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Analysis of Electronic Medical Records Implementation Using the Pieces Method at Balaraja Regional Hospital

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ABSTRACT

The advancement of information technology in the healthcare sector encourages hospitals to adopt *Electronic Medical Records* (EMR) systems to improve efficiency, accuracy, and service quality. This study aims to analyze the implementation of EMR at *Balaraja Regional Public Hospital* (*RSUD Balaraja*) using the PIECES framework (Performance, Information, Economy, Control, Efficiency, and Service). A descriptive qualitative method was employed, with data collected through observations and in-depth interviews involving seven informants from the *medical records* unit. The results show that, in terms of performance, the EMR system is responsive and supports staff tasks, although integration between systems remains a challenge. From the information aspect, the system is considered accurate and accessible, yet lacks automated data validation. Economically, the EMR system has improved resource efficiency and reduced long-term operational costs. In terms of control, data security is well managed through personal user accounts and system backups. The efficiency aspect reflects faster workflows and reduced manual processes. From the service perspective, the system enhances user satisfaction and convenience, though occasional technical issues still occur. This study recommends improving system integration and conducting continuous training to optimize EMR implementation at *RSUD Balaraja*.

Keywords:

Electronic Medical Records, implementation, PIECES.

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INTRODUCTION

Advances in information technology have driven significant changes in the healthcare system, including the management of patient data and information. One form of modernization is the implementation of *Electronic Medical Records* (RME), which replaces conventional paper-based medical records (Alhur, 2024; Bain, 2015; He et al., 2021; Janett & Yeracaris, 2020; Sanjaya et al., 2023). The implementation of RME aims to improve the efficiency, accuracy, security, and availability of real-time medical information in healthcare facilities. In Indonesia, digital transformation in the health sector is being driven through the national *"Satu Sehat"* policy that integrates health data nationally and supports the implementation of RME in all hospitals and other health facilities (Arabi et al., 2022; Bisrat et al., 2021; Fritz et al., 2015; Janssen et al., 2021; Mohd Nor et al., 2019; Zurynski et al., 2021). *Balaraja Hospital*, as one of the regional hospitals, has implemented the RME system to improve service quality, work efficiency, and patient safety. However, in its implementation, there are still various technical, operational, and human resource challenges that affect the effectiveness of the system's implementation.

The analysis of RME implementation requires a systematic approach to comprehensively assess the various aspects involved. The PIECES (Performance,

Information, Economy, Control, Efficiency, Service) method is an approach that can be used to evaluate the performance of information systems as a whole.

Previous studies have examined EMR implementation in hospitals. For instance, Wulandari et al. (2022) highlighted that EMR adoption can improve service efficiency and patient data accuracy. However, this study focused solely on the technical aspects of the system without considering operational effectiveness or healthcare staff satisfaction, indicating a limitation in understanding the overall factors influencing successful EMR implementation in hospitals.

Another study by Setiawan and Pratama (2021) explored the impact of EMR on the quality of patient care in type B hospitals. Nonetheless, the study focused primarily on patient perceptions and did not deeply investigate economic efficiency, internal control, and operational efficiency, which are also critical for system success. This gap indicates the need for a more comprehensive evaluation approach to identify constraints and improvement opportunities for hospital services holistically.

Balaraja Regional Hospital, as a regional healthcare facility, has implemented EMR to enhance service quality, work efficiency, and patient safety. In practice, however, various technical, operational, and human resource challenges still affect system effectiveness. The lack of a comprehensive evaluation means that opportunities to optimize efficiency, control, and service quality have not been fully explored, creating urgency for a structured and thorough assessment of EMR implementation.

This study employs the PIECES framework (Performance, Information, Economy, Control, Efficiency, Service) to evaluate EMR implementation at *Balaraja Hospital* holistically. This approach has rarely been applied to regional hospitals in Indonesia, providing a novel perspective in assessing healthcare information systems. Using PIECES, this study evaluates not only technical performance but also information quality, cost efficiency, internal control, operational efficiency, and service quality, offering a comprehensive picture of EMR effectiveness.

Therefore, this study aims to analyze the implementation of RME at *Balaraja Hospital* using the PIECES method, which includes analysis of system performance, information quality, economic efficiency, control aspects, operational efficiency, and service quality. The study benefits include improving healthcare service quality, operational efficiency, and satisfaction among healthcare staff and patients. The implications are expected to inform managerial decisions, guide EMR development planning, and strengthen digital transformation in regional hospitals toward more transparent, accountable, and sustainable healthcare services.

METHOD

This research is descriptive qualitative research with a case study approach. The study was conducted in June 2025 at *Balaraja Hospital*. The informants were seven people from various related units, including registration, reporting, coding, IT/*SIMRS*, and the head of the *medical record* installation. Data were collected through in-depth interviews using semi-structured interview guidelines. Data analysis was carried out using data reduction techniques, data presentation, and drawing conclusions based on the PIECES method.

RESULTS AND DISCUSSION

Table 1. Summary of PIECES Analysis Results at Balaraja Hospital

PIECES Dimension	Key Findings	Discussion / Implications	References
Performance	EMR is responsive, easy to use, supports registration, reporting, and coding. Integration issues between two applications remain.	Good performance improves workflow and patient service; system integration is crucial to prevent duplicate work and maintain high throughput.	Marwati (2021)
Information	Data is complete and easily accessible; completeness notification exists, but automated validation is absent.	High data quality supports decision-making; automated validation needed to ensure accuracy and reduce errors.	Hendra & Putra (2022)
Economy	Initial cost is high, but EMR reduces paper use and manpower in the long term.	Digitization leads to cost-effectiveness; management should consider long-term operational savings, not just upfront costs.	Supriyanti et al. (2023)
Control	Strong controls via personal accounts, backups, access restrictions; data cannot be changed post-discharge.	Maintains security and confidentiality; periodic audits and staff training are necessary to strengthen control.	Oktaviani et al. (2021)
Efficiency	Faster data distribution and retrieval compared to manual systems; use of two apps causes duplicate work.	Efficiency is improved, but integration of applications is needed to maximize benefits and reduce redundancy.	Supriyanti et al. (2023)
Service	Service delivery is faster and more practical; staff training supports adoption. Some officers struggle to adapt due to two apps.	User satisfaction and service quality are high if ease-of-use and socialization are maintained; change management strategies are essential.	Supriyanti et al. (2023)

Performance

The EMR system at Balaraja Hospital demonstrates satisfactory performance in terms of responsiveness, user-friendliness, and support for registration, reporting, and coding tasks. Staff reported that tasks which previously required manual effort are now completed faster, reducing waiting times for patients and improving operational workflow. This finding aligns with Marwati (2021), who stated that EMR systems enhance responsiveness and support operational activities effectively, although performance may decline if multiple applications are not fully integrated.

However, a critical obstacle remains in integrating two distinct applications, which occasionally interrupts workflow and data synchronization. The lack of seamless integration can result in duplicated effort and delays in service delivery. This emphasizes the need for hospital management to consider consolidating applications or developing middleware solutions to ensure smooth data exchange, supporting the argument that performance evaluation must include system interoperability, not just responsiveness (Marwati, 2021).

Information

The EMR system provides complete and easily accessible data, with notifications for data completeness that aid in reducing missing information. The system allows staff to access patient records quickly, which improves clinical decision-making and reduces errors.

Hendra and Putra (2022) highlight that accuracy and completeness of medical data are critical for supporting patient safety and effective healthcare delivery.

Nonetheless, the system currently lacks automated validation features, which may result in inconsistent data entry or errors going undetected. Developing automated validation and verification mechanisms is necessary to ensure the reliability and quality of information. Without these features, the risk of incorrect data being used in clinical decisions remains, emphasizing the importance of continuous system improvement to maintain high information quality (Hendra & Putra, 2022).

Economy

The initial cost of implementing the EMR system is substantial, including software, hardware, and staff training expenses. However, in the long term, the system proves to be more cost-efficient than manual record-keeping, primarily by reducing paper usage and minimizing manpower required for document distribution. This aligns with Supriyanti et al. (2023), who found that digitization of medical records leads to cost savings and reduces operational burden.

Despite the higher upfront costs, the economic benefits of EMR extend beyond tangible cost reduction. Faster access to data, reduced document loss, and improved billing accuracy contribute indirectly to economic efficiency. This suggests that hospital management should adopt a long-term perspective when evaluating cost-effectiveness, considering not only immediate expenses but also potential savings and operational gains over time (Supriyanti et al., 2023).

Control

The EMR system offers strong control mechanisms through personal accounts, access restrictions, and regular backups. The system prevents data alteration after patient discharge, ensuring record integrity. Oktaviani et al. (2021) emphasize that strict control measures are critical for maintaining data security and protecting patient confidentiality in healthcare institutions.

However, despite these controls, periodic audits are still necessary to monitor compliance and identify potential security gaps. Strong control measures alone are insufficient if users are not trained or audits are infrequent. Therefore, implementing continuous monitoring and auditing mechanisms, combined with staff training on data security, is essential to uphold robust control and minimize the risk of data breaches (Oktaviani et al., 2021).

Efficiency

EMR implementation has significantly improved efficiency by speeding up data distribution, record searching, and administrative tasks compared to manual systems. Staff can access patient information in real-time, reducing delays in service provision and improving workflow efficiency. Supriyanti et al. (2023) note that EMR systems increase operational efficiency by streamlining processes and reducing repetitive tasks.

Nonetheless, the use of two separate applications increases redundancy and requires staff to perform some tasks twice, which reduces overall efficiency. Application integration

is therefore critical to optimize the benefits of EMR. Hospitals should focus on integrating all functional modules into a unified system to maximize efficiency and minimize unnecessary workload (Supriyanti et al., 2023).

Service

The EMR system improves the speed and practicality of service delivery, supported by staff training and system guidance. Patient registration, record retrieval, and reporting processes are faster, which enhances patient satisfaction. According to Supriyanti et al. (2023), the ease of use and proper socialization of digital systems strongly influence user satisfaction and service quality.

However, some staff members face challenges adapting to the system, particularly due to the need to operate two applications simultaneously. Continuous training and structured socialization programs are required to ensure that all personnel are proficient in using the EMR system. This also highlights the importance of change management strategies to facilitate smooth adoption of new technologies in healthcare environments (Supriyanti et al., 2023).

This study has several limitations that should be considered when interpreting the findings. First, the research was conducted exclusively at Balaraja Regional Hospital, which may limit the generalizability of the results to other hospitals in Indonesia. Second, the analysis focuses solely on the implementation of the EMR system using the PIECES framework and does not account for other influencing factors such as organizational culture, digital literacy, or the availability of technical support. Third, the data collection relied on observations, interviews, and internal reports, which may be subject to staff perception biases and potential reporting errors. Finally, the study was carried out over a limited timeframe, restricting the ability to comprehensively assess the long-term impacts and sustainability of the EMR system implementation. These limitations suggest that future research should include a broader sample, additional contextual variables, and a longer evaluation period to provide more generalizable and in-depth insights.

CONCLUSION

The implementation of *Electronic Medical Records* (RME) at *Balaraja Hospital* using the PIECES method shows that the system has functioned quite well in supporting officer performance, information provision, cost efficiency, data control, smooth work processes, and service improvement. However, there are still obstacles such as the use of two applications and limitations in integration, so improvements are needed to optimize the system's functionality. It is recommended that the hospital prioritize full integration of the applications and provide ongoing training to officers to enhance system efficiency and user adaptation.

REFERENCES

Alhur, A. (2024). Overcoming electronic medical records adoption challenges in Saudi Arabia. *Cureus, 16*(2), e53827.

Arabi, Y. M., Al Ghamdi, A. A., Al-Moamary, M., Al Mutrafy, A., AlHazme, R. H., & Al Knawy, B. A. (2022). Electronic medical record implementation in a large healthcare

system from a leadership perspective. *BMC Medical Informatics and Decision Making, 22*(1). https://doi.org/10.1186/s12911-022-01801-0

Bain, C. (2015). The implementation of the electronic medical records system in health care facilities. *Procedia Manufacturing, 3,* 9–16. https://doi.org/10.1016/j.promfg.2015.07.547

Bisrat, A., Minda, D., Assamnew, B., Abebe, B., & Abegaz, T. (2021). Implementation challenges and perception of care providers on electronic medical records at St. Paul's and Ayder Hospitals, Ethiopia. *BMC Medical Informatics and Decision Making, 21*(1). https://doi.org/10.1186/s12911-021-01670-z

Fritz, F., Tilahun, B., & Dugas, M. (2015). Success criteria for electronic medical record implementations in low-resource settings: A systematic review. *Journal of the American Medical Informatics Association, 22*(2), 479–488. https://doi.org/10.1093/jamia/ocu038

He, X., Cai, L., Huang, S., Ma, X., & Zhou, X. (2021). The design of electronic medical records for patients of continuous care. *Journal of Infection and Public Health, 14*(1), 94–98. https://doi.org/10.1016/j.jiph.2019.07.013

Hendra, A., & Putra, K. (2022). Persepsi pengguna sistem informasi pendaftaran pasien rawat jalan di RSU Bangakatan Binjai. *Excellent Midwifery Journal, 5,* 38–52.

Janett, R. S., & Yeracaris, P. P. (2020). Electronic medical records in the American health system: Challenges and lessons learned. *Ciencia e Saude Coletiva, 25*(4), 1293–1304.

Janssen, A., Donnelly, C., Elder, E., Pathmanathan, N., & Shaw, T. (2021). Electronic medical record implementation in tertiary care: Factors influencing adoption of an electronic medical record in a cancer centre. *BMC Health Services Research, 21*(1). https://doi.org/10.1186/s12913-020-06015-6

Marwati. (2021). *Analisis sistem informasi registrasi pasien dengan metode PIECES di Rumah Sakit Umum Daerah Syekh Yusuf Kabupaten Gowa* [Undergraduate thesis, Universitas Islam Negeri Alauddin Makassar]. Universitas Islam Negeri Alauddin Makassar.

Mohd Nor, N. A., Taib, N. A., Saad, M., Zaini, H. S., Ahmad, Z., Ahmad, Y., & Dhillon, S. K. (2019). Development of electronic medical records for clinical and research purposes: The breast cancer module using an implementation framework in a middle income country—Malaysia. *BMC Bioinformatics, 19,* 401. https://doi.org/10.1186/s12859-018-2406-9

Oktaviani, I., Sumarlinda, S., & Widyaningsih, P. (2021). Penerapan metode PIECES pada analisis sistem informasi manajemen apotek. *Jurnal Sistem Informasi Kesehatan, 11*(1), 54–58.

Sanjaya, G. Y., Istiono, W., Ricki, A. V., Devi, E. R., Luckyarno, M. A., Arief Darmawan, M., & Afirda Prastika, N. (2023). Analytical data for electronic medical records in primary health care. *BIO Web of Conferences, 75,* 05003. https://doi.org/10.1051/bioconf/20237505003

Supriyanti, Widarti, S., & Muslim, M. (2023). Analisis SIMRS pada bagian pendaftaran pasien menggunakan metode PIECES di RSKIA Ummi Khasanah. *Jurnal Informasi Kesehatan Indonesia, 9*(1), 35–46.

Zurynski, Y., Ellis, L. A., Tong, H. L., Laranjo, L., Clay-Williams, R., Testa, L., Meulenbroeks, I., Turton, C., & Sara, G. (2021). Implementation of electronic medical records in mental health settings: Scoping review. *JMIR Mental Health, 8*(9), e30564. https://doi.org/10.2196/30564