Original Article

A Cross Sectional Study On Physicians' Perceived Usefulness And Ease Of Use Electronic Medical Records

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Abstract

Introduction: Regulation No. 21 of 2020 of the Minister of Health of the Republic of Indonesia has necessitated efforts to modify the governance of health development through the integration of health information systems. By 2024, all hospitals are expected to have fully integrated EMR.
Aim: To analyze the effect of perceived usefulness and perceived ease of use on the use of electronic medical records (RME) based on the Technology Acceptance Model (TAM) framework at Soetomo General and Teaching Hospital, Surabaya Indonesia.
Design: This study conducted a cross sectional study and the Estimate for path coefficients test utilizing the PLS software tool to explain the effect between the constructs tested.
Method: Population of 251 physicians worked as specialists in general hospitals and in outpatient facilities for children and obstetrics. A sample of 101 people was acquired using the sampling approach of random sampling in the use of sample size determination in health studies (sample size 2.0).
Result: Perceived usefulness, perceived ease of use, behavioural intention, and RME use had a value of estimate for path coefficients with p-values < 0,05, indicating that all constructs had a significant effect. The TAM model used in this study can be used in hospitals by adapting question items to the conditions of the existing electronic medical record system.
Conclusion: R-square behavioural intention value is 0,488, and the RME 0,549 has a moderate influence strength value. Novelty of the present study is the finding technology use is measured by subjective, objective, assessment, and plan indicators in the RME filling, this is different from previous studies.

Keyword: Behavioural Intention, Perceived Usefulness, Perceived Ease of Use, Use RME.

Introduction

The science education paradigm that pays attention to the integration of local culture into science learning as a national identity and local cultural customs as a vehicle for learning science is being developed in several studies [1]. Learning with ethno-science is based on the recognition of community culture as a fundamental part of education as an expression and communication of an idea and the development of science [2]. Learning science should be able to make students understand more about what they don't know about nature so that learning science is not just about understanding theories but understanding natural science associated with local excellence in the local area is also important to understand [3, 4].

The COVID-19 pandemic in Indonesia poses a number of obstacles, ranging from unequal access to health care to

a ratio of health facilities and health personnel that is not proportional to Indonesia's population. One way to address these issues is to use digital information technology to conduct COVID-19 pandemic testing, tracking, and treatment techniques. In the future, the Indonesian government firmly encourages and supports the use of digital technology for public health. Through the use of data and technology, digital transformation is an essential item for encouraging the achievement of a Healthy Indonesia.

Based on the statement above, Indonesia's Ministry of Health has developed a Blueprint for the Digital Health Transformation Strategy 2024. This discovery was developed as part of a long-term strategy to address the COVID-19 pandemic and other health issues by focusing on the health ecosystem, service efficiency, and data integration as the foundation for decision-making and policy. According on the current mapping data, the central and local governments have produced over 400 health applications. Medical records are one of them. Patient data, patient medical approval data, medical observation data, drug administration data, medical diagnostic data, and clinical action data are all included in medical record data. Data on health care facilities, which describes where the medical action event occurred, data on health human resources, which explains who conducts the medical action, and data on finance round out the medical record data [1].

According to research [2], there are several advantages to using RME, including: 1) providing safe and quality patient treatment services, which is also supported by research [3]; 2) increased medication safety, less duplication of information, legibility of patient medical records, ability to provide clinical support, reduced paper usage, and increased access to research-supported patient information [4]; and 3) ensuring the confidentiality and security of patient information [5]; 4) Effectiveness and efficiency [6]; [7].

Indeed, research in numerous countries suggests that health practitioners use RME infrequently, despite the fact that it is an important component of their job to provide high-quality care. Previous research has found that [8] just about a quarter or less than 25% of clinicians use electronic health records, and [9] there are rejections of health information technology.

Medical records must be kept at all hospitals, both manually and electronically, according to Indonesian Minister of Health Regulation 269 of 2008. On the patient's health data, physicians must record all activities relating to complaints, examinations, diagnoses, actions, and action plans [10]. The percentage of hospitals that adopt integrated electronic medical records is set to 60 percent in 2022, 80 percent in 2023, and 100 percent in 2021, according to the Indonesian Ministry of Health's strategic plan for the years 2020-2024.

The implementation and development of RME will depend on human resources as RME users, as well as policy makers. When patients visit, RME is an automated system that includes a laboratory that is documented by physicians. RME is a good system, however it is incomplete and useless without human resources. Knowledge, skills, and drive are all important components of good human resources [11]. Physicians are the primary actors in the implementation of RME [12], as they are responsible for providing diagnostic, decision-making, and treatment action to patients, therefore this study is critical.

Method

Purpose

The purpose of this study is to investigate the impact of perceived usefulness and perceived ease of use on the use of physicians' electronic medical records in the outpatient department of a General and Teaching Hospital in Soetomo Surabaya using the Technology Acceptance Model (TAM) framework [13] and behavioural intention. This study differs from others in that the technology instrument was created by researchers based on the state of the electronic medical record system at the public hospitals and schools where the study was conducted.

Participants and Settings

A cross sectional study and path analysis were used in the research. Physicians who worked at general and educational hospitals to complete their studies as specialist physicians provided data via questionnaires. Physicians who had a working time of using RME in outpatient for at least 6 months in the final semester were regarded experts and skilled in treating patients and had experience with the usage of RME. Physicians who refused to fill out the informed consent form and were outside the hospital were excluded. The samples obtained were 101 from a total population of 251 in paediatric and obstetric outpatient units with a relative precision of 0.15 using random sampling technique with sample size determination software in health studies (sample size 2.0) [14]

Instrument

This research instrument used a questionnaire consisting of 16 question items with the results of the validity of the item-total correlation coefficient and reliability on the Cronbach's alpha coefficient of > 0.7.

Ethical Consideration

This study has gotten ethical approval from Soetomo Surabaya Indonesia's General and Teaching Hospital, with the Letter of Exemption number 0146/LOE/301.4.2/X/2020.

Procedures

The researcher gave authorization to the hospital where the patient's health was taken care of by the physician. The director, head of research and development, head of functional medical unit, and head of study program are all involved in the licensing process. The researcher then introduces and explains the research to physicians who act as responders. In addition, the respondents were given informed consent papers to sign in order to show their willingness to participate in the study. Following the acceptance statement, the questionnaire link was distributed to the respondents based on the research inclusion criteria. Even after reading the questionnaire, respondents were free to leave the study at any moment. Besides, because the email address and due date for filling out the questionnaire can be detected directly, respondents who filled out the questionnaire via the google form application link that was distributed automatically will record the data from the questionnaire if it has been submitted. This automation application ensures the occurrence of duplication of data and falsification of the respondent's identity.

Research Model and Hypothesis

TAM as a theory of information system evaluation is based on two research conducted by [13] that indicated that there are two significant variables that determine information technology acceptance, namely usefulness and convenience. According to a recent study [13] the usefulness factor was found to be highly related to present system use and could predict future usage.

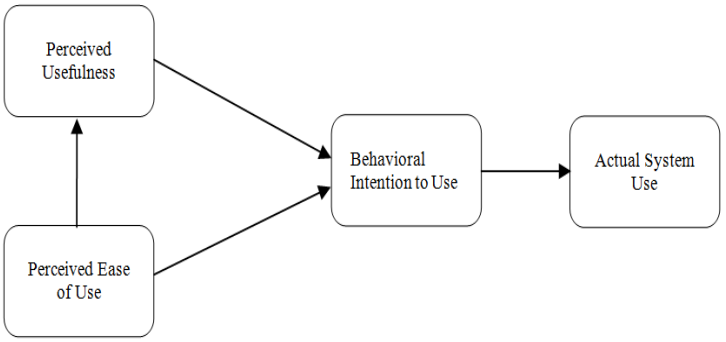

Figure 1: Model Technology Acceptance Model (TAM), [13]

The TAM framework is used by researchers because it contains a strong element of behaviour, presuming that when someone develops a part to act, they will be free to act without limitations. A number of research [13] have been duplicated to give empirical data on the relationship between usefulness, convenience of use, and system utilization. The use of the system (real system use) is influenced by an intervening variable, namely the intensity of use, as shown in the TAM scheme above (behavioural intention to use). In this investigation, the following ideas have been proposed:

H1: The effect of perceived usefulness on behavioural intention

H2: The effect of perceived ease of use on behavioural intention

H3: The effect of perceived ease of use on perceived usefulness

H4: The effect of behavioural intention on the use of RME

Partial Least Square (PLS) influence test with outer loading value and discriminant validity was used to analyse the data. Larcker, Fornell Criteria with a high standard rho A, composite reliability, and Average Variance Extracted (AVE) > 0.7. Construct reliability and validity with rho A, composite reliability, and Average Variance Extracted (AVE) > Inner loading has a significant value of 0.7, with a P value of 0.05 and a T-statistic of > 1.96. With the strength of the R-square model.

Result and Discussion

Result

Table 1. Physician's characteristic in using RME

No	Characteristic	Frequency	Percentage
1	Physicianal Education Program		
	Pediatrician	57	56%
	Obstetrician	44	44%
2	Age		
	≤ 25 years old	3	3 %
	26-35 years old	87	86 %
	36-46 years old	11	11 %
2	Gender		
	Male	37	37 %
	Female	64	63 %
3	PPDS education semester		
	Semester 1 and 2	17	17 %
	Semester 3 and 4	10	10 %
	Semester 5 and 6	25	25 %
	Semester 7 and 8	10	10 %
	≥ Semester 9	39	39 %
4	Working experience using RME in outpatients		
	< 2 weeks	19	19 %
	2 weeks – 1 month	5	6 %
	> 1 month – 6 month	9	8 %
	> 6 month – 1 year	68	67 %
	Total	101	100%

Based on table 1 shows that physicians as respondents in the acceptance and use of RME in this study were dominated by physicians aged 26-35 years as much as 86%, in paediatrics education study programs as much as 56%, female sex as much as 63%, final semester namely Semester 9 as much as 39%, and working experience using RME in outpatients is for > 6 months – 1 year as much as 67%.

Table 2. Physicians' Discriminant Validity in using RME

Construct	Behavioral Intention	Perceived Ease of Use	Perceived Usefulness	Use RME
Behavioral Intention	0,845			
Perceived Ease of Use	0,551	0,872		
Perceived Usefulness	0,621	0,420	0,897	
Use RME	0,741	0,519	0,555	0,849

According to table 2, the outer loading on discriminant validity had the highest value among the variants, indicating that the indicators in this study is valid.

Table 3. Physicians' Construct Reliability and Validity in Using RME

Construct	Rho_A	Composite Reliability	Average Variance Extracted (AVE)
Behavioral Intention	0,922	0,937	0,713
Perceived Ease of Use	0,704	0,864	0,760
Perceived Usefulness	0,879	0,925	0,805
Use RME	0,973	0,975	0,721

Table 3 demonstrate that the outer loading on rho A, composite reliability, and Average Variance Extracted (AVE) are all greater than 0.7, indicating that the indicators in this study are trustworthy and valid.

Table 4. Distribution of Estimate for path coefficients

Variables' influence	*Original Sample*	*T Statistics*	*P Values*	Description
Perceived Usefulness → Behavioural Intention	0,472	7,226	0,000	Significant

Perceived Ease of Use → Behavioural Intention	0,352	5,141	0,000	Significant
Perceived Ease of Use → Perceived Usefulness	0,422	6,477	0,000	Significant
Behavioral Intention → Use RME	0,741	19,533	0,000	Significant

Based on table 4, the estimate for path coefficients had p-values less than 0.05, indicating that the TAM model in this study can be constructed in hospitals utilizing question items tailored to the requirements of the existing electronic medical record system. The r-square behavioural intention had a value of 0.488 and uses RME 0.549, indicating that it had a suitable influence strength goodness fit value.

Discussion

Based on the findings, age, gender, semester taken by the physician, and working experience using RME in outpatients were among the characteristics of the physicians in this study. This is in line with [15]; [16]; [17]; [18]; [19], which reveals that users of health information systems in hospitals are dominated by productive age. According to [20], the age range of 15-64 is the productive age, that is, the age at which people one can labour. However, physicians in this study ranged in age from 26 to 35 years old, which is regarded mature both physically and mentally to be able to do a better job, in addition to being of productive age, educated, and having knowledge in various sectors.

According to previous research by [15]; [21] which demonstrates that the majority of health workers in hospitals are users of information technology systems dominated by the female gender. Female sex dominated by 63 percent compared to men. This study differs from [16], which found that the UTAUT model revealed that 56 percent of information technology users were mostly male [17]; [18]; [19]. The study focused on paediatricians and obstetricians because paediatricians and obstetricians dominated the use of RME at Soetomo's hospital, contrary to prior research [22] that found general practitioners and internal medicine specialists dominated the use of RME.

According to the findings of the study, the semester of specialist physician education is dominated by physicians who completed their studies at the end of the semester, that was semester 9, indicating that this semester has more experience, knowledge, expertise, and proficiency in the use of RME in treating patients than the semesters below. This is in line with the findings of a study [17]; [23] that reveals that those with the highest degree of education have the highest percentage of people who utilize information technology. However, this contradicts research [18]; [21] which claims that undergraduate education is the most common level of education for patients who utilize electronic health records.

Physicians with more than 6 months to a year of experience working with outpatient RME are the most common. Based on [15]; [19] the 0–5-year range dominated the work experience of health workers in hospitals by 68 percent; in this study, > 6 months-1 year was under the 5 year range, indicating that the findings were consistent with earlier research.

Based on the results of the study, it shows that the outer loading on discriminant validity has a value of > 0.7 which means that the indicators in this study are declared valid. Based on table 5.3 shows that the outer loading on rho-A, composite reliability > 0.7 and Average Variance Extracted (AVE) has the highest value among the variants, which means that the indicators in this study are declared reliable and valid [22]

The results showed that physicians were consistent predictors of the TAM model which indirectly affects the actual use of RME through behavioural intention [22]. Thus, physicians must be motivated to take advantage of RME, increase convenience of use, reduce errors, and hospital support provides instructions for use so that the system for recording patient health conditions is accurately documented. In the end, decision making by physicians is more appropriate and of course has an impact on improving the health status of the community, which is getting better.

The effect of perceived ease of use and perceived usefulness on the use of RME use by physicians is supported by research[24]; [25]. The higher the perceived usefulness of electronic medical records, the higher the intention and high actual use. Filling in the patient's health data status at the Physician Soetomo Hospital Surabaya, for example, will assist physicians in making judgments. Similarly, physicians' perceptions of the readability menu and the simplicity with which they can operate the electronic medical record menu will influence their real purpose and

use. This is consistent with earlier research [26]; [25]. Furthermore, hospital administration's cooperation is critical in efforts to enhance proper RME use through training programs [27].

The direct relationship of perceived ease of use on perceived usefulness is corroborated by [28]; [26] in this study, which suggests that the greater the convenience felt by medical personnel in using RME, the greater the benefits and usefulness of utilizing RME. As a result, it's critical for hospital management to improve systems that make it easier for physicians to use RME, such as user-friendly navigation [27]. This can be implemented at Physician Soetomo's hospital by displaying images and audio, as well as procedures for using RME with step-by-step instructions. can be easily manufactured.

According to the direct effect of behavioural intention on RME use, the higher the physician's intention, the higher the actual use of RME [12]. According to study [18]; [29]; [19] behavioural intention can add to the influence of technology use. The critical role of hospital policymakers and medical education providers in collaborating with hospital management to conduct training workshops and seminars by presenting skilled medical informants can help people understand the importance of RME and how to use it according to hospital procedures [21].

Because behavioural intention is a direct determinant of how people utilize information systems, it must be maintained and enhanced [13]. Behavioural intention demonstrates a willingness on the part of the physician to carry out RME willingly, and it is this willingness to carry out RME voluntarily that is required to ensure the long-term sustainability of RME implementation [30]. This is in line with the ministry of health's goal of making electronic medical records more accurate and reaching 100% accuracy

Conclusion

The study's overall findings revealed a 48 percent difference in behavioural intentions and 54 percent difference in actual use of electronic medical records. Physicians should be aware that the actual usage of RME begins with confidence in its use, trust in technology, and the instilling of convenience and vital utility. Furthermore, hospital management aid is provided in the form of expert assistance facilities if obstacles or errors arise, allowing physicians to feel that problems can be readily overcome with the help of various parties. Increase physician motivation and enthusiasm through appreciation and appreciation to increase behavioural intention, which will eventually result in the actual usage of RME, allowing for better health service quality in terms of capturing and documenting patient health status. This would also increase the quality of hospital services in an effort to promote public health and achieve the Indonesian Ministry of Health's strategic goal of 2024.

Limitation of the Study

The study's limitation is that the research subjects are only physicians who use electronic medical records, so heterogeneous samples to compare other health workers such as general practitioners, consultant physicians, senior physicians, nurses, and hospital administration staff who work in other service units are not available. Furthermore, this study is designed specifically for physicians who are studying specialists with certain organizational characteristics. This data is supposed to motivate more research on features of positive organizational behaviour in a broader spectrum of research subjects in both mandated and voluntary organizations.

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