The preparedness of Puskesmas officers is influenced by the attitudes and behaviors of Puskesmas officers in utilizing e-Puskesmas [9].

The Bekasi City Health Service has implemented the e-Puskesmas information system since 2019, which involves all Puskesmas officers to report all services via e-Puskesmas. Even though e-Puskesmas has been made mandatory for all Puskesmas officers in Bekasi City, there are still several obstacles in its implementation. TAM is used in this study to describe the implementation of e-Puskesmas in Bekasi City as seen from the level of intensity of ePuskesmas use.

A system is analyzed based on user perceptions to identify problems and user needs in operating the system based on their experiences. The issue serves as a reference and control for system changes, thus providing input for the development of health information systems in community health centers [14]. Therefore, it is necessary to analyze the relationship between sociodemographic factors, perceived usefulness, and perceived ease of use regarding the intensity of e-Puskesmas usage in the Bekasi City Health Center.

2 Methods

This research is a quantitative study with a *cross-sectional* design regarding the level of intensity of use of e-Puskesmas in terms of sociodemographics, *perceived usefulness*, and *perceived ease of use* in e-Puskesmas. This research was conducted at the Puskesmas of the Bekasi City Health Office work area in 2023. There were 5 Puskesmas that were selected as research samples using the *multistage random sampling* technique, namely Pondok Gede Puskesmas, Bojong Rawalumbu Puskesmas, Jaka Mulya Puskesmas, Jati Warna Puskesmas, and Jati Kramat Puskesmas. The research was conducted by distributing questionnaires using *google form* to 214 Puskesmas officers who use e-Puskesmas. Data analysis in this study used univariate analysis and bivariate analysis. Univariate analysis was conducted to determine the frequency distribution of the research variables. The results of the study used a frequency distribution table. While bivariate analysis was carried out to test the hypothesis, the relationship between the dependent variable and the independent variable. To get more accurate results in conducting heteroscedasticity tests. Researchers used the help of the SPSS version 22 program.

3 Result

Table 1. Characteristics and Intensity of Use of e-Puskesmas Respondents.

Sociodemographic Characteristics	Total	
	n	%
Gender		
Male	32	15%
Female	182	85%
Age Group		
17-25 Years	15	7%
26-35 Years	66	31%
36-45 Years	72	34%
46-55 Years	46	21%
56 Years and above	15	7%
Education		
High school	9	4%
Diploma 3	86	40%
Diploma 4	38	18%
Bachelor	74	34%
Master	7	3%
Employment Status		
Permanent	100	47%
Temporary	114	53%
Job Type		
Doctor	15	7%
Dentist	11	6%
Midwife	48	22%
Nurse	33	15%
Dental Nurse	4	2%

Sociodemographic Characteristics	Total	
	n	%
Pharmacist	7	3%
Ass. Pharmacist	5	3%
Health Lab Technician	7	3%
Other General Staff	84	39%
Frequency		
<1 in a week	-	
1 time a week	5	2.3%
>1 time per week	10	4.7%
1 time per day	88	41%
>1 time per day	111	52%
Duration		
1-2 hours	12	5,6%
3-5 hours	18	8.4%
6-8 hours	184	86%
Experience		
<1 month	-	-
1-3 months	14	6.5%
3-6 months`	25	11.6%
6 months - 1 year	32	14.9%
>1 year	143	66.5%

The majority of subjects are female as of 85%, age group 36 to 45 years old (34%) and slightly lower percentage as of 31% among age group 26 to 35 years old, the highest proportion of diploma 3 graduation as of 40%, more temporary status as 53%, position as other general staff 39%, use e-puskesmas more than one time a day as 52% around 6 to 8 hours as 86% and most subjects have been used epuskesmas or more than a year as 66.5%.

Table 2. Relationship between Perceived Usefulness Dimensions and Intensity of Use of e-Puskesmas.

Perceived Usability	Intensity of Use of e-Puskesmas				Total		P-Value
	High		Low				
	N	%	n	%	N	%	
High (If total score $\geq$ 34)	71	59%	49	41%	120	100%	0,018
Low (If total score $<$ 34)	64	68%	30	32%	94	100%	
Total	135	63%	79	37%	214	100%	

The results of the analysis of the relationship between perceived usefulness on the intensity of use of e-Puskesmas found that 71 (59%) of the total respondents had a high perceived usefulness dimension of e-Puskesmas. Bivariate analysis obtained a value of $p = 0.018$ there is a significant relationship in perceived usefulness to the intention of using e-Puskesmas.

Table 3. Relationship between Ease of Use Dimension and Intensity of Use of e-Puskesmas.

Perceived Ease	Intensity of Use of e- Puskesmas				Total		P-Value
	High		Low		N	%	
	n	%	N	%			
High (If total score $\geq$ 12)	62	55%	50	45%	112	100%	0,014
Low (If total score $<$ 12)	73	72%	29	28%	102	100%	
Total	135	63%	79	37%	214	100%	

The results of the analysis of the relationship between perceived ease of use on the intensity of use of e-Puskesmas found that 62 (55%) of the total respondents had a high perception of the ease of e-Puskesmas. Bivariate analysis obtained a value of $p = 0.014$ there is a significant relationship in the dimension of perceived ease of use on the intention to use e-Puskesmas.

Table 4. Relationship of Percived Usefulness and Ease of Use Dimensions with Sociodemographic Characteristics.

Sociodemographic Factors	Dimensions of Perceived Usefulness				Dimensions of Perceived Ease of Use				Total	
	High		Low		High		Low		n	%
	n	%	n	%	n	%	n	%		
Gender										
Male	28	88%	4	12%	25	78%	7	22%	32	100%
Female	92	51%	90	49%	87	48%	95	52%	182	100%
Age Group										
17-25 Years	11	73%	4	27%	10	67%	5	33%	15	100%
26-35 Years	60	91%	6	9%	43	65%	23	35%	66	100%
36-45 Years	56	78%	16	22%	47	65%	25	35%	72	100%
46-55 Years	33	72%	13	18%	25	54%	21	46%	46	100%
56 Years and above	5	33%	10	67%	3	20%	12	80%	15	100%
Education										
High school	5	56%	4	44%	7	78%	2	22%	9	100%
Bachelor	40	46%	46	54%	34	39%	52	61%	86	100%
Applied Bachelor	21	55%	17	45%	17	45%	21	55%	38	100%
Diploma	49	66%	25	34%	49	66%	25	34%	74	100%
Master	5	71%	2	29%	5	71%	2	29%	7	100%
Employment Status										
Permanent	69	69%	31	31%	68	68%	32	32%	100	100%
Temporary	51	45%	63	55%	44	39%	70	61%	114	100%
Type of Work										
Doctor	15	100%	0	0%	14	93%	1	7%	15	100%
Dentist	5	46%	6	54%	6	56%	5	44%	11	100%
Midwife	20	42%	28	58%	19	40%	29	60%	48	100%
Nurse	22	67%	11	33%	18	54%	15	46%	33	100%
Dental Nurse	1	25%	3	75%	1	25%	3	75%	4	100%
Pharmacist	7	100%	0	0%	7	100%	0	0%	7	100%
Ass. Pharmacist	5	100%	0	0%	5	100%	0	0%	5	100%
Health Lab Technician	5	71%	2	29%	5	71%	2	29%	7	100%
Other labor	40	48%	44	52%	37	44%	47	56%	84	100%

4 Discussion

4.1 Sociodemographics with Intensity of Use of e-Puskesmas and Characteristics of Respondents

In this digital era, health workers, in addition to having abilities and skills according to the health sector, are also required to be able to adapt to the surrounding environment which has begun to utilize information communication technology in supporting their work so that health workers must be literate in information communication technology [3]. Based on the results of the study, it can be seen that the gender of most respondents is 85% female compared to 15% male respondents. The results showed that there was a significant relationship between the gender variable and the intensity of use of e-Puskesmas in the Bekasi City area. This is evidenced by the p-value of 0.035. Gender greatly influences the attitudes and behavior of respondents in dealing with a job, where a man can work faster than a woman, as well as women usually work more neatly than men in determining the results of the work [4].

As for age, the research results are dominated by respondents with an age range of 36-45 years with a percentage of 34%. The results showed that there is a significant relationship between the age group variable and the intensity of use of e-Puskesmas in the Bekasi City area. This is evidenced by the p-value of 0.042. Based on

the results of research conducted by Anjani (2022), from the results of statistical tests on internet usage behavior using computer devices, it is known that the p value = 0.136 ($p > 0.05$) so that it can also be concluded that there is no relationship between age and internet usage behavior with computers [2]. However, the relationship between performance and age is closely related, the reason is the widespread belief that performance will decrease with increasing age [7].

Health worker education aims to produce professional health workers in numbers and types that are in accordance with the needs of health services. In this study, the education level of health workers at the Bekasi City Health Center was categorized into SMA, Diploma, Bachelor / S1, and Master / S2. Based on the results of the research that has been conducted, the number of health workers with the highest level of education is in the Diploma (D3) category as many as 84 respondents with a percentage of 39%. The results also show that there is a significant relationship between the variable level of education and the intensity of use of e-Puskesmas in the Bekasi City area. This is in line with the theory put forward by Kuncoro in Godensia (2017), which states that the higher the level of education, it can be assumed that the quality of the workforce is getting better, because the higher the level of education, the estimated ability and skills. This is evident from the results of the perceptions of Puskesmas officers at high education levels such as S1 (66%), and S2 (71%) have high perceptions of usefulness and convenience.

Based on the results of the study, employment status has the same percentage between permanent and non-permanent employment status at 50%. The results showed that there was no significant relationship between the employment status variable and the intensity of use of e-Puskesmas in Bekasi City area. So there is no relationship between employment status and the use of e-Puskesmas. Puskesmas officers who have a non-permanent employment status will continue to use e-Puskesmas because it has become a service rule and convenience in recording Puskesmas reporting.

Based on the results of the study, the most types of work in Puskesmas officers are in the type of work of other general personnel as many as 84 respondents with a percentage of 39%. The results showed that there is a significant relationship between the variable type of work and the intensity of use of e-Puskesmas in the Bekasi City area. The type of work has a relationship with the level of education, as seen from the results of the perception of Puskesmas officers in types of work such as doctors, pharmacists, and pharmacist assistants have a good perception of usefulness and convenience, namely 90-100% of respondents. When viewed in other types of work, it has a high perception of usefulness and convenience, but there are still more than 50% of health workers who have a low perception of usefulness and usefulness, namely in the types of work of dentists, midwives, nurses, and dental nurses.

4.2 Intensity of Use of e-Puskesmas

According to (Davis, 1989), intensity of use refers to *actual system* usage or actual system usage in e-Puskesmas is a measurement of frequency, duration, and time experience of using technology. The e-Puskesmas application is part of the effort to digitize health services in Indonesia. This application can assist in providing better health services, monitoring diseases more effectively, and designing more targeted health programs. Access is the availability of e-Puskesmas to be used by Puskesmas staff.

In addition, the experience of Puskesmas officers is one of the factors in the intensity of using e-Puskesmas. Based on the results of the study, the most experience of Puskesmas officers has used e-Puskesmas for more than 1 year as many as 143 respondents (66.5%). Based on the *Technology Acceptance Model* (TAM) theory, the intensity of use of e-Puskesmas is influenced by 2 dimensions, namely *perceived usefulness* and *perceived ease of use*. In addition to TAM, according to (Gahtani, 2005) and (Wang and Qi, 2021), the intensity of use of e-Puskesmas has a relationship with sociodemographic factors such as gender, age, education, status and type of work [1][18]. The intensity of using e-Puskesmas will affect the use of e-Puskesmas for Puskesmas officers. Infokes has provided guidelines for using e-Puskesmas which can be accessed through the "Manual Book e-Puskesmas NG Version". The guidelines contain steps for using e-Puskesmas from processing to reporting. Although there are guidelines for using e-Puskesmas, the implementation of e-Puskesmas is still not implemented effectively, because there are still Puskesmas that use the manual system even though they have entered data in e-Puskesmas [10].

4.3 Perceived Usefulness with Intensity of Use of e-Puskesmas

Perceived usefulness is the extent to which Puskesmas officers believe that the use of e-Puskesmas will improve their job performance. The usefulness of using e-Puskesmas can be known from the confidence of Puskesmas officers in deciding to accept e-Puskesmas, with a belief that the use of e-Puskesmas makes a positive contribution to Puskesmas officers. The TAM model measures perceived benefits, or how useful e-Puskesmas is for health center officers. Users assume that a system with high "perceived usefulness" will provide a positive

"use performance" relationship. The results also show that there is a significant relationship between the perceived usefulness variable and the intensity of use of e-Puskesmas in the Bekasi City area. This is evidenced by the p-value of 0.018. This is in line with the results of research conducted by Rizqulloh, et al (2022), on the variable *perceived usefulness* shows a pvalue of 0.000 ($p < 0.05$) which means that there is a significant relationship between *perceived usefulness* and the intensity of use of e-Puskesmas.

From several experts defining *perceived usefulness*, it can be said that *perceived usefulness* is the belief of Puskesmas officers when using e-Puskesmas can improve their work to be faster, more productive and effective. The level of trust of health center staff that using e-Puskesmas can improve performance. The usefulness of a technology is a benchmark so that the use of e-Puskesmas can increase the productivity of the performance of Puskesmas officers and will provide benefits when used. Overall, the level of perceived usefulness of Puskesmas officers is high as evidenced by the results of Puskesmas officers who have a high perception of usefulness and intensity of use of e-Puskesmas, namely 152 respondents (81%). However, there are still Puskesmas officers who have high perceived usefulness but low intention to use e-Puskesmas. This is evidenced by, as many as 6 respondents (2.8%) who disagree that using e-Puskesmas can get more work done than otherwise. In addition, as many as 13 respondents (6.1%) disagree that using e-Puskesmas can support the work done by Puskesmas officers. This is evidenced by the fact that there are still characteristics of respondents who have low perceived usefulness, namely specifically in the female gender (49%), age group >56 years (67%), D3 education level (54%), non-permanent employment status (55%), and the type of work of other general personnel (52%).

This is because there are still many obstacles in filling out e-Puskesmas. Infrastructure limitations include the number of computers at the Puskesmas is insufficient, there is no backup power source if the power goes out, the security of the computer room is not guaranteed [9]. Based on observations, there is still a slow internet network that is an obstacle in implementing e-Puskesmas.

4.4 Perceived Ease of Use with Intensity of Use of e-Puskesmas

Ease of use is the perceived ease of use which is defined as the extent to which health center officers believe that using e-Puskesmas can minimize effort is the extent to which a person believes that using a technology will be effort free. Conversely, if a health center officer believes that e-Puskesmas is not easy to use then he will not use it [8]. Based on the results of the study, the average respondent answered each statement regarding *perceived ease of use* by disagreeing and strongly disagreeing, because the statements on *perceived ease* were predominantly negative. The results showed that there is a significant relationship between the *perceived ease of use* variable and the intensity of use of e-Puskesmas in the Bekasi City area with a pvalue of 0.014. This is in line with research conducted by Khasanah, et al (2022), on the variable *perceived ease of use* with a pvalue of 0.001. The results of this study indicate that this factor is proven to be able to explain one's reasons for using e-Puskesmas and explain that the new system being developed is accepted by Puskesmas officers [5].

Tutorials on the use of e-Puskesmas in Bekasi City are provided by the Bekasi City Health Office through socialization by conducting meetings with e-Puskesmas operators at each Puskesmas. In addition, further monitoring and evaluation will be scheduled at each Puskesmas in Bekasi City. Infokes has made it easier for health workers who want to learn more about the use and features of e-Puskesmas. The dissemination carried out by the Bekasi City Health Office is sufficient to facilitate Puskesmas officers in using e-Puskesmas. This is because each Puskesmas has its own e-Puskesmas operator so that if there are problems, they can ask the operator for help. Some Puskesmas officers have not found it easy to use e-Puskesmas. To overcome these problems, the guidelines for using e-Puskesmas need to be adjusted to the flow so that Puskesmas officers can find it easy to use e-Puskesmas in addition to training and mentoring [13]. The use of a technology, will have an impact on the user, if the e-Puskesmas used is easy, it will increase Puskesmas officers in utilizing it, the ease aspect in e-Puskesmas has several indicators, namely easy to learn, controllable, clear and easy to understand, and flexible.

5 Conclusions

It is known that sociodemographic factors have a significant relationship with the intensity of use of e-Puskesmas with a Pvalue < 0.05 . However, there is one factor that does not have a significant relationship with the intensity of use of e-Puskesmas, namely in employment status with a Pvalue of 0.579. In addition, there is a variable relationship between *perceived usefulness* (0.018) and *perceived ease of use* (0.014) with the intensity of use of e-Puskesmas. However, there are still health center officers who have high perceptions of the usefulness and ease of use of e-Puskesmas but have low intention to use e-Puskesmas. Sociodemographics also have an influence on the perceived usefulness and perceived usefulness of e-Puskesmas, with there are still characteristics of respondents who have low perceptions of usefulness, especially in the female gender, age group >56 years, D3 education level, non-permanent employment status, and other types of employment of general personnel.

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