

INTENTION TO ADOPT: USING OF BARCODE SYSTEM TO REDUCE HEALTH SERVICE ERRORS

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Abstract : This study aims to examine the factors driving the intention to adopt an information system through the use of patient barcode system at a hospital in Surakarta. This study is necessary to explore the variables forming the information system adoption intention in order to improve the performance of hospital medical personnel. Survey method and questionnaire were applied in data collection. The data were collected using a probability sampling technique resulting in a number of 100 questionnaires to be processed. SPSS was used to test the instrument of the study, while SEM using AMOS method was applied to test hypotheses. The results showed that to be able to increase the confidence of user to form the intention to adopt barcode systems in hospitals is influenced by the condition of the facility not because of management pressure and social pressure.

Keywords: *Intention to Adopt Information System, Trust, Facility Condition, Managerial Pressure, Social Pressure, Barcode System.*

1. Introduction

Studies on information system adoption intention using patient barcode are still significant in the research on hospital information systems due to the novelty of the use of the barcode and the need to increase quality in data display. In addition, the difference in the results of the research caused by the difference in the research objects has contributed to the research objectives and the analysis instruments used (Cabanillas *et al.*, 2014; Al-Hadban *et al.*, 2016). The difference in the results provides an opportunity for the researchers to modify the research models to fit the research objects used.

Patient dissatisfaction in getting hospital services is still a problem in Indonesia and developing countries. Data shows that 70% of patients are not satisfied with the health services provided by regional general hospitals in Indonesia (Widiasari *et al.*, 2019). This dissatisfaction was caused by several factors, including patient identity errors, communication errors in the application of patient safety, and medication errors (Widiasari *et al.*, 2019). A health information system that is easy, low cost, and affordable can be a solution to improve the delivery of health services in hospitals. However, these technological changes have an impact on the successful adoption of health information systems (Hoque and Sorwar, 2017). Based on data from the American Hospital Association, it is reported that only 11% of hospital institutions fully adopt the hospital information system (Najaftorkaman *et al.*, 2015). The low adoption of hospital information systems is due to user behavior who perceives the complex to be a factor in the lack of successful implementation (Dwivedi *et al.*, 2016). The phenomenon of the adoption behavior of the hospital information system in reducing errors in health services is interesting to study.

The role of an organization in supporting the health information system implementation is encouraging the active use of technology by involving and providing resources for the implementation process of health information system adoption (Al-Hadban *et al.*, 2016). Several studies indicate low implementation of the health information system adoption in hospitals due to organization low quality of infrastructure provision, low motivation of the information system usage, and lenient regulations on the implementation (Ahmad *et al.*, 2013; Maillet *et al.*, 2015; Hoque and Sorwar, 2017). For that reason, a study on information system adoption involving the roles of an organization for the implementation requires further examination.

The high complexity of technology hampers the health information system adoption intention (Nikou and Economides, 2017). However, the problem of the complexity of information system implementation will be overcome if an organization has a strong role in the implementation (Ahmad *et al.*, 2013; Moya *et al.*, 2016; Masa'deh *et al.*, 2016). This is because the success of the health information system implementation through the organizational perspectives is more influential than that through technological

perspectives (Ahmadi *et al.*, 2015). The organizational factors directly connected to organizational policies on the management of resources and work environments can determine the improvement of organizational performance (Al-Hadban *et al.*, 2016; Dwivedi *et al.*, 2016). The present study, therefore, focuses on the health information system adoption intention through organizational perspectives.

Individual trust in an information system exerts a strong influence on the adoption intention (Masa'deh *et al.*, 2016; Moya *et al.*, 2016). This means that the higher the trust is, the stronger the establishment of the health information system adoption will be. The explanation proves that individual trust in a system can encourage information system adoption (Hanafizadeh *et al.*, 2014). Much literature also points out that trust serves as a variable which is able to mediate the influences of facility conditions, managerial pressure, as well as social pressure in the improvement of the information system adoption intention (Susanto and Aljoza, 2015; Slade *et al.*, 2015; Hajli, 2015; Safa and Solms, 2016). The present study examines the effects of roles of an organization under limited facility condition, managerial pressure, and social pressure in influencing individual trust to improve hospital information system adoption intention.

2. Theoretical Review

2.1 Intention to Adopt.

The concept of intention to adopt, in general, is defined as an individual motivation to have commitments to future actions (Hallikainen *et al.*, 2017). Such concept is in accordance with the definition of intention to adopt in the view of information system approach: individual consideration to apply sustainable information systems in an organization (Al-Mamary *et al.*, 2015).

Several studies explained diverse variables influencing the intention to adopt information system including social pressure (Choudrie *et al.*, 2014), managerial pressure (Susanto and Aljoza, 2015), trust (Moya *et al.*, 2016), and facility condition (Masa'deh *et al.*, 2016). The present study attempts to strengthen the previous studies by focusing on the establishment of intention to adopt through the roles of facility condition, managerial pressure, and social pressure on the research object of a hospital. In addition, the study includes trust as a mediating variable to strengthen the connection among the information system adoption intention, facility condition, managerial pressure, and social pressure (Cabanillas *et al.*, 2014; Al-Hadban *et al.*, 2016).

2.2 Trust.

Trust in the information system usage is defined as an individual belief that the information system used has operational reliability and capability (Hajli, 2015). Such explanation is supported by the definition of trust proposed by Amo *et al.* (2014): individual trust in online services which assures consumers to get the expected benefits. In reference to several definitions from much literature, trust is the belief in the reassurance of the information system usage to give advantages.

Several studies explain that trust serves as a significant variable which can influence the intention to adopt information system (Hajli, 2015; Masa'deh *et al.*, 2016; Moya *et al.*, 2016). Trust is a central issue in the context of the information system usage to improve information system adoption process (Morid and Shajari, 2012). The trust in the information system enables the users to encourage its frequent usage (Hajli, 2015). Other studies mention that trust is the strong determinant in the establishment of intention to adopt information systems using (Masa'deh *et al.*, 2016). Meanwhile, a study conducted by Moya *et al.* (2016) reveals that trust has become the framework for users' information security evaluation, leading to an intention to use information systems. The results of such studies indicate that trust in information systems will improve intention to adopt information system. It follows that the higher the trust is, the higher the intention to adopt information system will be.

2.3 Facility Condition.

Facility condition is defined as a way for users that organizational and technical infrastructures are available to support the use of the system (Ahmad *et al.*, 2013). The definition is in accordance with that stated by Oliveira *et al.* (2016) that facility condition is an individual perception towards available resources and support to behave. According to the explanation, facility condition is the availability of infrastructures and

technical support given by an organization in the use of information system which can encourage information system adoption.

Several previous studies explain that facility condition plays a vital role in establishing trust (Choudrie *et al.*, 2014; Huang, 2015; Witarsyah *et al.*, 2017). A study conducted by Huang (2015) reveals that facility condition which serves as both guidance and instruction required to use information system in organization exerts a strong influence on the ease of the use and the usefulness to establish trust in information system usage. A similar opinion was stated by Choudrie *et al.* (2014) that facility condition serves as the main factor leading to user trust on the acceptance of information system adoption. Meanwhile, a study carried out by Witarsyah *et al.* (2017) on the implementation of e-government mentions that facility condition can contribute to positive effects on information system usage behaviors. This means that high individual trust on organizational support in providing facilities for the information system usage will be able to establish trust for continuous usage. The results of the aforementioned studies conclude that good facility condition can establish user trust to encourage system adoption.

2.4 Managerial Pressure.

Managerial pressure includes behaviors of top management perceived by individuals on the usefulness of implementation innovation of information system in creating values for an organization (Gangwar *et al.*, 2015). The similar study conducted by Al-Hadban *et al.* (2016) defines managerial pressure as innovation by a senior manager and the willingness level of the manager to include ideas and innovative approach to solve organizational problems to improve the performance. In reference to the explanation, managerial pressure is defined as the influence of top management on the technology usefulness which affects subordinate trust on information system adoption usage

Previous studies reveal the strong correlation between managerial pressure and trust (Yang, 2013; Al Mamary *et al.*, 2015). A study carried out by Al Mamary *et al.* (2015) indicates that top management can assure adequate resources to do actions due to environmental change to create a conducive environment for the success of the system to establish the trust on information system usage. Such results are strengthened by the statement of Yang (2013) that self-management will refer to the trust of the extent to which users perceive discipline and are bound in the independent learning process for the success of system adoption. Such studies give meaning of managerial pressure through top management roles which can encourage the information system usage and can establish the trust of users in system adoption.

2.5 Social Pressure.

Social pressure is defined as a degree and surrounding environment perceived by individuals in giving important trust for service provision as a determining factor using a new information system (Hoque and Sorwar, 2017). The same argument expressed by Nikou and Economides (2017) who defined social pressure as the level of motivation and surrounding environments perceived by individuals and as another important factor to use a service through a new information system. The explanation concludes that social pressure is motivation from the environment to provide service using the information system.

The results of the previous studies show that social pressure can be a driving factor which leads to trust (Choudrie *et al.*, 2014; Maillet *et al.*, 2014; Moya *et al.*, 2016). A study conducted by Choudrie *et al.* (2014) proves that social pressure becomes an important factor which can influence the trust of such users as companions and coworkers towards the new system usage. In the implementation of the hospital information system, social influence plays a vital role in changing behaviors of nurses to use the new system (Maillet *et al.*, 2014). Another study carried out by Moya *et al.* (2016) demonstrates that social pressure has a role in establishing the trust of other users to use a new information system in figuring out the benefits of the system in hope that they will use the system for the ease of the performance. The aforementioned studies conclude that high social pressure can influence the establishment of trust of users in using the information system.

2.6 Research Framework

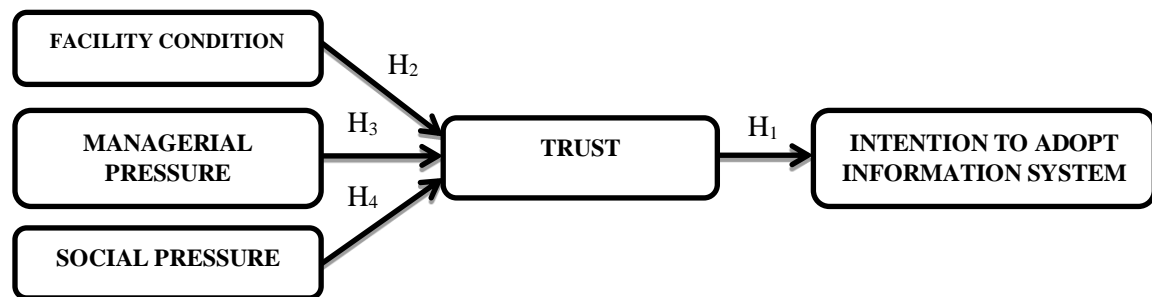


Figure 1. Research Model

Based on a review of the conceptual framework of the study the hypotheses of this study are as follows:

H₁ : High trust in information systems can improve the intention to adopt information system.

H₂ : High facility condition will be able to establish user trust in the information system.

H₃ : High management pressure will be able to establish trust in the information system

H₄ : High social pressure will be able to establish user trust in the information system.

3. Method

The study belongs to causal research. The type of research data is cross-section. The research objects include medical personnel who implement information system of the patient barcode in PKU Muhammadiyah hospital of Surakarta with minimum use of patient barcode of one time (with a number of 100 respondents). Probability sampling was applied in the study. The instruments of the study were tested using the validity test and reliability test using SPSS program. Hypothesis test was administered using the Structural Equation Model (SEM) analysis using AMOS program.

Table 1. Indicators of Variable Measurement

VARIABLE	INDICATOR	REFERENCE
Intention to Adopt Information System (INT)	1. an intention to continuously participate in using a service	Amo <i>et al.</i> , (2014)
	2. an intention to share or forward information of a service	
	3. an intention to start using a service	
	4. an intention to recommend to use a service in the future to others	
Trust (TR)	1. trust to use a system	Bai (2014)
	2. trust to use a reliable system as information	
	3. trust as a service provider with a commitment	
	4. trust as a service provider in giving maximum service	
Facility Condition (FC)	1. the facility resources are important for system usage	Huang (2015), Marumping, <i>et al.</i> ,(2017)
	2. knowledge is important for system usage	
	3. a system is compatible with another	
	4. experts are available for system assistance	
Managerial Pressure (MP)	1. the top management applies organizational culture to extend the development of the company	Gangwar <i>et al.</i> (2015)
	2. the top management has a long leadership to be involved in the process of the company information system implementation	

	3.	the top management tends to consider by taking risks in the implementation of the system	
Social Pressure (SP)	1.	influences system usage	Bai (2014), Huang (2015)
	2.	coworkers motivate to use the system to improve the system performance	
	3.	the influencing persons support the system usage	
	4.	it is important to recommend to other users	

4. Results

The instrument test of 19 items of questionnaire resulted in the deletion of 7 instruments: INT 1, INT 3, TR 1, TR 2, FC 3, SP 3, and SP 4 due to loading factor of smaller than 0.4. Meanwhile, the other 12 items were used for hypothesis testing due to the loading factor of bigger than 0.40 and the absence of cross loading in the existing columns. The items of the questionnaire, therefore, are proved to be valid. The results of the validity test are displayed in Table 2.

Table 2. The Results of Validity and Reliability Tests of the Questionnaire

Item	Loading factor Minimum= 0.40	The value of Cronbach Alpha Minimum= 0.60	Annotation
INT2	0.843	0.8978	Valid and reliable
INT4	0.880		Valid
TR3	0.655	0.8389	Valid and reliable
TR4	0.739		Valid
FC1	0.766	0.7495	Valid and reliable
FC2	0.759		Valid
MP1	0.736	0.8593	Valid and reliable
MP 2	0.637		Valid
MP 3	0.735		Valid
SP1	0.777	0.8798	Valid and reliable
SP2	0.701		Valid

The reliability test was administered using the Cronbach Alpha (α). The reliability of the questionnaire item was known and the coefficient was alpha (α). The test resulted in the reliability value of bigger than 0.6, and therefore it can be concluded that all of the questionnaire items are reliable to be used in data collection.

The results of SEM analysis using AMOS application can be seen in Table 3 below.

Table 3. The Results of Hypothesis Test

Hypothesis	Standardized estimate	C.R	Z_{table}	P	Results of Hypothesis Test	Annotation
MP → TR	-0.022	-0.160	2.57	0.873	Not Significant	H ₃ is not supported
FC → TR	0.715	4.479		<0.001	Significant	H ₂ is supported
SP → TR	0.232	1.944		0.052	Not Significant	H ₄ is not supported
TR → INT	0.688	7.237		<0.001	Significant	H ₁ is supported

Annotation: Significant at $\alpha = 0.01$

Based on the data processing, it is clear that H_1 and H_2 are supported; the critical ratio (c.r) is bigger than the value of Ztable, while H_3 and H_4 are not supported. The test with SEM analysis using AMOS application resulted in a model shown by Figure 2 below.

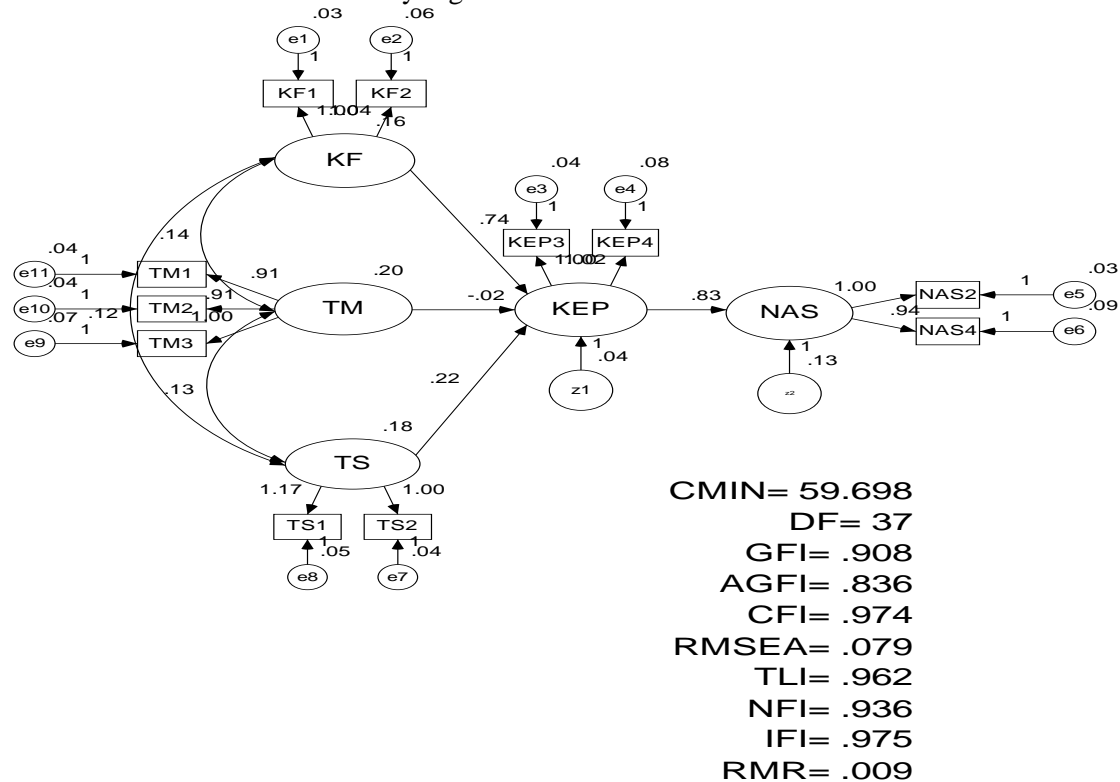


Figure 2. The Results of Model Testing

5. Discussion

The model constructed based on the variation of factors forming the intention to adopt of the information system was confirmed by the previous studies. The results of the testing show that not all hypotheses is supported. Hypothesis 1 testing examined the influence of trust on intention to adopt of barcode system usage and indicated significant results. This is in accordance with a previous study which shows that trust has become the framework for users' information security evaluation leading to an intention to use information systems (Masa'deh *et al.*, 2016; Moya *et al.*, 2016). This means that the medical personnel perceive that the barcode information system is reliable, secure, and able to be implemented in hospitals which establish trust on the system in influencing individual intention to continuously use it (Nikou and Economides, 2017). Based on the results of the research, it can be concluded that a high level of trust of medical personnel will indicate ease, reliability, and ability to increase intention to adopt the hospital information system using.

The hypothesis 2 testing on the influence of facility condition on the trust of barcode system usage shows significant results. This finding supports several previous studies which find out that facility condition which serves as both guidance and instruction required to use information system can establish trust on information system usage (Huang, 2015; Maruping *et al.*, 2017). Individuals perceive that an organization gives support in the provision of such facilities as resources and technology which possibly can facilitate and in the continuous information system usage (Maruping *et al.*, 2017; Nikou and Economides, 2017). It can be concluded that facility condition in PKU Muhammadiyah hospital is considered to be fair to support medical personnel in the health information system to establish trust towards information system to form the intention to adopt information system.

The hypothesis 3 testing which examined the influence of managerial pressure on trust indicates unsupported results. This finding contradicts the results of several previous studies which mention the influence of managerial pressure on trust (Gangwar *et al.*, 2015; Al-Hadban *et al.*, 2016). A study conducted

by Gangwar *et al.* (2015) explains that managerial support has a strong role in establishing individual trust for intention to adopt information system. The same argument was stated by Al-Hadban *et al.*, (2016) that managerial pressure exerts an influence on trust, meaning that the top management has a role to establish the trust of users of information system in implementing and encouraging information system adoption in health services. Support and strong control from the management in the implementation process of information system in uncertain environment conditions can give trust to individuals to believe that information system will improve performance for an organization (Li and Lin, 2006; Liu *et al.*, 2010).

The difference between the results of the study and those of the previous studies is caused by different backgrounds of the information system users. The respondents of the study include medical personnel who already had experience in the hospital information system usage. This contributes to high individual volunteerism in using the information system to give health services. Such an explanation is supported by Liu *et al.* (2010) stating that pressure from organization leaders to use the information system for experienced employees does not have a strong effect in improving the information system usage. Strong pressure from organization leaders without support to use the information system tends to lead to a denial from employees to use the information system (Mignaret and Rvard, 2009). Managerial pressure is, therefore, situational; adjusted to organizational conditions and employees in the information system implementation.

The hypothesis 4 testing which examined the influence of social pressure on trust demonstrates unsupported results. This finding is in contrast to the previous study which found out that social pressure can establish the trust of information system users. (Choudrie *et al.*, 2014; Moya *et al.*, 2016). Choudrie *et al.* (2014) explain that social pressure has a positive correlation as an important factor influencing the trust of users such as companions and coworkers on the new system usage. The same argument was stated by Moya *et al.* (2016) that social pressure has a role in establishing the trust of other users to use an information system in the form of information of benefits of the information system in contributing to ease in the work process.

The difference between the results of the study and those of the previous studies is caused by previous experience of the health personnel in using the information system. This means that health personnel perceive that the information system being used is easy and gives benefits in improving performance of health services, and therefore influence from the surrounding environments in establishing trust on the system is not required in the implementation. The argument is supported by the study conducted by Wu and Chen (2017) which finds out that the usefulness of the information system perceived by individuals gives subjective appraisal from the users experienced in the establishment of user trust leading to information system adoption intention. This finding is in accordance with that of a study conducted by Maillet *et al.* (2014) which figures out that medical personnel experienced in information system usage give negative responses on the social influence in influencing satisfaction which tends to maintain real usage of the hospital information system. Such explanation concludes that the information system usefulness for the experienced users can establish trust in intention to adopt information system without the presence of social influence from surrounding environments (Nikou and Economides, 2017).

6. Concluding Remarks

6.1 Conclusion.

The aim of the study is to examine intention to adopt information system influenced by facility condition, managerial pressure, and social pressure with mediating variable of trust. The findings of the study can have important implications for research development and managerial development. The study has proved that factors influencing intention to adopt information system include trust and facility condition, meaning that good perception of information system users on facility condition will establish trust, causing individuals to have the intention to use the information system.

The results of the study give a contribution to medical personnel from the department of the information system of hospital patient barcode usage and stakeholders. For the former, the study reveals that not all identified factors exerts an influence intention to adopt information system. Meanwhile, for the latter, the results of the study can be used as a framework of decision-making process in the management of medical personnel, especially in the department of an information system by considering facility

condition in supporting information system implementation which can establish the trust of medical personnel leading to high performance of hospital health services.

6.2 Suggestion.

In constructing the research model, the study was based on previous theories. However, there many identified factors which can influence information system adoption intention. The exploration of the forming variables is needed to enrich references on factors forming information system adoption intention if the study is conducted on different objects of study.

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