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OPTIMIZING HEALTHCARE PERFORMANCE THROUGH ELECTRONIC MEDICAL RECORDS: AN EFFICIENCY ANALYSIS

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Abstract

Burnout among healthcare workers has become a significant issue in the medical field, partially due to the adaptation process to Electronic Medical Records (EMR). While EMR technology is designed to enhance efficiency and accuracy in patient care, it often poses challenges during implementation. This study aims to examine the impact of medical record digitalization on healthcare worker performance, mediated by high-quality data access and data-driven decision-making at Wangaya Regional Hospital. Using the SEM-PLS method and involving 244 healthcare workers, the research reveals that medical record digitalization significantly improves data access and data-driven decision-making. The findings indicate that EMR plays a crucial role in enhancing healthcare worker performance by facilitating faster, more accurate, and up-to-date information access, ultimately improves service efficiency and effectiveness. These results support the implementation of digital transformation in medical record management to improve healthcare worker performance and, consequently, the overall quality of healthcare services.

Keywords : Burnout, Electronic Medical Records, healthcare performance, data access, decision-making, digital transformation

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INTRODUCTION

Within the context of healthcare digital transformation efforts, the implementation of electronic medical records (EMR) technology has emerged as a key innovation, expected to improve both service efficiency and patient satisfaction. EMR provides substantial benefits, such as reducing medical errors, enabling quick access to patient information, and facilitating better data-driven decision-making [1]. In Indonesia, the health digital transformation program outlined in the 2021-2024 National Medium-Term Development Plan (RPJMN) aims to address inefficiencies in medical record-keeping while supporting more effective and profitable hospital management strategies [2].

Despite these benefits, adapting to EMR technology poses considerable challenges, particularly for healthcare workers who must acclimate to complex and often counterintuitive systems. This adjustment process can induce significant stress, including an increased risk of burnout among healthcare workers. The added administrative workload further exacerbates symptoms of burnout [3],[4],[5].

This research utilizes the Technology Acceptance Model (TAM) to examine how healthcare personnel's perceptions of ease of use and usefulness influence the adoption and acceptance of EMRs. Previous research has predominantly focused on overall technology adoption, addressing the obstacles and challenges associated with its implementation [6]. For instance, [7] highlighted inefficiencies in EMR functionality, particularly related to laborious navigation and data entry, which intensify occupational stress. However, the impact of EMR documentation on the quality of data access from the user's perspective, as well as its implications for clinical decision-making by healthcare workers, remains underexplored. Models leveraging EMR data have demonstrated superior predictive accuracy compared to those using administrative data, often achieving an average C-statistic exceeding 0.75. The research emphasized EMRs' ability to enhance predictive modeling by integrating diverse clinical metrics, such as laboratory findings and vital signs, though the omission of socioeconomic factors was notable [8].

Saba et al. underscored the importance of IoMT (Internet of Medical Things) devices in tracking patient health metrics and transmitting information to healthcare workers while addressing concerns about energy consumption and data security. Their proposed framework focused on minimizing communication overhead and optimizing energy usage across biosensors while safeguarding the privacy and integrity of sensitive patient data. The results showed significant improvements in network performance, including an 18% increase in throughput and a 29% reduction in energy consumption. This study aligns with existing research by emphasizing the importance of rapid data access and secure information transmission in enhancing healthcare worker performance through EMR systems, thereby improving patient outcomes [9].

The implementation of EMRs in healthcare institutions offers substantial benefits for physicians, patients, and healthcare services overall. However, issues regarding the privacy and security of patient data continue to pose significant obstacles to widespread implementation. Safeguarding sensitive health information across various locations and formats presents a major challenge for EMR systems. Addressing these privacy and security issues is critical for healthcare institutions to improve EMR adoption rates [10],[11],[12].

This research aims to analyse the mediating effect of data access quality and data-driven decision-making on healthcare workers' performance in utilizing EMRs. It seeks to identify critical success factors for digital transformation that can enhance hospital staff performance and service quality at Wangaya Hospital, a prominent healthcare provider in Denpasar. Known for its rapid technological adoption and evolving healthcare demands, Denpasar serves as an ideal setting for this research [13]. Using a quantitative approach, this study explores these relationships, providing valuable insights for healthcare administrators and policymakers seeking to optimize EMR adoption strategies and improve overall healthcare system efficiency.

METHOD

This research adopted a quantitative methodology using a descriptive correlation design to investigate the influence of digitalized medical records on healthcare workers' performance, mediated by the quality of data access and data-driven decision-making at Wangaya Hospital. Wangaya Hospital, the oldest in Bali, has consistently adapted its Health Information Technology (HIT) infrastructure to meet the changing demands of the population while complying with relevant health legislation and standards. This setting provides an ideal context to evaluate how the implementation of electronic medical records affects medical staff performance, mediated by data access quality and data-driven decision-making. It highlights the urgent need for healthcare institutions to adjust to the advancing technological landscape in response to the city's urban population and evolving healthcare requirements.

The research population consisted of all healthcare workers at Wangaya Hospital, with a sample of 244 respondents selected through purposive sampling. This approach was employed based on the specific criterion of participants' familiarity with the electronic medical records (EMR) system, ensuring that respondents had sufficient exposure to the hospital's digitalization initiatives.

The data was collected using a standardized questionnaire disseminated through Google Forms. The questionnaire was adapted from previously validated research tools to ensure its reliability and relevance in assessing dimensions pertinent to this study. The questions were designed to evaluate respondents' perceptions of medical record digitalization, data access quality, the efficacy of data-driven decision-making, and their overall performance as healthcare workers. The use of an online platform for data collection enabled efficient outreach to a wide audience, ensured participant anonymity, and facilitated accessibility, resulting in a robust response rate.

The data was analysed using Partial Least Squares-Structural Equation Modeling (PLS-SEM) through Smart PLS software. This analytical method is particularly effective for exploring complex interactions among variables, allowing the assessment of both direct and indirect effects. In this study, the digitalization of medical records served as the independent variable, while data access quality and data-driven decision-making functioned as mediating variables. Healthcare staff performance was designated as the dependent variable. The results of the PLS-SEM analysis evaluated the overall model, clarifying the relationships among these variables and determining the specific effects of medical record digitization on healthcare personnel performance at Wangaya Hospital. Figure 1 provides a concise overview of the research phases undertaken in this study

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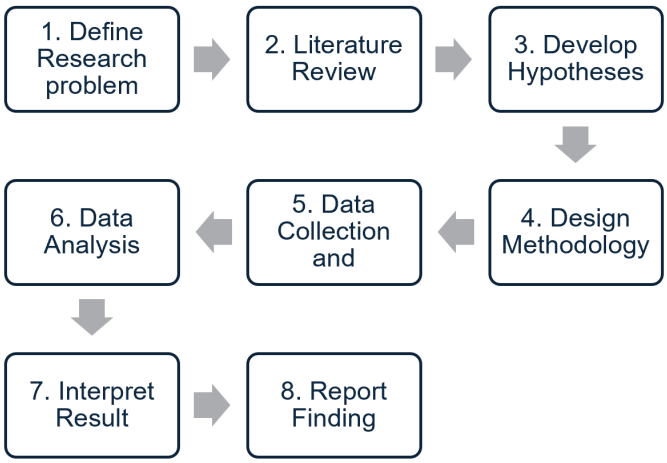

Figure 1. Research Process Flowchart

RESULT AND DISCUSSION

The demographic analysis of 244 respondents provided significant insights into the characteristics of healthcare workers at Wangaya Hospital. A noteworthy finding was that the largest proportion of respondents, 37.70%, fell within the age range of 21 to 35 years. This relatively youthful demographic represents a workforce that is generally more adaptable and receptive to change, particularly in adopting new technologies and advancements. Such flexibility is crucial in the fast-paced healthcare sector, where advancements in technology are key to improving patient care and operational efficiency. The inclusion of younger personnel also highlights the potential for innovative perspectives and modern methodologies in healthcare delivery.

The majority of respondents, accounting for 49.59% of the total, were nursing personnel. This significant representation underscores the crucial role of nurses in the hospital's overall operations. As frontline caregivers, nurses are often the first to implement and use new healthcare technologies designed to address patient needs. Highlighting nursing personnel in the demographic profile emphasizes the importance of understanding their perspectives and experiences with incorporating digital tools in patient management and care. Their feedback is vital for developing effective training programs and ensuring the new system meets the practical requirements of daily users.

The data revealed that most respondents held a bachelor's degree (44.26%), indicating a well-educated workforce equipped with the knowledge necessary to deliver high-quality care. Furthermore, a majority of respondents reported over five years of professional experience (76.23%), reflecting a high level of proficiency and familiarity with hospital operations and patient care processes. This combination of advanced education and extensive professional experience illustrates that the workforce is not only competent but also possesses pragmatic insights that can enhance the implementation of technological advancements. Together, these attributes depict a skilled and seasoned team poised to excel in the digital healthcare landscape at Wangaya Hospital.

The findings indicated that all metrics related to the digitalization of medical records, data access quality, data-driven decision-making, and healthcare professional performance received ratings of "agree" or "strongly agree" on a scale of 1 to 10. The digitalization of medical records received the highest score for the importance of reliable internet devices and computers (9.42) and the lowest for the professionalism of IT experts (8.05). Data access quality achieved the highest rating for ease of accessing data in standard formats (8.91) and the lowest for the availability of EMR applications without significant downtime (7.08). Data-driven decision-making received the highest score for the effectiveness of decisions made using EMR systems (8.32) and the lowest for reducing diagnostic errors and documentation duplication (7.53).

Regarding healthcare personnel performance, the highest rating was for teamwork enhancement post-EMR deployment (8.41), while the lowest was for improving patient

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interaction time (7.84). These findings underscore the importance of robust technical infrastructure and professional support in optimizing the efficiency and effectiveness of healthcare personnel at Wangaya Hospital.

The evaluation of the PLS model involved two primary phases: outer model evaluation and inner model evaluation. Figure 2 illustrates the path diagram, highlighting the outer model evaluation and path coefficient values within the Partial Least Squares (PLS) model. PLS, a statistical technique used for structural equation modelling (SEM), is mainly advantageous for predictive analysis and managing complex data interactions. Figure 1 provides a concise visual summary of the PLS model evaluation, showcasing outer loading values that demonstrate the strength and relevance of relationships between latent variables and their respective indicators.

In a clinical context, the digitization of medical records (X) includes adherence to quality standards (X.1), sufficient IT infrastructure (X.2), system interoperability (X.3), visual ergonomics (X.4), IT support (X.5), and organizational support (X.6). The digitization of medical records is used to evaluate the performance of healthcare workers (Y). Performance is assessed through various aspects, including the volume (Y.1) and quality of work (Y.2), efficiency (Y.3), collaboration among providers (Y.4), comprehensiveness in patient care and documentation (Y.5), and overall productivity (Y.6).

The data access quality indicator (M1) is defined by timeliness (M1.1), accessibility (M1.2), dependability (M1.3), consistency (M1.4), and security (M1.5). The future incorporation of advanced technologies such as artificial intelligence and machine learning into EMR systems may further enhance administrative efficiency, enabling healthcare workers to dedicate more time to patient care and make well-informed decisions. Data-driven decision-making (M2) encompasses key elements such as accuracy (M2.1), efficacy (M2.2), decision-making processes (M2.3), predictability of results (M2.4), and coordination of care (M2.5). These two indicators serve as mediating variables in this study.

Figure 2 illustrates a path diagram representing the outcomes of the outer model evaluation in the Partial Least Squares (PLS) study. The outer loading value(s) in this diagram indicate the strength of the correlation between the indicator and the latent variable it represents. Any indicator with a loading value exceeding 0.7 is considered valid for assessing the variable, in line with the criteria for convergence validity. The analysis results demonstrate that all indicators meet this condition, with the highest loading value of 0.900 attributed to indicator X.6 (organizational support). This implies that organizational support is a key factor in the successful implementation of medical record digitalization [14]. Such support includes training and resource availability, which, according to the study [4], significantly influence the adoption of technology-based solutions.

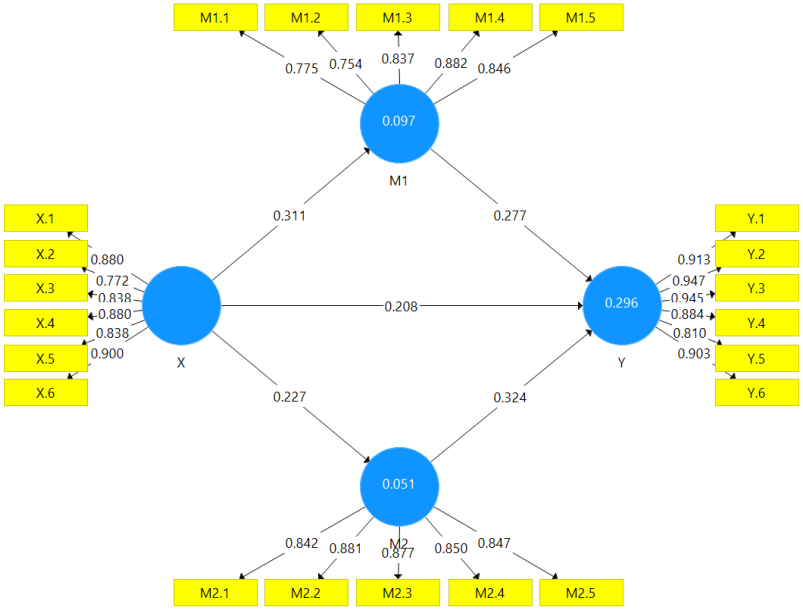

Figure 2.Path Diagram Value of Outer Loading

The external model evaluation focuses on assessing the reliability and validity of the latent variables. This process includes the evaluation of convergent and discriminant validity, and the assessment of indicator reliability and internal consistency. Convergent validity is assessed by analyzing loading factor values, ensuring each indicator has a loading factor greater than 0.7, and that the Average Variance Extracted (AVE) value exceeds 0.5. Table 1 shows that all indicators meet this condition, with loading coefficients above 0.7, and the results further confirm that AVE values exceed 0.5, thereby affirming the validity of the indicators. Additionally, the composite reliability ratings, all exceeding 0.5, suggest that the indicators consistently measure their corresponding latent variables.

Table 1 presents the findings of the analysis on the validity and reliability of the research variables: Digitalization of Medical Records, Quality of Data Access, Data-Based Decision Making, and Health Worker Performance. This assessment adopts Composite Reliability (CR), Cronbach's Alpha (CA), and Average Variance Extracted (AVE) to verify the precision and consistency of measurements for each variable.

In the validity assessment, all indicators exhibited a loading factor value exceeding 0.5, thereby satisfying the criterion for convergent validity. These results demonstrate that the indicators accurately represent each variable. The AVE score for the Digitalization of Medical Records was 0.726, indicating that 72.6% of the variance in all indicators was effectively accounted for by this variable. This suggests that indicators such as record quality, IT infrastructure, interoperability, IT support, and organizational support encompass the fundamental concept of Medical Record Digitalization. The CR value of 0.941 and the CA of 0.927, both exceeding the 0.7 criterion, indicate robust internal consistency. Consequently, the digitization of medical records is shown to possess high validity and trustworthiness. This finding aligns with studies [12], [15], which demonstrate that technological and infrastructural support significantly influences the adoption of electronic medical records.

Table 1. Result of Validity and Reliability test of Research Variables

Variable	Indicator	*Outer Loading*	Category
Medical Records Digitalization (X) *CR: 0.941* *CA: 0.927* *AVE: 0.726*	X.1 (records quality)	0,880	VALID
	X.2 (Infrastructure)	0,772	VALID
	X.3 (Interoperability)	0,838	VALID
	X.4 (Visual ergonomic)	0,880	VALID
	X.5 (IT Support)	0,838	VALID
	X.6 (Organizational Support)	0,900	VALID
Data Access Quality (M1) *CR: 0.911* *CA: 0.882* *AVE: 0.673*	M1.1 (Timeliness)	0,775	VALID
	M1.2 (Accessibility)	0,754	VALID
	M1.3 (Reliability)	0,837	VALID
	M1.4 (Consistency)	0,882	VALID
	M1.5 (Security)	0,846	VALID
Data-Based Decision Making (M2) *CR: 0.934* *CA: 0.913* *AVE: 0.739*	M2.1 (Accuracy)	0,842	VALID
	M2.2 (Effectiveness)	0,881	VALID
	M2.3 (Decision Process)	0,877	VALID
	M2.4 (Outcome Predictability)	0,850	VALID
	M2.5 (Coordination)	0,847	VALID
Healthcare Worker Performance (Y) *CR: 0.963* *CA: 0.953* *AVE: 0.813*	Y.1 (Quantity)	0,913	VALID
	Y.2 (Quality Service)	0,947	VALID
	Y.3 (Efficiency)	0,945	VALID
	Y.4 (Collaboration)	0,884	VALID
	Y.5 (Thoroughness)	0,810	VALID
	Y.6 (Productivity)	0,903	VALID

The Data Access Quality variable has an AVE value of 0.673, indicating that 67.3% of the variance is explained by characteristics such as accessibility, consistency, dependability, timeliness, and data security. The analysis yielded a CR of 0.911 and a CA of 0.882, indicating strong internal consistency for this variable. These values confirm that the indicators are reliable in assessing the quality of data access, a crucial element in the utilization of electronic medical records. Research in [16] underscores the importance of interoperability standards to ensure consistent, accessible, and secure data, particularly in healthcare systems that rely on digital technologies.

The Data-Based Decision-Making variable has an AVE value of 0.739, indicating that 73.9% of the variance is effectively explained by metrics such as decision accuracy, process effectiveness, result predictability, and treatment coordination. The CR score of 0.934 and the CA of 0.913 signify excellent measurement consistency. These findings suggest that data derived from digitalization enhances the accuracy and informativeness of decision-making processes. Research by [15], [17] emphasizes that the implementation of electronic systems can improve decision-making by providing real-time, evidence-based information.

The efficacy of Health Workers demonstrates substantial validity and reliability, evidenced by an AVE of 0.813, a CR of 0.963, and a CA of 0.953. These values indicate that 81.3% of the variance in health professionals' performance can be attributed to factors such as service quantity, service quality, job efficiency, inter-officer collaboration, documentation accuracy, and overall productivity. The high consistency confirms that the performance of healthcare workers can be accurately assessed using these metrics. Studies [1], [18] assert that enhancing the efficacy of healthcare workers is intrinsically linked to the implementation of technology that fosters teamwork and productivity.

The validity and reliability tests indicate a high degree of reliability in assessing each dimension among all the variables examined. These findings support the assertion that digitization in healthcare enhances efficiency, streamlines decision-making, and improves the effectiveness of healthcare workers. The report highlights the need to address challenges such as dependence on reliable IT infrastructure and user training for the system [15].

Consequently, Table 1 offers a comprehensive summary of the trustworthiness of the employed research models. All indicators demonstrated substantial validity in reflecting the research variables, confirming that the analysis effectively illustrated a robust association among the digitalization of medical records, data access, data-driven decision-making, and health professional performance. This study emphasizes the need for a strategic implementation plan to enhance the efficacy of digital technology in healthcare services.

Table 2. Cross Loading Result

	M1	M2	X	Y
M1.1	**0,775**	-0,076	0,140	0,145
M1.2	**0,754**	0,024	0,248	0,257
M1.3	**0,837**	-0,042	0,274	0,193
M1.4	**0,882**	0,018	0,278	0,241
M1.5	**0,846**	0,114	0,281	0,461
M2.1	-0,013	**0,842**	0,234	0,233
M2.2	0,064	**0,881**	0,227	0,315
M2.3	0,026	**0,877**	0,194	0,284
M2.4	-0,058	**0,850**	0,181	0,264
M2.5	0,084	**0,847**	0,152	0,469
X.1	0,247	0,246	**0,880**	0,359
X.2	0,145	0,135	**0,772**	0,167
X.3	0,201	0,125	**0,838**	0,183
X.4	0,257	0,175	**0,880**	0,278
X.5	0,326	0,182	**0,838**	0,340

	M1	M2	X	Y
X.6	0,330	0,239	**0,900**	0,418
Y.1	0,310	0,377	0,359	**0,913**
Y.2	0,284	0,306	0,301	**0,947**
Y.3	0,336	0,349	0,363	**0,945**
Y.4	0,309	0,342	0,253	**0,884**
Y.5	0,360	0,297	0,330	**0,810**
Y.6	0,297	0,371	0,363	**0,903**

Table 2 displays the outcomes of the cross-loading analysis for the four primary constructs in the study: Data Access Quality (M1), Data-Based Decision Making (M2), Digitalization of Medical Records (X), and Health Worker Performance (Y). The purpose of this cross-loading analysis is to evaluate the discriminant validity, which measures how well an indicator can distinguish the construct it represents from other constructs.

Overall, the results demonstrate that most indicators exhibit high loading values against their respective constructs, with values exceeding 0.7, satisfying the requirements for discriminant validity. For the M1 construct, indicators such as M1.4 (consistency) and M1.5 (security) showed the highest loading values, 0.882 and 0.846, respectively. This suggests that these indicators are significant and contribute greatly to measuring data access quality. However, other indicators such as M1.1 (timeliness), M1.2 (accessibility), and M1.3 (reliability) exhibited lower loading values, though they remained above the minimum criterion of 0.7.

Additionally, negative values were observed in the relationships between M1.1 (-0.013) and M1.3 (-0.042) with the M2 construct. This suggests that these indicators may be less aligned with or less relevant to data-driven decision-making. These findings align with the study by [16], which emphasizes the importance of data dependability and security in ensuring efficient accessibility in digital health systems.

In the M2 construct, the indicators M2.2 (decision efficacy) and M2.3 (decision process) recorded the highest loading values, 0.881 and 0.877, respectively. These values indicate that these indicators play a critical role in understanding how data-driven decision-making contributes to the operational performance of healthcare workers. Other indicators such as M2.1 (accuracy) and M2.4 (outcome predictability) also showed substantial loading values, suggesting their importance in assessing the M2 construct. These results support studies [19], [20], which suggest that accurate and well-organized data-driven systems enhance the quality of decision-making in healthcare contexts.

The Digitalization of Medical Records (X) construct demonstrates a strong association between its indicators and the construct itself. The X.1 (record quality) and X.6 (organizational support) indicators exhibited the highest loading values, 0.880 and 0.900, respectively. This suggests that the quality of digital records and organizational support are crucial factors in promoting digital transformation in hospitals. However, the indicators X.2 (IT infrastructure) and X.3 (interoperability) showed slightly lower loading values of 0.772 and 0.838, respectively. While these indicators remain valid, their efficacy in facilitating digitalization may need further improvement. Research by [12], [15] highlights the need for a robust IT infrastructure to enhance interoperability, thereby facilitating the introduction of more efficient electronic medical records.

Within the Health Worker Performance (Y) construct, all indicators exhibited exceptionally high loading values, with the highest scores observed at Y.2 (service quality) of 0.947 and Y.3 (efficiency) of 0.945. These indicators emphasize the critical role that service quality and work efficiency play in evaluating healthcare workers' performance. Additional indicators, such as Y.1 (quantity of services) and Y.6 (productivity), also showed substantial loading values of 0.913 and 0.903, respectively, underlining the importance of these dimensions in assessing healthcare performance. However, the Y.5 indicator (accuracy) recorded the lowest loading value of 0.810, though it remains valid in evaluating the Y construct. Studies [21],[22],[23] indicate that enhanced efficiency and collaboration through digitalization directly influence healthcare workers' performance.

Alongside the cross-loading analysis, comprehensive model testing was performed to assess the model's predictive efficacy. This

evaluation includes examining collinearity, predictive relevance through R-Squared values, and Q-Squared analysis. The findings suggest that the R-Squared value for construct Y (health worker performance) is 0.296, indicating that 29.6% of the variance in performance is attributable to data availability (M1), data-driven decision-making (M2), and digitalization of medical records (X). In contrast, the R-Squared values for M1 and M2 are relatively low, at 0.097 and 0.051, respectively, indicating the model's limited explanatory capacity regarding the variance in data access and decision-making. These results suggest the need to incorporate additional features into the model to improve its predictive accuracy.

Overall, the cross-loading analysis and model testing provide robust validity for most of the indicators in assessing their corresponding constructs. However, some indicators reveal deficiencies that require further refinement to offer a more precise representation of the constructs. These findings highlight the importance of improving digital infrastructure, providing training for healthcare workers, and implementing progressive organizational policies to optimize the benefits of digitizing medical records and enhancing healthcare worker performance [16].

Table 3. Results of Prediction Strength Analysis (R-Square and Q-Square)

	R-Square	R-Square Adj	Q2
M1	0,097	0,093	0,057
M2	0,051	0,047	0,037
Y	0,296	0,287	0,221

Table 3 presents an evaluation of the model's predictive capability using R-Square (R^2) and Q-Square (Q^2) analysis. This analysis aims to determine the extent to which the model explains the variability in dependent variables and effectively forecasts new observations. The study evaluates the variables Data Access (M1), Data-Based Decision Making (M2), and Health Worker Performance (Y), all of which are influenced by the Digitalization of Medical Records (X).

The R^2 value of 0.097 and the Adjusted R^2 of 0.093 for the Data Access variable (M1) indicate that only 9.7% of the variation in Data Access is attributable to the Digitization of Medical Records. This suggests that the model has minimal explanatory power for this variable. The Q^2 value of 0.057 further supports this finding, indicating the model's limited predictive capacity for M1. These results suggest that factors beyond the digitization of medical records likely play a significant role in influencing data access quality. According to the study [23], factors such as reliable technological infrastructure, comprehensive staff training, and system interoperability can enhance data access quality, but they are not sufficiently reflected in this research model.

For the Data-Based Decision Making (M2) variable, the R^2 value was 0.051, and the Adjusted R^2 was 0.047, indicating that only 5.1% of the variation in Decision Making is accounted for by the Digitization of Medical Records. The Q^2 value of 0.037 signifies minimal predictive capability for this variable. This low value indicates that while the digitization of medical records does influence decision-making quality, its effect is relatively minor compared to other variables not included in the model. [11][4] Effective data-driven decision-making requires advanced analytics tools and real-time reporting systems to provide healthcare workers with accurate and relevant information.

Health Worker Performance (Y) demonstrated stronger results compared to the previous two variables. The R^2 value of 0.296 and the Adjusted R^2 of 0.287 indicate that 29.6% of the variance in Health Worker Performance can be explained by Data Access (M1), Data-Based Decision Making (M2), and the Digitization of Medical Records (X). A Q^2 value of 0.221 indicates moderate predictive capability, suggesting that the model has moderate proficiency in forecasting variations in these variables. These findings align with research by [21], which emphasizes the potential of digitizing medical data to improve operational efficiency and enhance the quality of healthcare workers' performance. However, achieving optimal outcomes requires better system support and improved team communication.

The analysis results show that the model's predictive capacity varies across the evaluated variables. Health Worker Performance (Y) demonstrates better predictive capability than Data Access (M1) and Data-Based Decision Making (M2). The low R^2 and Q^2 values for M1 and M2 suggest the need to enhance the model by including additional elements, such as staff training, data security, and organizational support, as recommended by [21]. Furthermore, the limited predictive efficacy in M1 and M2 indicates the need for better integration of technological systems to ensure reliable data availability and streamline the decision-making process. [20] stated that implementing advanced technologies, such as artificial intelligence (AI)

and big data analytics, can improve the accuracy and relevance of data used in decision-making. Therefore, investing in such technologies is essential to facilitating digital transformation in healthcare.

On the other hand, the stronger results for the Health Worker Performance variable suggest that factors such as digitalization and data accessibility significantly enhance the productivity and efficiency of healthcare workers. [21] stated that improving documentation efficiency through electronic medical records (EHRs) can reduce administrative time, allowing healthcare workers to focus more on patient interactions, which directly improves service quality. These findings highlight the importance of a comprehensive approach when deploying digital technologies in the healthcare sector. By addressing the factors influencing data access and decision-making, a more robust model can be developed to maximize the benefits of digitalization on health worker performance. These findings underscore the importance of measures such as staff training, improving technological infrastructure, and implementing systems that facilitate data-driven decision-making to ensure the sustainability of digital transformation in healthcare [4], [14], [23].

Table 4. Results of Effect Size Analysis (f²) in Structural Models

	M1	M2	Y
M1			0,098
M2			0,141
X	0,107	0,054	0,052

Table 4 displays the findings of the effect size analysis (*f²*), quantified by the f² value to evaluate the strength of the association between latent variables in structural models. This analysis seeks to assess the comparative influence of independent factors on dependent variables within the model. Cohen's criteria classify f² as small (0.02–0.15), medium (0.15–0.35), and large (>0.35). The results indicated that all connections exhibited a minor, although statistically significant, impact size. The impact of Data Access (M1) on the performance of health workers (Y) showed an *f²* value of 0.098, categorizing it as a small effect size. This suggests that enhancing data access quality contributes minimally to the improvement of healthcare staff performance. These findings can be attributed to technical limitations, including system interoperability issues and insufficient user training, which may hinder the efficacy of data in assisting health workers' tasks [4]. Previous research indicates that enhanced access to data, along with extensive training and technical assistance, can optimize the utilization of data to improve the work productivity of healthcare workers.

The association between Data-Based Decision Making (M2) and Health Worker Performance (Y) yielded an *f²* value of 0.141, approaching the threshold for the medium effect size category. This indicates that data-driven decision-making significantly enhances health worker performance, more so than data access alone. Although regarded as weak, the effect is amplified by data-driven decision-making, enabling healthcare workers to make swifter, more precise, and evidence-based decisions [16]. Furthermore, the integration of advanced analytics tools, such as artificial intelligence (AI), could enhance the efficacy of decision-making within healthcare settings.

The impact of the digitization of medical records (X) on data access (M1) had an *f²* value of 0.107, categorizing it as a small effect size. The findings suggest that the digitization of medical records positively affects data access quality, although its impact is not predominant. These results align with studies [4], [23], which emphasize that the adoption of electronic medical records often necessitates modifications to the technological framework and additional training to achieve optimal efficacy. Consequently, a comprehensive approach is essential to ensure that digitalization can substantially enhance data accessibility.

The impact size analysis indicates that the associations within the structural model exert minimal influence on the dependent variables. Although the correlation between Data-Driven Decision Making (M2) and Health Worker Performance (Y) shows the most significant impact compared to other associations, the f² value remains below the threshold for medium effect size. These findings suggest that while the model successfully identifies certain significant associations, numerous external factors still influence the variability of dependent variables, particularly in Data Access (M1) and Data-Driven Decision Making (M2). This underscores the need to expand the research model by including additional variables, such as user training levels, quality of IT support, and institutional regulations, to guarantee the sustainability and efficacy of digitalization. Research by [16] indicated that incorporating AI-driven tools and technologies tailored to user requirements can enhance the interconnections among variables in the model. Consequently, although digitalization offers

concrete advantages in improving healthcare worker efficacy, a comprehensive approach is essential to maximize the influence of digitalization on data accessibility and data-informed decision-making within healthcare settings.

Table 5 presents the computed path coefficients used to evaluate the strength of the relationships among variables in the structural model, aiming to quantify both the magnitude and direction (positive or negative) of their influence. These findings underscore the significance of the interconnections among structures. The analysis of Data Access's impact on Health Worker Performance (M1 -> Y) demonstrated a positive and statistically significant effect, with a path coefficient of 0.277, T-statistics of 5.017, and a P-value of 0.000. Enhanced data accessibility significantly elevates the efficacy of healthcare workers. These findings corroborate the Technology Acceptance Model (TAM), which posits that technology adoption is influenced by perceived advantages and usability [23]. Moreover, the Task-Technology Compatibility (TTF) Theory further supports these results, indicating that the integration of various information sources into a cohesive platform enhances labor efficiency [12]. Notwithstanding potential risks to data security, the implementation of stringent security mechanisms highlights that the advantages of digitization outweigh the associated costs, as evidenced by the Reasoned Action Theory (TRA) and the Technology Acceptance Model (TAM). This study confirms that the digitization of medical records improves operational efficiency and the quality of health services at Wangaya Hospital.

The influence of Decision Making (M2) on Health Worker Performance (Y) is substantial, as evidenced by a path coefficient of 0.324, T-statistics of 6.753, and a P-value of 0.000. This indicates that an enhanced decision-making process improves the performance of healthcare workers. These results align with the Technology Acceptance Model (TAM), which asserts that technology adoption is influenced by perceived advantages and usability. Furthermore, the Innovation Diffusion Theory (DIT) and the Technology-Task Fit Theory (TTF) corroborate these findings, emphasizing that technologies aligning with user needs facilitate adoption and enhance performance. Consequently, digitalization improves decision-making quality, thereby boosting healthcare performance [23].

The impact of Medical Record Digitization on Data Access (X -> M1) reveals a substantial positive influence, with a path coefficient of 0.311, T-statistics of 3.462, and a P-value of 0.001. The increased digitization of medical records improves data accessibility, in accordance with the Technology Acceptance Model (TAM) and the Task-Technology Compatibility Theory (TTF). These theories argue that technologies enabling simpler and more precise data access are more likely to be successfully adopted and integrated into tasks. Consequently, the digitization of medical records significantly enhances the efficiency and precision of data retrieval. In 2020, Sun et al. employed a multi-criteria decision-making (MCDM) methodology, integrating approaches such as the Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) and the Analytical Hierarchy Process (AHP), to identify key factors affecting the trust and adoption of electronic medical records (EMRs) in Malaysian public hospitals. Their findings emphasize the need to address security and privacy issues to enhance EMR adoption, which aligns with the study's current focus on improving healthcare performance through better data accessibility and decision-making [6], [12], [19].

Table 5. Path Coefficient Result

	Original Sample (O)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
M1 -> Y	0,277	0,055	5,017	0,000
M2 -> Y	0,324	0,048	6,753	0,000
X -> M1	0,311	0,090	3,462	0,001
X -> M2	0,227	0,092	2,464	0,014
X -> Y	0,208	0,094	2,201	0,028
X -> M1 -> Y	0,086	0,034	2,502	0,013
X -> M2 -> Y	0,073	0,032	2,279	0,023

The research into the influence of Medical Record Digitization (X) on Decision Making (M2) indicates a positive and substantial impact, evidenced by a path coefficient of 0.227, T-statistics of 2.464, and a P-value of 0.014. This suggests that enhanced digitalization leads to improved decision-making quality. The findings support the Technology Acceptance Model (TAM) and the Work-Technology Fit Theory (TTF), which assert that technologies that align with user requirements and enhance work performance are more effective. As a result, increased digitalization facilitates a more informed and efficient decision-making process. The blockchain-based platform for CEMR management enhances the expediency of accessing patient data for research, facilitating a prompt response to the ongoing pandemic and supporting successful medical research and therapy development. The integration of EMR data with claims-based predictors improves model performance, as evidenced by increased areas under the precision-recall curve (AUPRC) for home day fatalities and losses. This underscores the potential of integrated data sources to improve risk classification and intervention strategies in heart failure management, emphasizing the importance of EMR in optimizing healthcare outcomes through improved predictive modeling [1], [24], [25].

The study on the effect of digitization of medical records on health workers' performance (X -> Y) indicates that digitization positively and significantly influences health workers' performance, with a path coefficient of 0.208, T-statistics of 2.201, and a P-value of 0.028. This suggests that digitalization improves the performance of healthcare workers. These findings align with the Technology Acceptance Model (TAM), which underscores that the perceived advantages of technology drive its adoption. The Planned Behavior Theory (CPD) posits that trust in technological benefits enhances performance, emphasizing digitization as a crucial element in improving healthcare outcomes. However, the digitization of medical records also poses challenges for healthcare workers. A study indicated that primary care physicians who spend considerable time using electronic health records (EHRs) outside of standard hours, along with those receiving a high volume of communications, experience heightened emotional exhaustion. Physicians in the highest quartile for after-hours EHR use were 12.52 times more likely to experience significant burnout, while those with a higher message volume faced a 6.17-fold increased likelihood. No significant correlation was found between EHR utilization and cynicism, suggesting that specific aspects of EHR interactions may contribute more to burnout than others [24], [26],[27].

The study reveals a significant indirect effect of Medical Record Digitization (X) on Health Worker Performance (Y) through Data Access (M1), with a path coefficient of 0.086, T-statistics of 2.502, and a P-value of 0.013. This suggests that Data Access substantially mediates the impact of Medical Record Digitization on Health Worker Performance. Consequently, enhanced digitalization improves performance by initially enhancing data accessibility, thereby corroborating the Technology Acceptance Model (TAM) and the Task-Technology Fit (TTF) Theory [26].

The study demonstrates a notable indirect effect of Medical Record Digitization (X) on Health Worker Performance (Y) through Decision Making (M2), with a path coefficient of 0.073, T-statistics of 2.279, and a P-value of 0.023. This indicates that Decision Making significantly influences the relationship between the Digitization of Medical Records and Health Worker Performance. Therefore, enhanced digitalization improves performance by refining decision-making quality, in alignment with the Technology Acceptance Model (TAM) and the Technology-Task Fit Theory (TTF). Researchers used a multi-criteria decision-making (MCDM) method, utilizing techniques such as TOPSIS and AHP, to analyze the key factors affecting the trust and acceptance of electronic medical records (EMRs) in Malaysian public hospitals. Their findings highlight the need to address security and privacy concerns to enhance EMR adoption, which aligns with the study's current emphasis on improving healthcare performance through increased data accessibility and decision-making using EMR. This underscores that fostering trust in the EMR system is crucial for optimizing its ability to enhance healthcare worker performance and service efficiency [26][18][15], [19], [28], [29].

CONCLUSION

This study demonstrated that the digitalization of medical records significantly enhanced the effectiveness of healthcare workers by facilitating data accessibility and optimizing decision-making processes. The findings revealed a clear correlation between digitalization and various performance measures within the healthcare workforce. Specifically, the adoption of digital medical records improved data accessibility, enabling healthcare workers to quickly and effectively obtain critical patient information. This improved access was crucial for

making timely and informed decisions, which are vital for delivering high-quality patient care. The results indicated that the benefits of digitization extended beyond data management, impacting the core operations of healthcare workers.

Furthermore, the study found that the combined benefits of digitalization on data accessibility and decision-making resulted in substantial improvements in healthcare worker performance. This suggests that when healthcare staff can easily access and utilize patient information, they are better equipped to make accurate clinical decisions, thereby improving patient outcomes. The integration of digital medical records proved essential for enhancing healthcare delivery by streamlining workflows and reducing the likelihood of errors associated with manual record-keeping. As the healthcare system continues to evolve, understanding these connections will be crucial for fostering an environment where healthcare workers can excel and provide outstanding care.

Future research should explore the long-term effects of digitalization on various aspects of healthcare quality, including patient safety, therapeutic efficacy, and overall satisfaction for both healthcare workers and patients. Moreover, examining potential challenges encountered during the adaptation process—such as training difficulties, technology integration concerns, and resistance to change—could yield valuable insights for healthcare organizations. By addressing these challenges, healthcare institutions can improve their readiness for the effective adoption of digital medical records, ensuring that this transition fosters ongoing advancements in healthcare delivery and employee performance over time.

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