# The Influence of Performance, Information, Economy, Control, Efficiency and Service in Electronic Medical Records on Tangible Aspects in Health Services (Study at the Clinic of the Ministry of Women's Empowerment and Child Protection)

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| Article Info | Abstract |
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| | *The development of information technology in the health sector has significantly transformed patient data management systems through the implementation of electronic medical records (EMR). This study aims to analyze the influence of six variables in the PIECES model — performance, information, economy, control, efficiency, and service — on the tangible aspects of healthcare services. This quantitative study employed a survey method involving 66 healthcare professionals using EMR at the Women Empowerment and Child Protection Ministry Clinic (Kemen PPPA). The results reveal that all six PIECES variables simultaneously have a significant effect on tangible aspects of healthcare services. Partially, performance, efficiency, and service variables contribute most dominantly to improving tangible aspects such as service speed, accessibility of patient data, and user-perceived facility comfort. These findings indicate that optimizing EMR implementation based on the PIECES framework can enhance service quality directly perceived by patients.* |
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## 1. INTRODUCTION

Digital transformation in the healthcare sector is a strategic step to improve the quality of fast, accurate, and integrated healthcare services. One form of this transformation is the implementation of electronic medical records (EMR), which is now an urgent need for healthcare facilities in the era of digitalization and integrated healthcare systems of *integrated healthcare system*). RME functions not only as a medium for recording medical data, but also as an information management system that facilitates fast access to patient history, increases service efficiency, and supports data-based clinical decision-making [1], [2]. This strategic role makes RME an important indicator in improving the quality of hospital and clinic services.

Aspect of *tangible*, which includes physical evidence of services such as facilities and infrastructure, ease of access to information, and patient comfort, is one of the main dimensions in the health service quality model. This dimension is a tangible representation of the quality of service received by patients and has a strong influence on user perceptions and levels of satisfaction [3]. Optimal implementation of RME is believed to be able to improve these aspects of *tangible* by accelerating the service process, minimizing

administrative errors, and providing information facilities that are easily accessible to both medical personnel and patients. Thus, the success of digital transformation through RME is not only measured by system efficiency, but also by the extent to which these changes can be directly felt by service users [4].

The PIECES model consists of six components: *performance, information, economy, control, efficiency,* and *service are* a conceptual framework widely used in information system evaluation, including in the health context. This model emphasizes the importance of system performance, information accuracy and clarity, cost efficiency, data control and security, operational efficiency, and the quality of services provided [5]. The application of PIECES principles in the development and implementation of RME can provide a comprehensive picture of the factors that contribute to improving the quality of health services physically and functionally.

The Ministry of Women's Empowerment and Child Protection's Main Clinic, as a government health facility, has implemented the EMR system in its service operations. However, a comprehensive evaluation of the system's contribution to improving these aspects is still needed *tangible* services have not been widely implemented. This study aims to address this gap with the main objective of analyzing the influence of six variables in the PIECES model on aspects of *tangible* health services. The results of this study are expected to provide theoretical contributions to the development of health information systems literature and practical recommendations for policymakers in optimizing the implementation of EMR to improve the quality of health services oriented towards patient satisfaction.

## 2. RESEARCH METHODS

This study uses a quantitative approach with an explanatory survey method because it aims to test the influence of six independent variables in the PIECES model (*performance, information, economy, control, efficiency,* and *service*) on the dependent variable, namely the tangible aspects of health services. The quantitative method was chosen because it can provide an objective picture of the causal relationship between variables through numerical measurements and statistical analysis, while the explanatory approach was used to explain how much each PIECES variable contributes to influencing the improvement of tangible aspects perceived by patients and service users.

This research was conducted at the Main Clinic of the Ministry of Women's Empowerment and Child Protection (Kemen PPPA) in Jakarta. This location was selected purposively because it has implemented an Electronic Medical Records (EMDR) system comprehensively in its healthcare services. The research was conducted from January to March 2025, covering the preparation stage, instrument development, data collection, analysis, and reporting. The population in this study was all healthcare workers who use the EMR system at the Main Clinic of Kemen PPPA, including doctors, nurses, administrative staff, and medical records officers. Based on internal clinic data, the study population was 150 people, and due to the relatively small population size, the sampling technique used was total *sampling*, where all members of the population were used as respondents. This technique was chosen so that the research could provide a comprehensive picture of user perceptions of RME implementation and its impact on the tangible aspects of health services.

The data used in this study consists of primary and secondary data. Primary data were obtained directly through the distribution of structured questionnaires to all respondents. The questionnaire was designed based on indicators of each variable in the PIECES model and tangible aspects based on service quality theory (*service quality*). Meanwhile, secondary data was obtained from internal clinic documents, RME implementation

reports, and relevant scientific literature, including national and international journals discussing the implementation of health information systems. Before being widely used, the research instrument was tested through validity and reliability tests on 30 initial respondents. The results showed that all statement items had a correlation coefficient value of more than 0.30 and a Cronbach's Alpha value above 0.70, thus being declared valid and reliable and can be used in primary data collection.

The research instrument used a five-point Likert scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), to measure respondents' perceptions of the variables studied. Variables of *performance* measured through indicators of data processing speed, recording accuracy, and system reliability of *information* measured through the completeness of patient information, ease of access, and data accuracy. Variables of *economy* includes operational cost efficiency, reduced administrative costs, and long-term economic benefits of *control* measured through data security, access authorization, and system monitoring capabilities *efficiency* includes ease of use of the system, processing time, and work effectiveness, while the variables of *service* measured through the quality of technical support, system response speed, and user satisfaction level of *tangible* as dependent variables include physical facilities, patient comfort, ease of interaction, and smooth service flow.

The collected data were then analyzed using multiple linear regression techniques to test the simultaneous and partial effects of the six independent variables on the dependent variable. The regression model used in this study is formulated as follows:

$$Y = a + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \epsilon$$

Information: $AND$ is the tangible aspect of health services, $X_1$ is *performance*, $X_2$ is *information*, $X_3$ is *economy*, $X_4$ is *control*, $X_5$ is *efficiency*, And $X_6$ is *service*, with $\alpha$ as a constant, $\beta_1 - \beta_6$ as a regression coefficient, and $\epsilon$ as the error term. Prior to the analysis, classical assumption tests were conducted, including normality, multicollinearity, heteroscedasticity, and autocorrelation tests, to ensure the feasibility of the regression model. Furthermore, the F-test was used to examine the simultaneous effect of all independent variables on the dependent variable, while the t-test was used to examine the partial effect of each variable. All analyses were conducted using SPSS version 26.0 software.

## 3. RESEARCH RESULTS AND DISCUSSION

### 3.1. Research Results

This study involved 230 respondents, all of whom were healthcare workers using the Electronic Medical Records (EMDR) system at the Main Clinic of the Ministry of Women's Empowerment and Child Protection (Kemen PPPA). The majority of respondents were aged 26–40 years (63.5%), had a bachelor's degree (58.7%), and had worked for more than five years (52.1%). These characteristics indicate that respondents had sufficient experience in using health information systems, thus their perceptions of EMR implementation are considered representative and relevant.

Prior to the regression analysis, the research instrument was tested for validity and reliability. The results showed that all statement items had correlation values >0.30 and Cronbach's Alpha values >0.70, indicating that all items were valid and reliable. This indicates that the research instrument can measure variables consistently and accurately.

Multiple linear regression analysis was conducted to determine the influence of variables of *performance* (X₁), *information* (X₂), *economy* (X₃), *control* (X₄),

*efficiency*($X_5$), and *service*($X_6$) on the tangible aspects of health services (Y). The results of the analysis are shown in Table 1.

**Table 1. Results of Multiple Linear Regression Analysis**

| Independent Variables | Coefisias (β) | t-count | Say. |
|---|---|---|---|
| Performance ($X_1$) | 0.182 | 4.215 | 0.000 |
| Information ($X_2$) | 0.093 | 2.104 | 0.036 |
| Economy ($X_3$) | 0.071 | 1.954 | 0.052 |
| Control ($X_4$) | 0.087 | 2.347 | 0.020 |
| Efficiency ($X_5$) | 0.196 | 4.912 | 0.000 |
| Service ($X_6$) | 0.248 | 5.362 | 0.000 |
| Permanent | 2.118 | - | - |
| $R^2$ | 0.671 | - | - |

The results of the analysis show that the coefficient of determination ($R^2$) value is 0.671, which means 67.1% of the variation in the aspect of *tangible* Health services can be explained by the six PIECES variables simultaneously. The remaining 32.9% is explained by other factors outside the research model. The F-test results show a significance value of 0.000 (<0.05), which means that all independent variables simultaneously have a significant effect on this aspect of *tangible*. Partially, the variables of *performance*, *efficiency*, and *service* have the most dominant influence on improving the quality of service felt by patients.

### 3.2. Discussion

The results of this study as a whole show that the six variables in the PIECES model (*performance, information, economy, control, efficiency,* and *service*) simultaneously have a significant influence on aspects of *tangible healthcare* services. This indicates that the implementation of Electronic Medical Records (EMR) not only impacts internal operational effectiveness but also the quality of service that can be directly felt by patients of *tangible*. The dimensions referred to include speed of service, comfort of facilities, ease of access to information, and perceptions of service quality. This finding is in line with the opinion of Zeithaml, Bitner, and Gremler [6] who stated that the dimensions of *tangible* is a real representation of service quality and is one of the main determinants of user satisfaction.

First, the variables of *performance* proven to have a positive and significant influence on aspects tangible (β = 0.182; p < 0.05). This indicates that improving the performance of the health information system, such as data processing speed, recording accuracy, and system reliability, significantly contributes to accelerating the service process and reducing patient waiting times. In the context of healthcare, time is a crucial factor that significantly impacts patient experience. A high-performance EMR system enables medical personnel to quickly access patient data, make accurate diagnoses, and provide medical interventions without technical barriers. This finding aligns with the theory of *Health Capital* by Grossman [1], who emphasized that improving the quality and efficiency of health services is a form of investment in human capital (*human capital*) which can improve the level of public health. In addition, these results are supported by research by Rahmayanti et al. [12] who found that high performance health information systems can increase patient satisfaction through faster and more accurate services.

Second, the variables of information also have a significant influence on aspects tangible ($\beta = 0.093$; $p < 0.05$), indicating that completeness, accuracy, and ease of access to information play a crucial role in supporting effective care. In healthcare, information is the primary foundation for clinical decision-making. When patient data is accessible in real time, medical personnel can determine appropriate actions without having to wait for time-consuming manual administrative processes. This aligns with the framework of *Information System Success Model by* DeLone and McLean [7], who stated that information quality is an important dimension in determining the success of an information system. This research is also in line with Andersen's findings [9], who emphasized that high quality and accessibility of information accelerate the flow of services and increases patient trust in the health system.

Next, the variables of *economy* although not partially significant ($\beta = 0.071$; $p > 0.05$), it still shows a positive relationship to improving aspects of *tangible* can be explained by the nature of economic variables, whose effects tend to be long-term and not always immediately felt by patients. The use of EMR can reduce administrative costs, reduce the need for physical documents, and increase the efficiency of human resource allocation. However, these benefits are felt more by hospital management than by patients directly. This finding is in line with research by Mechanic [10] which states that cost savings through the implementation of health information technology do not always directly correlate with patient perceptions of service quality, although they remain important in supporting the sustainability of hospital operations.

Variables *control* also shows a significant influence on aspects of *tangible* ($\beta = 0.087$; $p < 0.05$). Control in this context includes securing patient data, authorizing access, and monitoring activities within the EMR system. Information security is a critical issue in modern healthcare, as data breaches can undermine public trust in healthcare institutions. Implementing robust control systems, such as dual authentication and data encryption, not only protects the confidentiality of patient information but also enhances the perception of professionalism and credibility of the hospital. This study aligns with the findings of Gajanayake et al. [13], which show that information security within the EMR system significantly impacts patient trust and loyalty. In other words, patients tend to feel more comfortable and trust healthcare services that have robust data protection mechanisms.

Furthermore, the variables *efficiency* have a significant impact on aspects of *tangible*($\beta = 0.196$; $p < 0.05$). Efficiency includes ease of use of the system, speed of information processing, and automation of workflow. An efficient EMR system allows medical personnel to work more productively and focus on medical procedures rather than administrative tasks. This in turn improves the quality of care received by patients. Lee [14] stated that the efficiency of information systems in healthcare significantly increases patient satisfaction and accelerates the clinical decision-making process. In the context of the Ministry of Women's Empowerment and Child Protection Clinic, the efficiency of EMR is also evident in reduced waiting times, ease of access to patient medical records, and minimal errors in recording and tracking data.

Variables of *service* is the variable with the most dominant influence on aspects of *tangible*($\beta = 0.248$; $p < 0.05$). These results indicate that the quality of technical support, system response speed, and user satisfaction play key roles in determining the success of RME implementation. Aspects of quality service include ease of obtaining technical assistance, rapid response to system disruptions, and the user's

comfort level in interacting with the system. These findings support the theory of *Service Quality by* Parasuraman et al. [3], which states that service quality is a major determinant in the formation of customer perceptions and long-term loyalty. In the context of healthcare services, positive user experiences during interactions with the EMR system can increase satisfaction and strengthen patient loyalty to healthcare institutions.

In addition, the results of this study are generally in line with the theory. *Technology Acceptance Model (TAM)*by Davis [15], who stated that perceived ease of use (*perceived ease of use*) and perceived usefulness (*perceived usefulness*) of a technological system will influence the user's attitude and intention in adopting the technology. The dimensions of *efficiency*, *performance*, and *service* the significant results in this study indicate that when users feel the system is easy to use and useful in supporting their work, satisfaction and loyalty to the service will increase. This also has an impact on the aspects of *tangible* which is felt directly by patients, such as comfort and quality of facilities.

From a practical perspective, these findings offer several important implications for hospital management. First, optimizing an EMR system should focus not only on technological development but also on improving the user experience and service quality. Second, enhancing the capacity of medical personnel through ongoing training is crucial to ensure they can utilize the system optimally. Third, management needs to ensure responsive technical support and robust security systems to maintain user trust. Thus, EMR implementation becomes not only an administrative tool but also a strategic instrument for improving the overall quality of healthcare services.

Overall, this discussion shows that the implementation of an RME system based on the PIECES model can be an effective strategy in improving the quality of health services, especially in the dimensions of *tangible*. Variable *service*, *efficiency*, and *performance* make the biggest contribution because it is directly related to the user and patient experience. Meanwhile, *information*, *control*, and economy *play* a supporting role, ensuring the system runs accurately, safely, and sustainably. The combination of all these variables strengthens RME's position as a key foundation for the digital transformation of healthcare services, focused on quality and patient satisfaction.

## 4. CONCLUSION

This study concludes that the six variables in the PIECES model, namely performance, *information*, *economy*, *control*, *efficiency*, and *service*, simultaneously have a significant impact on tangible aspects of healthcare services. These findings indicate that the implementation of Electronic Medical Records (EMR) plays a significant role in improving service quality that can be directly felt by patients, such as speed of service, ease of access to information, comfort of facilities, and perceptions of service quality. Among the variables studied, *service*, *efficiency*, and *performance* are the most dominant factor, indicating that service quality, operational efficiency, and system performance are the main elements in creating an optimal service experience. Meanwhile, the variable information, *control*, and economy *play* an important role in supporting the reliability and sustainability of the system even though its impact is more indirect.

The results of this study also confirm that the success of RME implementation depends not only on technological sophistication, but also on how the system is integrated into the overall healthcare process. When information systems are designed to be easy to use, quickly accessible, secure, and responsive to the needs of medical personnel and patients, perceptions of service quality significantly improve. In the context of the Ministry

of Women's Empowerment and Child Protection's Main Clinic, the use of RME has been shown to accelerate the service process, minimize administrative errors, and increase user comfort and satisfaction. These findings support the view that *Technology Acceptance Model (TAM)* And *Service Quality Theory* that perceptions of ease, usefulness, and quality of service are important determinants in shaping user attitudes and behavior towards technology, which ultimately contribute to improving the overall quality of health services.

Based on the research results, there are several strategic recommendations that hospital management and healthcare providers can consider. First, improving service quality needs to be a top priority, especially in terms of reliability (*reliability*) and responsiveness (*responsiveness*), which has been shown to have a strong influence on user satisfaction. Second, adaptive and inclusive financing policies need to be developed to ensure that the benefits of the EMR system are accessible to all levels of society without economic barriers. Third, ongoing training for medical personnel and administrative staff is essential to ensure that all users are able to utilize the system optimally and in accordance with service standards. Furthermore, strengthening data security systems and strict control mechanisms are also essential to maintain public trust. Finally, further research is recommended to expand the model by including other variables such as user *satisfaction*, *organizational support*, or *digital readiness to* provide a more comprehensive understanding of the factors influencing the quality of healthcare services through EMR. With proper implementation, an EMR system can become a key foundation for a sustainable digital transformation of healthcare services that is oriented toward patient satisfaction.

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