❒ 168

Acceptance of Health Information System for Public Health Centre in North Borneo, Indonesia

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Article Info	ABSTRACT
	This study sought the factor associated with own acceptance of HIS for PHC by using the modification of Technology Acceptance Model (TAM) in the Sebengkok PHC, Central Tarakan Subdistrict, Tarakan City, North Borneo, Indonesia. A cross-sectional approach was conducted through a survey on the 37 of PHC's user. A set of questionnaires which was adopted from the previous research was used to collect the information from the participant. The model was developed by involving job relevance, output quality, result demonstrability, screen design, terminology, facilitating condition, perceived of usefulness, perceived ease of use, intention to use and system use (actual usage) as the construct. According to the hypothesis testing, perceived usefulness predicted by terminology, perceived ease of use is significantly predicted by screen design and terminology, perceived usefulness significantly predicts the intention of use and perceived ease of use, while system use which predicted considerably by the intention of use and facilitating condition. This study may have a contribution to the future improvement of HIS for PHC and guide the next coming research to dig the difference acceptance among the user.

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1. INTRODUCTION

The growth of population in developing country must be balanced with the excellent data collection to support the policymaker to provide a health service. Health Information System or Healthcare Information system (HIS) is a function to collect, compile, quality assurance, analyse and disseminate and sharing use of data [1] from the healthcare facilities for policy purposes. HIS has grown dramatically since 1960 worldwide [2] as an effort to provide a reliable data for the policymaker purposes. However, in some developing countries like Indonesia, rising a challenge on HIS implementation, such as the poor data quality. Thus regarding the lack of quality personnel and in proper infrastructure [3], [4].

As the fourth most populous country in the world with more than 260 millions population [5], Indonesia may contribute the significant health metric globally. For that reason, collecting reliable data is a must. In order bridge that purpose, Indonesia government launched Health Information System in Primary Health Centre (HISPHC) or "SIMPUS" which is connected to the District Health Office Information System also the upper level [6]. HISPHC was initiated in 2010 by the Indonesia Ministry of Health [7] which is implemented in 9.655 PHC in Indonesia [8]. In 2014, Indonesia released Indonesia Health Insurance or called as BPJS in which need adequate data from the HISPHC. Accordingly, the role of HISPHC become essential to provide adequate and validate data related to the health aspect. However, amount research in some areas in Indonesia reported there was some challenge of HISPHC implementation. For example, a study in Mulyorejo PHC, Surabaya found that HISPHC has not been used routinely due to some trouble, human experience and

acceptance were other challenges of the implementation [9]. As a result, there is a necessity to update information regarding the current situation of the HISPHC acceptance to establish evidence as an input for the health authorities.

Sebengkok Public Health Centre located in Central Tarakan Subdistrict, Tarakan City, North Borneo, Indonesia. This PHC may represent the urban PHC in Indonesia, has been implementing HISPHC since 2011. The HIS that they used has being integrated among the division in the PHC such as in registration patient, general polyclinic, hospitalisation services, laboratory and pharmacy. Despite the HIS implementation is remain running, but they still face some challenges such as 1) the unstable of electricity, so occasionally manual record had to perform to make the patient service remain running; 2) no specific staff operates the HIS. To the best of our knowledge, the same problem was found in the another PHC in Indonesia, but little research was performed. Accordingly, this study could stand for the other areas with the similar characteristic and the corresponding problem.

By using modification of Technology Acceptance Model (TAM) which is developed by [10], this study aims to observe the factor associated with individual acceptance of HISPHC through some construct such as job relevance, output quality, result demonstrability, screen design, terminology, facilitating condition, perceived of usefulness, perceived ease of use, intention to use and system use (actual use). The urgency of this research due to the importance of system use (practical use) to carried out the system implementation successful.

2. RESEARCH METHOD

Cross-sectional approach by performing a survey was applied in December 2017 in Sebengkok Public Health Centre (PHC), Tarakan Subdistrict, Tarakan City, North Borneo, Indonesia. Modification of original Technology Acceptance Model (TAM) was used to measure the technology acceptance among PHC's user, i.e. physician, nurse, midwife, pharmacies, nutrition officer, public health officer and register patient staff.

Slovin calculator (http://www.en.globalstatistik.com/sampling-size-calculator/) was used to count the sample size based on 10% of margin error. Accordingly, the sample was 37 participants out of 59 people who is everyone ever been exposed by PHC's information system. The sample was chosen through accidental sampling. We added 10% of the sample size to anticipate drop out due to the incompleteness of data.

A set of questionnaires which was adopted from previous research was used to obtain the data from the participant. The questionnaire validity value is more than 0.5 for each construct question and Cronbach`s Alpha- Composite Reliability was more than 0.7 [11]. The questionnaire consisted of two sections, i.e. socio-demographic participant and research variable. Twenty-six statements in which served on Likert Scale was asked to the participant. Likert scale was score 1 for very disagree, 2 for disagree, 3 for neutral, 4 for agree and 5 for very agree. Dependent, independent variable, construct and question for each construct are presented in Table 1.

The analysis was performed in Smart PLS 3.2.3 trial version by following these steps: 1) univariate analysis, 2) evaluation model (outer model): convergent and discriminant validity, reliability construct, 3) evaluation structure model (inner model): using R square, 4) hypothesis testing. The hypothesis was accepted through Bootstrapping test with t-value>1.96 which is equivalent to $p < 0.05$. This research was approved by the public health faculty committee. Informed consent was asked from each participant prior to the interview.

3. RESULTS AND ANALYSIS

A 37-participant has participated in this research. Most of them were female, and more than 90% of the participant was aged between 30-49. Only 5 participants hold on senior high school education while the rest was at diploma or bachelor. Majority of the participant was a nurse and followed by the midwife as shown in Table 2.

Univariate analysis tells that the majority of participant accepted the PHC's information system that they have been used. Thus, be reflected by the mean score which is more than 3 for each indicator. Afterwards, entirely studied constructs were valid. It is shown from Cronbach Alpha, AVE and Composite Reliability are >0.6, >0.5 and >0.7 respectively such as explained in (12) as shown in Table 3.

Refer to the previous study, convergent validity was assessed through loading factor value by considering loading factor more than >0.7 was accepted [13]. On this research, entirely sub construct embrace > 0.7 of loading factor. Accordingly, they were accepted as sub construct to develop the model. To assess the power of the model, we took into consideration the R square value. Among the dependent variable, Perceived usefulness, Perceived ease of use, Intention to use and System use had R square more than 0.8, this

number shows that the independent variable (sub-construct) could explain the dependent variable (construct) amount more than 64%. While the 36% is explained by other factors as shown in Figure 1.

Table 1. Structure Item for Each Construct

No	Variable	Construct	Code	Statements
1	IV	Job Relevance	JR1	In my job, using PHC's information system is very important
2	IV		JR2	In my job, using PHC's information system is very relevant
3	IV	Output Quality	OQ1	I don't have any problem with PHC's information system output
4	IV		OQ2	I don't have any problem with output quality of PHC's information system
5	IV	Result Demonstrability	RD1	The result of using PHC's information system is applicable for me
6	IV		RD2	I believe can communicate with other regarding consequences of using PHC's information system
7	IV	Screen Design	SD1	PHC's information system display is consistent
8	IV		SD2	Instruction on PHC's information system is placed in the right button
9	IV	Terminology	TM1	I understand the terminology used in PHC's information system
10	IV		TM2	In my opinion, the terminology used in PHC's information system is consistent
11	IV	Facilitating Condition	FC1	The existing resources support the usage of PHC's information system
12	IV		FC2	I have appropriate knowledge for using PHC's information system
13	IV		FC3	IT staff in district health office be able to help if I found difficulties in using PHC's information system
14	DV	Perceived Usefulness	PU1	Using PHC's information system increases my work productivity
15	DV		PU2	Using PHC's information system increases my work effectivity
16	DV	Perceived Ease of Use	PEU1	PHC's information system is easy to use
17	DV		PEU2	Usage of PHC's information system is don't need high effort
18	DV	Intention to Use	IU1	I am interested in using PHC's information system in the next three months
19	DV		IU2	I predict that I will use PHC's information system in the next three months
20	DV		IU3	I plan to use PHC's information system in the next three months
21	DV		SU1	I use PHC's information system neither in my daily work nor holiday
22	DV	System Use (Actual	SU2	I always use PHC's information system for data entry purposes
23	DV	Use)	SU3	I use PHC's information system in my every work
24	DV		SU4	I use PHC's information system average 10 minutes for a section
25	DV		SU5	Overall, I satisfy with the PHC's information system performance
26	DV		SU6	I will communicate my satisfaction on using PHC's information system to my colleagues

Note: IV: Independent variable. DV: Dependent variable

Table 2. Socio-Demographic of Participant

Demographic		Frequency	Percentage (%)
Gender	Female	31	83.8
	Male	6	16.2
	Total	37	100
Age	< 30	2	5.4
	30 – 49	34	91.9
	> 50	1	2.7
	Total	37	100
Education	Senior high school	5	13.5
	Diploma	14	37.8
	Bachelor	18	48.6
	Total	37	100
Occupation	General practitioner	3	8.1
	Nurse	14	37.8
	Dentist	1	2.7
	Midwife	9	24.3
	Pharmacist assistance	1	2.7
	Administration staff	2	5.4
	Manager assistance	1	2.7
	Nutritionist	2	5.4
	Environmental health staff	1	2.7
	Pharmacist	1	2.7
	Health analyst	2	5.4
	Total	37	100

Table 3. The Relationship among Studied Construct

	CA	CR	AVE
FC	0.875	0.923	0.800
IU	0.920	0.949	0.862
JR	0.826	-0.920	0.852
OQ	0.854	0.932	0.872
PEU	0.899	0.952	0.908
PU	0.769	0.896	0.812
RD	0.890	0.948	0.901
SD	0.609	0.836	0.719
SU	0.966	0.973	0.855
TM	0.715	0.875	0.778

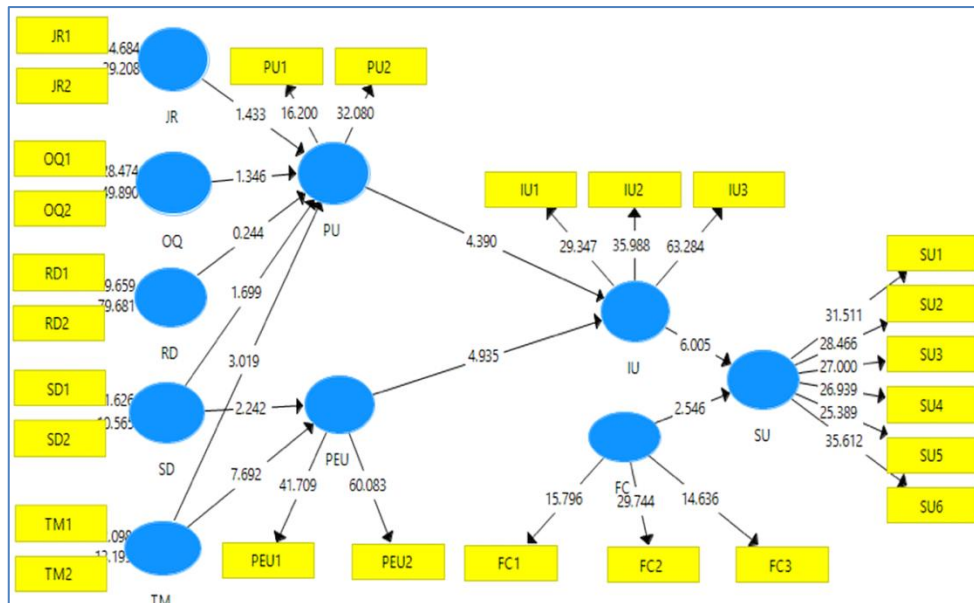CA: Cronbach's alpha; CR: Composite reliability; AVE: average variance extracted

Figure 1. Bootstrapping model result

According to the hypothesis testing of the structural model (Bootstrapping model), the entire sub construct has a positive effect to construct. Additionally, perceived usefulness only predicted by terminology, perceived ease of use is significantly predicted by screen design and terminology, the intention of use is significantly predicted by perceived usefulness and perceived ease of use, last is the system use which significantly predicted by the intention of use and facilitating condition as shown in Table 4.

Table 4. Hypothesis Testing Result

Construct	t-statistic
JR → PU	1.433
OQ → PU	1.346
RD → PU	0.244
SD → PU	1.699
TM → PU	3.019*
TM → PEU	7.692*
SD → PEU	2.242*
PU → IU	4.390*
PEU → IU	4.935*
IU → SU	6.005*
FC → SU	2.546*

* t-table > 1.96

Health Information System (HIS) is an essential part in health care service to collect reliable a data relates to decision making purpose on health. HIS performs several activities such as collecting, processing, storing and visualising to support decision maker in planning the health care services. In addition, HIS is integrated with health system improving the quality of health service [14]. In Indonesia, "*Puskesmas*" or Public Health Center or PHC roles as primer healthcare, they perform case finding and health service [15] directly to the community. Looking at the huge population in Indonesia, it would be related to the number of data that should be collected and managed. Accordingly, working with the effective and efficient system is the fundamental step to cut the time and money consuming. Also, in the health national insurance era in Indonesia, the role of PHC as first health care provider holds essential role to deliver a good data regarding the claims of the insurance. While, on the other hand, to run such technology, a human is a pivotal person to succeed because human initiates to conceptualising and implementing those technology [16]. Accordingly, assessment of HISforPHC acceptance among the user will bring an understanding of the factor associated with the HIS acceptance and may improve the HIS quality in the future.

In this study, we measured the factor associated with the human acceptance of HIS implementation. Through Technology Acceptance Model (TAM) approach, we identified that system use or actual use of HISforPHC significantly related to the Intention Use (IU) and Facilitating Condition (FC). While Intention of Use predicted considerably by Perceived Ease of Use (PEU) and Perceived of Usefulness (PU).

Terminology is significantly influencing the PU and PEU the HIS in Sebengkok PHC. Terminology plays a vital role to carried out the user understanding when operating the HIS regarding the program interface. Terminology clarity assists the user to input a data to the HIS in proper technique and faster. As a result, the user keeps on their mind that HIS gives a benefit to them and helpful to do their jobs. The same finding had found from another different research in Somalia who said terminology was associated with PEU [17]. On another hand, looking at the education background of the participant (Table 2) which is most of them have a university degree, probably it is a reason that participant easy to understand the terminology which used in the HIS. Perceived of usefulness is a valuable insight that has to form on the health information system implementation. Thus, associated with the willingness to use to use daily work if they understand that HIS is helpful and solve their duty. As well as for the perceived of ease to use, terminology help to encourage the user that they do not require a hard effort on using the HIS program. In line with this, research in the digital library has found the similar finding that terminology influences the perceived ease of use [18].

In this research also discovered that screen design significantly correlated perceived Ease of Use (PEU) of HIS. In line with this finding, a study found the same that screen design has a positive association with the PEU [19]. Screen design is the primary interface in HIS; user will directly interact with the system through this menu. Designing an exciting screen interface could be help user easily to find the menu. A research said that excellent screen design would make the user comfortable with the screen environment and user easy to play around the program [19, 20]. Another research revealed that there are five determinants of the individual perception of the computer technology, one of which is screen design [21].

This study also elaborated that PEU and PU have a positive association with the Intention of Use (IU). This finding is approved by another research which stated behavioural intention is an indirect function from two variables that are perceived ease of use and perceived of usefulness [22]. The intention is a willingness of an individual to follow or participate in the particular program. This intention is an investment for a specific program to be successful in the implementation. Thus, it is supported by the social cognitive theory that IU as one of constructing actual behaviour [23].

Correspond with social cognitive theory; in this study found that IU has a positive association to System Use (SU) together with Facilitating Condition (FC). IU is defined by the subjective individual, while FC is influenced by the external situation such as the support of related health agencies to fulfil the infrastructures [24] such as good internet connection, qualified computer, and stable electricity to perform the system. As the best PHC in North Borneo [25], Sebengkok PHC has proper facilities including to run Health Information System. Accordingly, the HIS runs efficiently and support the routine work in the PHC in a proper way.

According to original TAM theory, it explains that technology usage determined by user behaviour which is an indirect function of Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) [26]. Reflected that theory and considering this research result, terminology and screen design are the two crucial part of HIS implementation. This study may have a limitation on the sample size, which was conducted in one PHC in Indonesia. Result interpretation may perform carefully by considering the type of the PHC.

4. CONCLUSION

Health information system management is an essential part of providing accurate and validates data to support the policy maker. Owing to the urgency of the data needs, health authority rolling out the PHC Health Information System as the first entry of the data from the community. In developing countries, such as in Indonesia, acceptance of HIS often becomes a problem due to the human resources and low awareness of the HIS importance. Accordingly, understanding user acceptance is essential to bring HIS closer to them. Even though a lot of effort improving user participation on HIS implementation likewise the identification factor associated with the acceptance has been done, more research is needed to know the acceptance among healthcare staff such midwife, nurse, general practitioner, pharmacist, etc. In addition, reviewing the acceptance through other parameters might enrich the insight for the policymaker.

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