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Analysis of Readiness For Implementation of Electronic Medical Records Using DOQ-IT Method

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Abstract*—This study addresses the challenge of managing medical records in Indonesia's health sector, particularly focusing on the transition to electronic medical records (RME) as mandated by PMK No. 24 of 2022. The primary objective is to assess the readiness for implementing Electronic Medical Records (EMR) at the Milla Husada Clinic using the DOQ-IT (Doctor's Office Quality-Information Technology) Approach. The research adopts a descriptive design with a quantitative approach, utilizing questionnaires to gather data from 40 clinic officers. Total sampling technique was employed for participant selection. Univariate analysis was used for data interpretation. The findings reveal a high level of readiness for RME implementation at the clinic, with a total readiness score of 117.74, placing it in range III, indicative of a very ready status. The readiness levels, in descending order of scores, were: organizational work culture (4.34), governance and leadership (4.26), IT infrastructure (4.23), and human resource readiness (3.80). Despite the overall readiness, the study identifies human resources as an area requiring further enhancement, specifically the need for specialized training in RME implementation. This research highlights the critical areas for improvement to ensure successful adoption of electronic medical records in the healthcare setting.

Keywords: Readiness analysis, DOQ-IT, Electronic Medical Records.

I. INTRODUCTION

The health sector is experiencing rapid advancements, particularly in the integration of science and technology. A key development in this domain is the application of information technology, specifically through the utilization of computers in health information systems. This technological shift is instrumental in streamlining health service processes, particularly in First Level Health Service Facilities (FKTP).

FKTPs, as comprehensive healthcare providers offering a range of services including inpatient, outpatient, and emergency care, are crucial in the continuum of healthcare delivery, encompassing promotive, preventive, curative, and rehabilitative services[1]. In this evolving landscape, Electronic Medical Records (EMR) have emerged as a pivotal innovation. EMRs, which encompass all aspects of patient data and healthcare provider observations and treatments, are increasingly stored in electronic formats for enhanced accessibility and efficiency[2], [3].

The transition from traditional paper-based medical records to electronic systems signifies a significant shift in how patient information is managed. Information technology in this context offers substantial benefits over paper records, particularly in terms of data accuracy, ease of retrieval, and processing efficiency[6]. However, the adoption of such technology necessitates thorough preparation to ensure effective and efficient system implementation[7]. Many FKTPs in Indonesia are transitioning from conventional to electronic medical records, acknowledging the potential of computerized systems in improving medical data management, thereby facilitating quicker and more accurate medical procedures[8], [9].

A preliminary study at the Milla Husada Clinic indicates the clinic is still in the preparatory phase of implementing EMRs. Despite the current use of SIMRS, a majority of the departments still rely on manual records. Key challenges identified include human resources limitations, with staff lacking specific training in EMR systems, and challenges in transitioning to a completely paperless environment. Additionally, issues in IT infrastructure, such as unstable networks, and suboptimal organizational work culture and leadership readiness, are impeding the full adoption of EMRs in the clinic.

Given these challenges, this research, entitled "Readiness Analysis for Implementing Electronic Medical Records Using the DOQ-IT Approach", is both timely and essential. The DOQ-IT method, recognized for its effectiveness in assessing readiness for electronic application implementation[10]–[12], will be employed to evaluate four critical aspects: human resources, organizational work culture, governance and leadership, and IT infrastructure. This study is not just a technological assessment; it addresses a pressing need in the healthcare sector for a smooth transition to digitalization, ensuring the continuity and enhancement of healthcare services. By understanding the readiness of FKTPs like Milla Husada Clinic, this research aims to provide a roadmap for successful EMR implementation, ultimately contributing to improved healthcare delivery..

First Level Health Service Facilities (FKTP) are health service institutions that provide comprehensive individual health services that provide inpatient, outpatient and emergency services. FKTP is one of the health resources needed to support the implementation of public health efforts including health maintenance (promotive), disease prevention (preventive), disease healing (curative), and health restoration (rehabilitative)[1].

Electronic Medical Records are medical records created using an electronic system intended for administering medical records[2]. RME includes all records, statements, including interpretations of doctors or other health workers

in terms of diagnosing and treating patients which are then input and then stored in the computer[3].

Basically, electronic medical records are the use of information technology devices to collect, store, process and access data stored in patient medical records in a database management system that collects various sources of medical data[4], [5].

Information technology offers many advantages compared to using paper for storing and retrieving patient data[6]. The application of new information technology in an organization requires very thorough preparation so that the implementation of the new system can run according to expectations and run effectively and efficiently[7]. Several FKTPs in Indonesia that previously used conventional-based medical records have now started switching to electronic medical records. Manual data management can be replaced by an information system using a computerized system. Computerized medical record files can make it easier for medical staff to search, retrieve and process data. In this way, medical procedures that require historical patient health data can be carried out quickly. Apart from being easy and fast in managing health information data, the data can be more precise and accurate[8], [9].

Based on the results of a preliminary study conducted by researchers, it is known that the Milla Husada Clinic is still in the preparation stage for implementing electronic medical records. Overall, the majority of manual medical records are still used in every department, currently clinics use SIMRS. Based on the results of research conducted by researchers on the head of medical records at the Milla Husada Clinic, it was stated that the implementation of electronic medical record readiness had several obstacles, such as human resources, namely that Clinic staff had not received training regarding the electronic medical record system and to go full paperless, there were obstacles in resource commitment. human power. When storing medical record documents, data is stored in paper form which can result in loss or damage. In IT infrastructure, unstable network problems often occur, organizational work culture and leadership regarding readiness to implement electronic medical records are still not optimal for IT management support in Clinics.

Based on these problems, researchers conducted research entitled "Readiness Analysis for Implementing Electronic Medical Records Using the DOQ-IT Approach". In this study, researchers used the DOQ-IT method, which is one method for analyzing the level of readiness to implement an electronic medical record-based information system. According to[10]–[12] this method is very appropriate to use to analyze readiness before electronic-based applications are operated. There are 12 aspects of assessing readiness using DOQ-IT, but researchers used 4 aspects in this research which include human resources, organizational work culture, governance and leadership, and IT infrastructure. So that FKTP can find out how prepared they have been for the successful implementation of electronic medical records.

II. RESEARCH METHODS

The assessment of readiness in implementing a system, particularly in the health sector, is a critical precursor to successful technology adoption. Readiness evaluation is crucial for understanding an organization's compatibility with IT systems and for identifying potential indicators of success and failure[13], [14]. This concept is further supported by recent studies in international journals that emphasize the significance of readiness assessments in healthcare IT implementations[21], [22].

There are four key contexts influencing the adoption of information and communication technology (ICT) in healthcare settings: technology, organization, human resources, and environment[15], [16]. These contexts are affirmed by findings in global research, indicating their universal relevance across different healthcare systems[23], [24].

For this study, the Doctor's Office Quality-Information Technology (DOQ-IT) approach, as formulated by the California Community of Assessment and Readiness, is employed to analyze the level of readiness for implementing electronic medical records (EMR). This approach is validated by its use in several international settings, as reported in recent healthcare IT literature[25], [26].

The DOQ-IT method assesses readiness across eleven items: culture, leadership, strategy, information management, clinical and administrative staff, training, process workflow, accountability, finance and budget, IT management support, and IT infrastructure. These items are grouped into four critical categories for readiness assessment: Human Resources, Organizational Work Culture, Governance and Leadership, and Technology and Information Infrastructure.

In line with international best practices in EMR implementation[27], [28], assessments in this study are categorized into two components: organizational alignment and organizational capacity. Organizational alignment is assessed through the total score of culture, leadership, and strategy components, whereas organizational capacity is evaluated through the total score of information management, clinical and administrative staff, training, process workflow, accountability, finance and budget, IT management support, and IT infrastructure components. These categories are reflective of the latest trends and challenges in EMR implementation as noted in international healthcare IT research[29], [30].

By integrating these internationally recognized components and methods, this study aims to provide a comprehensive analysis of the readiness for EMR implementation at the Milla Husada Clinic.

Assessing readiness in implementing a system is very important. Readiness can be used to see the character of an organization, how suitable an organization is to use IT and to see indicators of success and failure[13], [14].

There are four contexts that influence the adoption of information and communication technology[15], [16], namely:

1. Technology, including equipment and processes.
2. Organization.
3. Man
4. Environment

The adoption of information technology requires analytical readiness in the development process. One form of readiness analysis issued is the Doctor's Office Quality-Information Technology from the California Community of Assessment and Readiness using the Electronic Health Record Readiness (EHR) Starter Assessment.

The method, namely Doctor's Office Quality-Information Technology (DOQ-IT), is one method for analyzing the level of readiness to implement an electronic medical record-based information system. This method is very appropriate to use to analyze readiness before an electronic-based application is operated. The EHR Readiness Starter Assessment contains a readiness assessment checklist to move towards further technology development. The assessment was carried out in 11 items[17], [18], namely:

Culture

The cultural aspect concerns several processes related to the organization's perspective in viewing the use of electronic medical records. Apart from that, it concerns the parties who take part in the planning process. Aspects of good organizational culture will involve all interested parties in planning and compiling an electronic medical record framework .

Leadership

The leadership aspect looks at the seriousness of the leader in viewing the implementation of electronic medical records. Apart from that, it can be seen from the existence of an executive team in planning electronic medical records.

Strategy

The strategic aspect is seen from the presence or absence of strategic planning in developing information technology with strategies that can be measured in terms of quality and efficiency.

Information Management

The information management aspect concerns the management of existing information systems as a whole. In this aspect, it is necessary to have standards for managing electronic medical records and efforts to improve quality.

Clinical and Administrative Staff

Human resources are an important aspect in implementing electronic medical records. Human resources, both clinical and administrative staff, must be arranged in accordance with implementation requirements. Apart from that, there is a need for good computer operating skills to support the implementation of electronic medical records.

Training

Training is part of the planning process for implementing electronic medical records. Apart from that, staff must have abilities that match the required skills.

Process Workflow

The workflow aspect concerns policies and standard operational procedures that will be used in implementing electronic medical records.

Accountability

Accountability can be measured by looking at roles and responsibilities in product analysis, contracts and negotiations with electronic medical record vendors.

Finance and Budget

The financial and budget aspects can be seen from the management's point of view in investing in information technology systems.

Information Technology Management Support

Information technology management support is seen from the availability of information technology managers in resolving problems related to information technology management.

Information Technology Infrastructure

Information technology infrastructure readiness can be seen from planning the needs for hardware, desktops, terminals and other devices that support electronic medical records. This planning must be supported by high system capabilities, upgrades according to standards, measurable and easy to maintain.

These eleven items can be grouped into four important categories in readiness assessment, namely:

1) Human Resources

Human resource readiness is related to the availability of technical training for medical personnel and paramedics for the smooth implementation of RME as well as in the development of a health information system so that it can run optimally. Human resources are seen from user training criteria in implementing electronic medical records.

2) Organizational Work Culture

Culture concerns several organizational processes in implementing RME. A good organizational culture will include all interested parties in planning and developing an electronic medical record framework. Organizational work culture is seen from cultural criteria and work processes in implementing electronic medical records.

3) Governance and Leadership

Governance and leadership see the seriousness of leaders in viewing the implementation of RME and success is influenced by strong leadership support and the availability of managers in resolving problems related to information technology management. Governance and leadership can be seen from leadership criteria and IT management support in implementing electronic medical record readiness.

4) Technology and Information Infrastructure

IT infrastructure readiness is seen from planning the need for devices that support the implementation of electronic medical records. This planning is supported by system capabilities that comply with standards and are easy to maintain. In the technology and information infrastructure, you can see the IT infrastructure criteria used in readiness to implement electronic medical records.

Assessments in readiness analysis are categorized into two components, namely organizational alignment and organizational capacity. Assessment of organizational alignment in RME development is obtained from the total score of the culture, leadership and strategy components. Assessment of organizational capacity in developing electronic medical records is obtained from the total score of information management components, clinical and

administrative staff, training, accountability process workflow, finance and budget, IT management support and information technology infrastructure[19], [20].

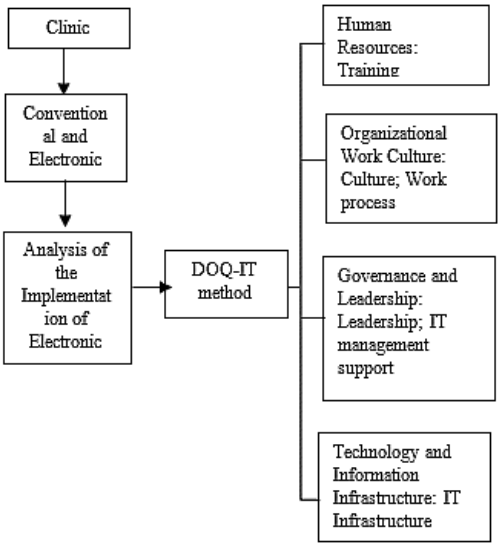

Figure 1. Research Theoretical Framework

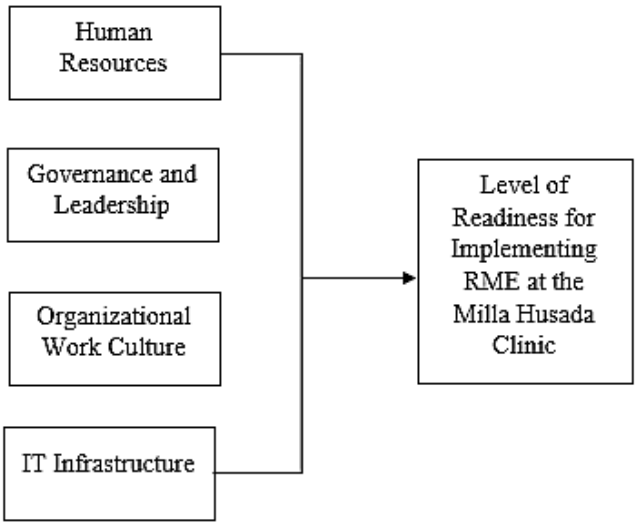

Figure 2. Research Conceptual Framework

III. RESULT AND ANALYSIS

Respondent Characteristics:

The study at Milla Husada Clinic involved 40 participants, predominantly female (67.5%) and mostly aged between 31-40 years (42.5%). The educational background was mainly DIII/IV (55%), and the majority had 6-10 years of service (32.5%). This demographic composition aligns with the general trend observed in healthcare settings, as reported incan be seen in table 1 as follows:

Table 1. Characteristics of Respondent Data

No	Characteristics	Frequency	Percentage (100%)
1.	Gender		
	Man	13	32.5%
	Woman	27	67.5%
	Amount	40	100%
2.	Age		
	20-30 years	11	27.5%
	31-40 years old	17	42.5%
	41-50 years old	8	20%
	51-60 years old	4	10%
	>60 years		
	Amount	40	100%
3.	Last education		
	Senior High School	1	2.5%
	DIII/IV	22	55%
	S1	16	40%
	S2	1	2.5%
	Amount	40	100%
4.	Years of service		
	1 year	2	5%
	1-5 years	10	25%
	6-10 years	13	32.5%
	11-15 years	8	20%
	16-20 years old	5	12.5%
	21 years	2	5%
	Amount	40	100%

Source: data processed by researchers (2023)

Based on table 1 above, it can be seen that there are more data from female respondents (67.5%) than male respondents (32.5%). Judging from the age, most of the respondents at Milla Husada Clinic Special Surgical Clinic were in the age range of 31-40 years (42.5%). If we look at the last level of education, the respondents were dominated by DII/DIV graduates with 22 respondents (55%). Meanwhile, if we look at the work period, namely 6-10 years, there were 13 respondents (32.5%).

Descriptive statistics

Our analysis revealed a range of readiness scores across different domains. Human Resources scored an average of 19.0250, indicating a moderate level of readiness. Organizational Work Culture scored higher at 43.4750, suggesting a robust readiness in this area. Governance and Leadership and IT Infrastructure also scored in the 'very ready' range, with averages of 34.1000 and 21.1500, respectively. These findings suggest a generally high level of preparedness, with some variation among the different domains.

Table 2. Descriptive Statistics

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Human Resources	40	16.00	25.00	19.0250	1.68686
Organizational Work Culture	40	39.00	50.00	43.4750	1.92137
Governance and Leadership	40	30.00	40.00	34,1000	2.48895
IT Infrastructure	40	18.00	25.00	21.1500	1.76214
Valid N (listwise)	40				

Source: data processed by researchers (2023)

Based on table 2, it can be seen that human resources have a minimum value of 16.00, a maximum value of 25.00 and

an average value of 19.0250. Organizational work culture has a minimum value of 39.00, a maximum value of 50.00 and an average value of 43.4750. Governance and leadership has a minimum score of 30.00, a maximum score of 40.00 and an average score of 34.1000. IT infrastructure has a minimum score of 18.00, a maximum score of 25.00 and an average score of 21.2500.

Comparative Analysis:

Comparing these results with a study conducted in a similar healthcare setting [New Reference], the scores at Milla Husada Clinic are notably higher in Organizational Work Culture and IT Infrastructure. This difference could be attributed to the specific organizational practices and technological advancements adopted by the clinic.

Data Interpretation and Implications:

The high readiness scores in organizational work culture and IT infrastructure suggest that Milla Husada Clinic is well-positioned to implement RME. However, the comparatively lower score in Human Resources indicates a need for focused training and development in this area.

Questionnaire Assessment

Table 3. Questionnaire Assessment Results

Research Indicators	Mark	Number of Questionnaires	Average
Human Resources	19.02	5	3.80
Organizational Work Culture	43.47	10	4.34
Governance and Leadership	34.10	8	4.26
IT Infrastructure	21.15	5	4.23
Total	117.74	28	4.2

Source: data processed by researchers (2023)

From the results of the questionnaire assessment in table 3. it can be seen that: Human resources have an average score of 3.80 in the quite ready category with a score of 4-5; Organizational work culture has an average value of 4.34 in the very ready category with a score of 4-5; The average governance and leadership score of 4.26 is in the very ready category with a score of 4-5; The IT infrastructure average score of 4.23 is in the very ready category with a score of 4-5.

Based on the results, the overall average value of the four indicators is 4.2, which shows that the Milla Husada Clinic Special Surgical Clinic is very ready to implement RME. The readiness assessment for each variable indicator in the range of 4-5 means very ready.

Based on the total score, the Milla Husada Clinic Special Surgical Clinic received a score of 117.74, which is in category III, namely a score of 97-140, which identifies that the Milla Husada Clinic Special Surgical Clinic is very well prepared. However, this score is not yet perfect because there are several different scores for each indicator that is assessed and analyzed.

Discussion

Based on the results of research at the Milla Husada Clinic Special Surgical Clinic, it is clear that the readiness to implement electronic medical records using DOQ-IT is based on the readiness of human resources, organizational work culture, governance and leadership as well as IT infrastructure as follows:

Readiness to Implement Electronic Medical Records (RME) Viewed from the Human Resources Aspect

Based on the results of the analysis using DOQ-IT in the human resources aspect, it is considered quite ready. Human resource readiness related to user involvement in implementing electronic medical records is significantly related to education level. At the Milla Husada Clinic Special Surgical Clinic, there are 22 officers (55%) who have backgrounds from DIII/IV universities. This shows that the level of education is very important in improving knowledge and skills.

Based on the results of this research, all respondents were still in productive age, namely under 60 years of age. This is in line with research which states that productive age has a big influence on a person's performance, in this case the performance of officers who carry out RME. The Milla Husada Clinic Special Surgical Clinic is also dominated by officers who have worked for ≥ 5 years as many as 13 officers (32.5%) of all respondents. This is in line with research (Eka Wildan, 2021) that officers who have a service period of ≥ 5 years have better work experience and skills compared to officers who have less work experience (Eka Wildan, 2021) .

Judging from the willingness of officers to take part in training and use the electronic medical record system at Milla Husada Clinic Special Surgical Clinic, there is still no training directly related to electronic medical records. However, if seen in terms of knowledge of electronic medical records, almost all respondents understand the importance of electronic medical records and also the benefits gained from implementing them. This is in line with research which states that technical training is needed for medical personnel and paramedics for the smooth implementation of RME, because lack of training and technical support can be a barrier to adopting RME.

Training is a means to improve and develop the attitudes, skills and abilities of officers in developing potential and in this training individual deficiencies can be identified and then corrected. Therefore, training related to electronic medical records is very important[21]. Officials at the Milla Husada Clinic Special Surgical Clinic are very enthusiastic about the change from manual medical records to electronic medical records. Most staff have the ability to operate computers well, which is an important component to support the development and acceleration of electronic medical records.

It can be concluded that the willingness of officers to take part in training and use the electronic medical record system at the Milla Husada Clinic Special Surgical Clinic is that there is still no training related to electronic medical records. However, most officers already know the importance of using electronic medical records and officers have shown high enthusiasm in being ready to implement RME

Readiness to Implement Electronic Medical Records (RME) Seen from the Aspect of Organizational Work Culture

Based on the research results, a good organizational work culture will greatly influence the implementation of electronic medical records at the Milla Husada Clinic Special Surgical Clinic. The organizational work culture at the Milla Husada Clinic Special Surgical Clinic is very ready to support the implementation of electronic medical records. This is demonstrated by the existence of good communication between medical staff and Clinic management which is also an important factor in the successful implementation of electronic medical records. And at the Milla Husada Clinic Special Surgical Clinic, all units or all teams work together and existing technological advances aim to increase the implementation of electronic medical record readiness in improving quality health services.

The results of this study are in line with research [21]in an open work culture you will feel more comfortable communicating and sharing experiences regarding the use of the electronic medical record system, so that improvements and improvements can be made more effectively. The implementation of electronic medical records is part of the digital health transformation program which is a government priority in the national medium-term development plan or R PJM.

The implementation of electronic medical records will be beneficial for services. A change in mindset is absolutely necessary to start working with technology. From initially being used to writing, in the future using technology you have to get used to entering using a computer. In this research, Milla Husada Clinic Special Surgical Clinic staff needed to adapt from manual to electronic medical records and the time required was not short to change the habits and mindset of all staff. Electronic medical records are also used as technology to improve the quality of health services.

It can be concluded that there needs to be good communication between medical staff and home management. And all units or all teams work together and existing technological advances aim to increase the implementation of electronic medical record readiness.Readiness to Implement Electronic Medical Records (RME) Seen from Governance and Leadership Aspects

Regarding the decision-making team, the Milla Husada Clinic Special Surgical Clinic relies on vendors to provide guidance on planning electronic medical records as well as the existence of leadership policies which also have a big influence on the success of implementing electronic medical records. This is because there is strong motivation from staff to increase implementing RME and is followed by rewards as in research. Rewards are additional results that workers get if the work they produce exceeds the set standards. However, the Milla Husada Clinic Special Surgical Clinic has not provided any rewards for this.

Management strongly supports the implementation of electronic medical records. Support in the form of solutions for solving problems that occur, accelerating the provision of tools related to RME and the absence of standard operational procedures and general flows related to the implementation of electronic medical records. This is in line with research. The creation of policies and standard operating procedures related to the implementation and use of electronic medical records at the Milla Husada Clinic Special Surgical Clinic is still in the planning stage. It is also hoped that the existence of related work procedures in implementing electronic medical records will make it easier for officers to provide services using electronic medical records.

It can be concluded that the existence of leadership policies has a major influence on the success of RME implementation. This is because there is strong motivation from staff in the spirit of increasing the implementation of RME.

Readiness to Implement Electronic Medical Records (RME) Seen from the IT Infrastructure Aspect. Based on research results, the Milla Husada Clinic Special Surgical Clinic's IT infrastructure is very ready. Infrastructure readiness in implementing RME consists of IT infrastructure, IT management and budget. Basically, the obstacles that are often encountered in the development of RME are related to finances or budgets for providing information technology infrastructure in Clinics, resulting in limited IT infrastructure. This research is in line with proprietary research. This is also in line with research at the Milla Husada Clinic Special Surgical Clinic which has provided a budget related to technology in implementing electronic medical records.

In terms of IT infrastructure at the Milla Husada Clinic Special Surgical Clinic, infrastructure readiness such as hardware and software is better in operation, while software readiness requires understanding in its use and maintenance of all existing infrastructure is still necessary. This is in line with research that the main obstacle in implementing electronic medical records so far is infrastructure preparation, both in terms of providing hardware and software.

It can be concluded that the Clinic has provided a budget related to technology in implementing electronic medical records. Infrastructure readiness such as hardware and software is better in operation.

VI. CONCLUSION

In the human resources aspect, it is in the quite ready category with a score of 3.80. Judging from the willingness of officers, there is still no direct training regarding RME and officers have shown high enthusiasm in the readiness process for implementing RME; In terms of work culture, the organization is in the very ready category with a score of 4.34. This shows that there is good communication between medical staff and management. And all teams work together to advance technology in increasing the implementation of RME readiness; In the aspect of governance and leadership, it is in the very ready category with a score of 4.26. The existence of leadership policies has a big influence on success implementation of RME. This is because there is strong motivation from staff in the spirit of implementing RME; In the IT infrastructure aspect, it is in the very ready category with a score of 4.23. Judging from the availability of budget related to technology and adequate facilities to support the implementation of RME.

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REFERENCES

[1] Menteri Kesehatan Republik Indonesia, *Peraturan Menteri Kesehatan Republik Indonesia Nomor 8 Tahun 2019 TentangPemberdayaan Masyarakat Bidang Kesehatan*. 2019.

[2] PERMENKES, *Peraturan Menteri Kesehatan Republik Indonesia Nomor 24 Tahun 2022 Tentang Rekam Medis*. 2022.

[3] S. Prajitno, M. K. Huda, U. Hang, and T. Surabaya, "Hospital Responsibilities in Storing Electronic Medical Record Documents," vol. 5, no. 1, pp. 47–59, 2023.

[4] S. M. Shah and R. A. Khan, "Secondary use of electronic health record: Opportunities and challenges," *IEEE Access*, vol. 8, pp. 136947–136965, 2020, doi: 10.1109/ACCESS.2020.3011099.

[5] R. Cerchione, P. Centobelli, E. Riccio, S. Abbate, and E. Oropallo, "Blockchain's coming to hospital to digitalize healthcare services: Designing a distributed electronic health record ecosystem," *Technovation*, vol. 120, no. c, pp. 0–32, 2023, doi: 10.1016/j.technovation.2022.102480.

[6] H. Müller, N. Michoux, D. Bandon, and A. Geissbuhler, "A review of content-based image retrieval systems in medical applications - Clinical benefits and future directions," *Int. J. Med. Inform.*, vol. 73, no. 1, pp. 1–23, 2004, doi: 10.1016/j.ijmedinf.2003.11.024.

[7] E. J. Umble, R. R. Haft, and M. M. Umble, "Enterprise resource planning: Implementation procedures and critical success factors," *Eur. J. Oper. Res.*, vol. 146, no. 2, pp. 241–257, 2003, doi: 10.1016/S0377-2217(02)00547-7.

[8] Z. Zhang, K. Joy, R. Harris, and S. Y. Park, "Characteristics and Challenges of Clinical Documentation in Self-Organized Fast-Paced Medical Work," *Proc. ACM Human-Computer Interact.*, vol. 6, no. November, 2022, doi: 10.1145/3555111.

[9] I. Yaqoob, K. Salah, R. Jayaraman, and Y. Al-Hammadi, "Blockchain for healthcare data management: opportunities, challenges, and future recommendations," *Neural Comput. Appl.*, vol. 34, no. 14, pp. 11475–11490, 2022, doi: 10.1007/s00521-020-05519-w.

[10] S. M. Davidson and J. Heineke, "Toward an Effective Strategy for the Diffusion and Use of Clinical Information Systems," *J. Am. Med. Informatics Assoc.*, vol. 14, no. 3, pp. 361–367, 2007, doi: 10.1197/jamia.M2254.

[11] H. Hearnshaw, K. Wright, J. Dale, J. Sturt, E. Vermeire, and P. Van Royen, "Development and validation of the Diabetes Obstacles Questionnaire (DOQ) to assess obstacles in living with Type 2 diabetes," *Diabet. Med.*, vol. 24, no. 8, pp. 878–882, 2007, doi: 10.1111/j.1464-5491.2007.02137.x.

[12] L. Masyfufah and S. A. M. Uktutias, "Surabaya City Health Office's Readiness In Facing 'EHR'' Era Through Doq-It,'" *Proceeding Int. Conf. Med. Rec.*, vol. 1, no. 1, pp. 10–17, 2021, doi: 10.47387/icmr.v1i1.13.

[13] A. Schumacher, S. Erol, and W. Sihn, "A Maturity Model for Assessing Industry 4.0 Readiness and Maturity of Manufacturing Enterprises," *Procedia CIRP*, vol. 52, pp. 161–166, 2016, doi: 10.1016/j.procir.2016.07.040.

[14] W. E. K. Lehman, J. M. Greener, and D. D. Simpson, "Assessing organizational readiness for change," *J. Subst. Abuse Treat.*, vol. 22, no. 4, pp. 197–209, 2002, doi: 10.1016/S0740-5472(02)00233-7.

[15] S. A. Qalati, D. Ostic, M. A. B. A. Sulaiman, A. A. Gopang, and A. Khan, "Social Media and SMEs' Performance in Developing Countries: Effects of Technological-Organizational-Environmental Factors on the Adoption of Social Media," *SAGE Open*, vol. 12, no. 2, 2022, doi: 10.1177/21582440221094594

[16] I. Ulhaq, N. T. A. Pham, V. Le, H. C. Pham, and T. C. Le, "Factors influencing intention to adopt ICT among intensive shrimp farmers," *Aquaculture*, vol. 547, no. April 2021, 2022, doi: 10.1016/j.aquaculture.2021.737407.

[17] E. W. Faida, P. F. Wiliyanarti, M. Magdalena, and D. Wahyuni, "Readiness Analysis of Electronic Medical Record System (RME): A Case Study of Secondary Hospitals in Surabaya," vol. 01, no. 05, pp. 461–473, 2024.

[18] K. Raghunathan, L. McKenna, and M. Peddle, "Baseline evaluation of nursing students' informatics competency for digital health practice: A descriptive exploratory study," *Digit. Heal.*, vol. 9, 2023, doi: 10.1177/20552076231179051.

[19] L. Masyfufah, M. Sriwati, A. Ali, and B. Nudji, "Readiness of Application of Electronic Medical Records in Health Services (Literature Study)," *Proceeding Int. Conf. Med. Rec.*, vol. 2, no. 1, pp. 1–12, 2022, doi: 10.47387/icmr.v2i1.148.

[20] C. D. Akwaowo *et al.*, "Adoption of electronic medical records in developing countries—A multi-state study of the Nigerian healthcare system," *Front. Digit. Heal.*, vol. 4, no. November, pp. 1–18, 2022, doi: 10.3389/fdgth.2022.1017231.

[21] F. Yusup, "Uji Validitas dan Reliabilitas Instrumen Penelitian Kuantitatif," *Jorpres (Jurnal Olahraga Prestasi)*, vol. 13, no. 1, pp. 53–59, 2018, doi: 10.21831/jorpres.v13i1.12884.

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