

The Determinants of Electronic Medical Record Satisfaction: Communication Styles, Computer Efficacy and Competency

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Abstract

Electronic medical record (EMR) satisfaction in hospitals is very important to understand. This is related in how far doctors will use it. There are many factors that can affect the internal satisfaction of ERM. Some of them are communication styles, computer efficacy and competencies. This research seeks to analyze how far communication style, computer efficacy and competencies affect internal satisfaction of electronic medical record services. Location of this research was conducted in one of the hospitals in Surabaya, Indonesia. The method used is multiple linear regression analysis. Sample collection involve 30 doctors from general clinics. The results show that communication style, computer efficacy and competency have a positive and significant effect on internal satisfaction with electronic medical record services, either partially or simultaneously. Computer efficacy are the most dominant factor in influencing EMR satisfaction. This research is expected to be used as input for hospital management to focus on EMR satisfaction by improving doctor's communication styles, computer efficacy and competencies. If these three factors continue to be improved, especially in computer efficacy for example through training, then EMR satisfaction at hospital will also increase.

Keywords

Satisfaction, communication, computer, efficacy, competency.

1. Introduction

Starting in the middle of 2018, digital transformation begun in PHC Hospital Surabaya. It transforms from document to digital. The process included scanning hard copy document into soft copy data and then stored into single storage database. Firstly, doctors used multi combination between medical record documents and electronic medical record (EMR). That happened because it was not possible to convert all medical record document into EMR at once. The process continued until the end of 2018. Doctors have to type medical records into computer and sometimes have to read document if it is not scanned yet and available in computer application. Even when the application was ready to be used and document had scanned, some doctors still wrote down medical information of patient into paper or medical record document. It's hard to identify which document had scanned and which one had not yet. Although hospital management instruct to use electronic medical record instead, some doctors still wants to write in paper.

With that fact, hospital management think, there is no ending process between writing document and scanning. That action must be stopped, or EMR have no success. Then in February 2019, hospital management decided to stop medical record paper document. Implementation process got obstacle such as technical problem and human error. Doctor complained it's harder to type in computer while interacting with patient than write on paper. It also affected to some doctors who likes to talk with patient and write comprehensive detail of medical record. They will type simple text because it takes time to type longer text on computer. Simple text of medical record history made doctor dissatisfied to EMR. Another problem arised when doctor not familiar with computer or they lack of computer efficacy. Even they had been trained to use computer, application and EMR, they still have problem with that. When they did not know how to operate computer or use application, they often filled the data incomplete and hard to

understand. Other problems were about standardized medical terms. Doctor often prefer use medical abbreviation of theirs or some of them use standard medical abbreviation. If they read what they write with their own standard, it is easy to understand. But when another doctor has to read it, it is difficult to understand.

All of those problems make doctor feel dissatisfied with EMR. If doctors do not feel satisfied with EMR, data of patient will be incomplete and not good. It becomes vulnerable to patient's safety. In order to provide good EMR, doctor need to fill medical records completely and in order to achieve that, hospital management have to assure satisfaction of EMR among doctors. To increase satisfaction, hospital management may adopt a variety of approaches including communication styles (Seo et al., 2016), computer efficacy (Alasmay et al., 2014; Li et al 2007; Hwang et al., 2016) and competency (Hadiwijaya et al., 2016; Deswarta 2017). Based on the description above, the research question can be made; whether communication styles, computer efficacy and competency had affects on ERM or not.

Doctor who have good communication skills usually have good ability to use computers when receiving consultations (Duke et al., 2013). Doctor should start focus on talking to patients about their complaints, before starting to run applications and work in front of the monitor. The doctor can also explain why they have to enter medical record data into the computer and ask for a moment to type the data into the computer. If doctors don't tell patients what they are doing, they will confuse patients about what they are doing. They can also directly communicate medical problems by inviting patients to view visual data on the computer. When using EMR, doctors should provide an explanation of what is entered into the computer, instead of avoiding interactions when entering EMR data. No matter how long and how complex EMR are, doctors must continue to give the patient the first priority (Ventres et al., 2006). In the future, computers will play an increasingly important role and patients will be directly involved in a more creative three-way consultation (Pearce et al., 2011). This three-way consultation, for example, is online communication or entering their own EMR through a computer. From this method, doctors and patients will have EMR information together.

By allowing patients to complete monologues or consultations, it takes longer time but better achievement of diagnosis in the condition of patients who have new clinical problems (Rabinowitz et al., 2004). According to research (Hojat et al., 2010), empathy in the context of care is defined as the dominant cognitive attribute. These attributes involve an understanding of the patient's experience, the patient's concerns and the patient's perspective. These factors are then combined with the capacity to communicate this understanding and intention to help the patient. Research (Jones et al., 2013) explains that when EMR are more common in primary care practice, there is a need for increased collaboration between EMR vendors and doctors. With this collaboration, it will increase the potential that EMR can support doctors to implement daily workflows and encourage doctors to improve their competencies by practicing medicine that is safer, more efficient and has higher job satisfaction.

Doctor satisfaction with EMR is also related to system performance and information quality (Alharthi et al., 2014), both of these things are closely related to the technical knowledge of doctors how to access information through the EMR system so that the information obtained is as expected. If doctor do not understand computer functions and use an EMR system, it is certain that less information is accessed. Previous research conducted in Japan by (Ochieng et al., 2006), as many as 61% of doctors, revealed that using a computer can increase efficiency in finding information on the history of patients' medical records. And 66% said that using EMR can increase efficiency in the process of documenting patient clinical information. Based on research conducted (Alawi et al., 2014), doctors believe that computer skills have an important role in understanding EMR. They have difference competency in the use of technology. For example, the use of the copy and paste feature can use the shortcut keys on the keyboard, and for example the doctor wants to explain something to the patient related to anatomy. Instead of having to draw a sketch on paper, they can directly look for it online on a search engine that is connected to the internet. This will provide useful educational materials for patients at the same time. Doctors also want free typing in adding diagnoses and don't want to be limited to diagnostic codes or ICDs. In choosing a diagnostic code, it is easier to classify a medical problem related to drug prescribing.

Computer skills are divided into three dimensions, namely basic computer skills, media-related skills and the ability to use the internet (Doyle, 2005). The computer skills possessed by individuals are the same as perceptions of the ease of using computers or about self-efficacy which is defined as an assessment of how well a person can perform the necessary actions to deal with certain situations, said Bandura (Elasmar et al., 1996). In a previous study, doctors received EMR in a concept that describes the ease of accessing patient information remotely and improvements in quality of care (Friedberg et al., 2014). In the application of EMR, there are several problems such as time consuming data entry, less efficient in filling out results, which considered to be disturbing in interaction with patients and a decrease in recording clinical documentation.

2. Literature and Hypothesis

2.1 Communication Styles

Norton in (Allen et., al., 2006) describes communication styles as how people can interact in verbal way and para verbal, in order to give a sign of what is the true meaning which have to understood. Communication styles is a window to understand how the world fully see individual as unique personality. This affect connection, carrier and emotional well-being. Aspects of Communication Styles are divided into ten, namely:

1. Dominant, dominant communicator in interacting. People like this tend to master the conversation.
2. Dramatic, in terms of communication tends to be excessive, using things that contain figures of speech, metaphors, stories, fantasies, and voice plays.
3. Animated Expressive, colors in communication, such as eye contact, facial expressions, gestures and body movements.
4. Open, the communicator is open, there are no secrets so that confidence arises and two-way communication is formed.
5. Argumentative, communicators tend to be argumentative and aggressive in arguing.
6. Relaxed, communicators are able to be positive and support each other towards others.
7. Attentive, communicators interact with others by being active, empathetic and sensitive listeners.
8. Impression Leaving, the ability of a communicator to form an impression on the listener.
9. Friendly, the communicator is friendly and polite when delivering a message to the recipient of the message.
10. Precise, the right style where the communicator asks to talk about a precise and accurate content in oral communication.

The compatibility of communication style depends on sender's intention and receiver's hope. If educational programs on communication are developed to help clinical research nurses use the informative and effective communication styles according to the characteristics of subject, they will be able to increase satisfaction (Seo et al.,2016).

2.2 Computer Efficacy

Computer efficacy can be assumed as a people's skill to operate computer supported with adequate intellectual ability obtained from talent or learning. (Doyle, 2005) describes computer usage skill is defined as an individual's judgement of their capability to use computer. Every individual believes their computer usage skill is not relate with past experience, but more focus on ability for their specific tasks. This shows that with a strong belief or belief in his abilities, a person sees certain difficult tasks that use computer programs as an opportunity to be able to master various computer programs. With this belief, one's abilities will tend to be able to overcome the difficulties they are facing. Aspects of expertise in the use of computers put forward by a number of experts including (Compeau et al., 1995) who distinguish them in three aspects of computer skills, namely:

1. Magnitude, the magnitude dimension refers to the expected level of capability in computer use. Individuals who have a high magnitude of computer skills are expected to be able to complete more complex computing tasks. (Compeau et al., 1995) suggested that the dimensions of the low magnitude of computing were due to a lack of support or assistance. This dimension also explains that the high magnitude of a person's computer skills is associated with the level required to understand a task.
2. Strength, the second dimension, namely strength, refers to the level of confidence in the judgment or belief of an individual to be able to complete computational tasks well. According to (Marakas et al., 1998), strength is a person's confidence in running computer programs, especially new programs. New programs in computing happen so quickly that it takes a high level of confidence from everyone to be able to easily master them.
3. Generalibility, The last dimension is generability, which refers to the level of user judgment that is limited to a specific domain of activity. In the context of computers, this domain reflects differences in hardware and software configurations, so that individuals who have a high level of computer generability are expected to be able to competently use different software packages and computer systems.

Research by (Alasmay et., al., 2014; Li et., al., 2007; Hwang et., al., 2016) states that computer efficacy has a positive and significant effect on satisfaction.

2.3 Competency

Doctor Competency Standards are structured in order to fulfill the mandate of the Republic of Indonesia Law Number 29 of 2004 concerning Medical Practice Article 8 which states that the Indonesian Medical Council has the authority to ratify the competency standards of doctors and dentists. Article 26 of the law further states that the Medical Professional Education Standards are prepared by the Association of Indonesian Medical Education Institutions and in coordination with professional organizations, collegiums, teaching hospital associations, the Ministry of National Education and the Ministry of Health. The process of preparing the Competency Standards for Doctors involves various stakeholders intensively through a series of meetings facilitated by the Division of Professional Education

Standards, Indonesian Medical Council. (Konsil Kedokteran, 2006). Competency standards for doctors include high professionalism, self-awareness and self-development, effective communication, information management, scientific foundations of medical science, clinical skills and management of health problems. Doctor Competency Standards are as follows:

1. Sublime Professionalism
2. Self-awareness and Self-Development
3. Effective Communication
4. Information Management
5. Scientific foundation of medical science
6. Clinical Skills
7. Management of Health Problems

Research by (Hadiwijaya et., al., 2016; Deswarta 2017) states that competency has a positive and significant effect on satisfaction.

2.4 Electronic Medical Record (EMR) Satisfaction

Satisfaction comes from the Latin "Satis" which means good enough, adequate and "Facio" which means to do or make. In simple terms, satisfaction can be interpreted as an effort to fulfill something or make something adequate (Tjiptono, 2014). Consumer satisfaction is the extent to which the benefits of a product are perceived in accordance with what customers expect (Amir, 2005). Medical record is a file or document containing notes about the patient's identity, results of diagnosis, treatment, actions and other services that have been provided to patients listed on chapter 46 paragraph 1 Medical Practice Law in Indonesia. Updated with Minister of Health regulations number 269/Menkes/Per/III/2008 about medical records, stating the medical record is the file containing the patient's records and documents on which contain identification, examination, treatment, other medical treatment at health-care facilities for outpatient, inpatient both managed by government and private. Medical record is a collection of records or a collection of records regarding who, why, what, how and when health services are provided to patients during the treatment period. The records contain knowledge about patients and services obtained and contain complete information to identify patients, drugs and confirm the diagnosis and record the results obtained (Huffman, 1994). Electronic medical records have many definitions and forms. There are so many different concepts and definitions regarding electronic medical records that are applied and trusted by a health service provider. But broadly speaking according to the manual on electronic medical records released by (WHO, 2006), The term electronic medical record, as well as automated health records, has been used to describe automated systems based on document imaging or systems that have been developed in medical practices or public health centers. It has been widely used by general practitioners in many developed countries and includes details of patient identification, medication and prescribing, laboratory results and in some cases all health information recorded by doctors during each patient visit. Indicators of electronic medical record satisfaction (Al-Mujaini et al., 2011):

1. Up to date
2. In time
3. Easy use
4. User friendly
5. Useful format
6. Satisfied with accuracy
7. Accurate
8. Sufficient info
9. Precise reports
10. Content meet needs
11. Precise information

From the explanation above then the conceptual framework on this research as shown below.

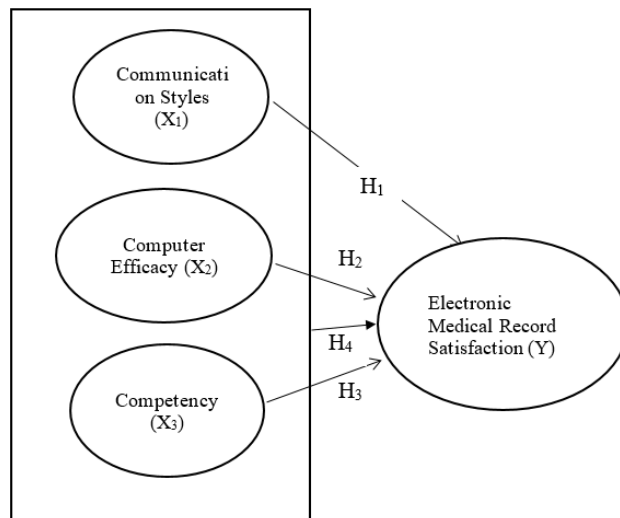


Figure 1. Conceptual Framework

Based on the conceptual framework above, the formulation of this research hypothesis is as follows:

H1: Communication style has significant effect on electronic medical record satisfaction.

H2: Computer efficacy has significant effect on electronic medical record satisfaction.

H3: Competency has significant effect on electronic medical record satisfaction.

H4: Communication style, computer efficacy and competency simultaneously have significant effect on electronic medical record satisfaction.

3. Methods

The research method is based on the philosophy of positivism. It is used to examine certain populations or samples, data collection using research instruments. Data analysis is quantitative / statistical, with the aim of testing predetermined hypotheses. The population of this study was 30 doctors in the PHC Surabaya Hospital. To achieve the objectives in this study using multiple linear regression models, the classical assumption was first tested, to determine whether the model used had no problems of normality, multi collinearity, heteroscedasticity and autocorrelation. The goal is to provide certainty that the regression equation obtained is accurate in estimation, unbiased and consistent. The normality test was conducted to determine whether the distribution of the data from the research results was normal or not. A normal data is one of the requirements for a Parametric test. In this study, the normality test used was the Shapiro-Wilk test. Multi collinearity test was conducted to test whether the regression model found a correlation between the independent variables. A good regression model should not have a correlation between the independent variables. Testing whether there is multi collinearity in the regression model can be seen by looking at the tolerance value and the VIF (Variance Inflation Factor) value. The value commonly used to indicate multi collinearity is the tolerance value 0.10. Heteroscedasticity test aims to test whether in the regression model there is an inequality of variance from the residuals of one observation to another observation. Heteroscedasticity means that there is a variable variance in the regression model that is not the same (constant). On the other hand, if the variable variance in the regression model has the same or constant value, it is called homoscedasticity. To detect the presence or absence of heteroscedasticity in this study, the *glejser* test was carried out. The *glejser* test is done by regressing all independent variables to the absolute value of the residual. If there is a significant influence of the independent variable on the absolute value of the residual, then in the model there is a heteroscedasticity problem. The autocorrelation test aims to determine whether there is a correlation between members of a series of observation data described by time (times-series) or space (cross section). The autocorrelation test in this study used the Durbin Watson test.

To test the variables of communication style, computer efficacy and competency on internal satisfaction of EMR services, multiple linear regression analysis was used with the model

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + e.$$

The Significance Test (significant effect) of the independent variable (Xi) on the dependent variable (Y) both jointly and partially on hypothesis 1 (H1) to hypothesis 4 (H4) was carried out by F - Test and T - Test at the 5% level ($\alpha = 0.05$). This F-Test is used to test the feasibility of the model (goodness of fit). This hypothesis is formulated H1: $b_1, b_2, b_3 \neq 0$. This means that if the significance level is less than 0.05 or 5% then the model used in the theoretical framework is feasible to use, while if the significance level is greater than 0.05 or 5% then the model used in the theoretical framework is not feasible to use. In the T-Test, the coefficient significance test (b_i) was performed with the T-statistic. It is used to partially test the regression coefficients of the independent variables. The hypothesis is formulated H1: $b_i \neq 0$. This means that if the significance level is less than 0.05 or 5%, the proposed hypothesis is accepted or said to be significant, meaning that partially the independent variables (X1 to X3) have a significant effect on the dependent variable (Y) = the hypothesis is accepted, while if the significance level is greater than 0.05 or 5% then the proposed hypothesis is rejected or said to be insignificant, meaning that partially the independent variables (X1 to X3) have no significant effect on the dependent variable (Y), hypothesis is rejected.

4. Result and Discussion

4.1 T-Test

The following is a table of Coefficients providing information about the regression equation and whether or not there is a partial influence of the communication style, computer efficacy and competency variables on the satisfaction variable.

Table 1. T-Test Result

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.170	5.398		.031	.975
	COMMUNICATION STYLES	.249	.120	.313	2.073	.048
	COMPUTER EFFICACY	.493	.207	.350	2.378	.025
	COMPETENCY	.317	.148	.320	2.143	.042

A. Dependent Variable: EMR SATISFACTION

H1: Communication style has a positive and significant effect on internal satisfaction of EMR services.

The results of multiple regression analysis show that the communication style has a t-count of 2.073 > t-table of 2.056 (df=26, Pr=0.05), which means that H1 is accepted. This is also supported by the probability value of the communication style 0.048 < 0.05.

H2: computer efficacy has a positive and significant effect on internal satisfaction of EMR services.

The results of multiple regression analysis showed that computer efficacy had a t-count of 2.378 > t-table 2.056 (df=26, Pr=0.05), which means H2 is accepted. This is also supported by the probability value of computer efficacy 0.025 < 0.05.

H3: Competency has a positive and significant effect on internal satisfaction of EMR services.

The results of multiple regression analysis show that the competency has a t-count of 2.143 > t-table 2.056 (df=26, Pr=0.05), which means that H3 is accepted. This is also supported by the probability value of competency 0.042 < 0.05.

4.2 F-Test

Table 2. F-Test Result

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	76.556	3	25.519	8.160	.001 ^b
	Residual	81.310	26	3.127		
	Total	157.867	29			

a. Dependent variable: emr satisfaction
 b. Predictors: (constant), competency, computer efficacy, communication styles

Based on the F-test, the result is that the F-count value is 8.160 with a significance level of 0.001. Because the significance level is less than 0.05, and the F-count value is $8.160 > F\text{-table } 2.960$, the regression model can be used to predict the satisfaction variable or together the variables of communication style, computer efficacy and competency affect the satisfaction variable.

H4 : Communication style, computer efficacy and competency simultaneously have a positive and significant effect on internal satisfaction of EMR services.

The results of multiple regression analysis show that the F-count is $8.160 > F\text{-table } 2.960$ ($Pr=0.05$), which means that H4 is accepted. This is also supported by the probability value of $0.001 < 0.05$.

From the Table 1, the result of multiple linear regression equation is:

$$Y = 0,170 + 0,249 X1 + 0,493 X2 + 0,317 X3$$

Based on the multiple linear regression equation above, the communication style regression coefficient is 0.249. These coefficients indicate a positive relationship between the variables of communication style on satisfaction. The regression coefficient for computer efficacy is 0.493. These coefficients indicate a positive relationship between the variables of computer efficacy and satisfaction. The competency regression coefficient is 0.317. These coefficients indicate a positive relationship between the variables of competency and satisfaction.

4.3 Discussion

The results of this study show that an increase or decrease in communication style during the study period has a positive and significant effect on satisfaction. (H1: communication styles have a positive and significant effect on internal satisfaction of EMR, accepted). The coefficient of communication style variable is positive, so that communication style is parallel to satisfaction of electronic medical record services. The coefficient value of the communication style variable is 0.249. This means that every single attempts to improve communication style, it will increase satisfaction by 0.249. The results of the analysis show that communication style has a positive and significant effect on internal satisfaction of EMR. This is because Hospital already has good communication media in the form of a coordination group related to EMR services. The communication media is a *Whatsapp* group containing doctors, nurses, administration and IT departments. Whenever there are technical problems or administrative problems related to the disruption of EMR, doctors can inform the group and these problems can be handled together quickly. The results of this study are in line with the results of previous research conducted by (Seo et al., 2016) stating that communication style has a positive and significant effect on satisfaction.

The results of this study show that the increase or decrease in computer efficacy during the study period has a positive and significant effect on satisfaction. (H2: computer efficacy has a positive and significant effect on internal satisfaction of EMR, accepted). The variable coefficient of computer efficacy is positive, so that computer efficacy is parallel to satisfaction of electronic medical record services. The coefficient of computer efficacy is 0.493. This means that every single attempts to increase computer efficacy will increase satisfaction by 0.493. Among other independent variables, the computer efficacy variable has the largest coefficient value, so that the computer efficacy variable is the dominant variable that affects internal satisfaction of EMR. The results of the analysis show that computer efficacy have a positive and significant effect on internal satisfaction of EMR. This is because the Hospital routinely carries out socialization activities related to how to use and troubleshoot EMR applications by IT units. In addition to socialization, it also regularly conducts webinars with topics related to IT for employees, including doctors. With these routine activities, the computer efficacy for doctors will increase. The results of this study are in line with the results of previous studies conducted by (Alasmary et., al., 2014; Li et., al., 2007; Hwang et., al., 2016) stated that computer efficacy have a positive and significant effect on satisfaction.

The results of this study show that the increase or decrease in competency during the study period has a positive and significant effect on satisfaction. (H3: competency has a positive and significant effect on internal satisfaction of EMR, accepted). The coefficient of competency variable is positive, so that competency is parallel to satisfaction of electronic medical record services. The competency coefficient value is 0.317. This means that every single attempts to increase competency will increase satisfaction by 0.317. The results of the analysis show that competency has a positive and significant effect on internal satisfaction of EMR. This is because the hospital has a communication forum between internal doctors that aims to discuss scientifically with each other, training from the Human Capital unit for employees, especially doctors to improve competency and the existence of a workplace rotation system to provide new experiences, handle new cases so that doctors are encouraged to continue to improve their competencies. The results of this study are in line with the results of previous studies conducted by (Hadiwijaya et., al., 2016;

Deswarta 2017) which stated that competency had a positive and significant effect on satisfaction

5. Conclusion

From this research, several conclusions can be formulated. Partially there is a positive and significant influence of communication style on internal satisfaction of EMR services. There is also an influence of computer efficacy on internal satisfaction of EMR services positively and significantly. Partially there is an influence of competency on internal satisfaction of EMR services positively and significantly. Simultaneously there is a positive and significant influence on the variables of communication style, computer efficacy and competency on internal satisfaction of EMR services. This shows that simultaneously all independent variables have a significant effect on the dependent variable. Communication style affects the internal satisfaction of EMR services, so that satisfaction with EMR services can be increased by increasing the use of communication media in the form of coordination groups related to EMR services. Whenever there are technical problems or administrative problems related to the disruption of EMR services, doctors can inform the group and these problems can be handled together quickly. Not only that, the Change Management Department at the hospital can also provide reminders about good communication tips, culture and hospital motto for the service department, especially medical personnel and doctors. Computer Efficacy affect the internal satisfaction of EMR services, so that satisfaction with EMR services can be increased by continuing to carry out socialization activities related to how to use and troubleshoot EMR applications by IT units. In addition to socialization, hospital can also regularly conduct webinars on IT-related topics for employees, including doctors. With these routine activities, the computer efficacy for doctors will increase. Competency affects internal satisfaction of EMR services, so that satisfaction with EMR services can be increased by establishing a communication forum between internal doctors that aims to discuss scientifically with each other. Human Capital Department of the hospital can also provide training for employees, especially doctors to improve competency and implement a workplace rotation system to provide new experiences or handle new cases so that doctors are encouraged to continue to improve their competencies. Based on the results of the study, the adjusted R² value was 0.426, this means that the variation in satisfaction can be explained by variations in the independent variables of communication style, computer efficacy and competency of 42.6 percent. While the remaining 57.4 percent is explained by other reasons outside the model. From the remaining percentage obtained, it can provide the opportunity for further researchers to examine what other aspects can affect the internal satisfaction of EMR services apart from communication style factors, computer efficacy and competency.

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