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Operational Efficiency and Cost-Benefit Analysis of Electronic Medical Records (EMR) Transformation at the MAS Clinic in South Kalimantan

Novia Purnamasari[1], Martin Agusta[2], Adhika Ramadhan[3], Herman S. Soegoto[4], Agus Riyanto[5]

[1,2,3,4,5] Universitas Komputer Indonesia, Indonesia. Email: novia.75425001@mahasiswa.unikom.ac.id[1], martin.75425018@mahasiswa.unikom.ac.id[2], adhika.75425015@mahasiswa.unikom.ac.id[3], herman@email.unikom.ac.id[4], agus.riyanto@email.unikom.ac.id[5]

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ABSTRACT
Digital transformation in the healthcare sector has become a strategic approach to improving operational efficiency and service quality. One form of this transformation is the implementation of Electronic Medical Records (EMR), which enables faster, more accurate, and integrated patient data management. Clinic MAS in South Kalimantan adopted EMR to replace the conventional administrative system that previously caused queue build-ups, service delays, potential errors in prescription reading, high administrative burdens, and weak operational control. This study aims to analyze the operational efficiency and cost-benefit of EMR transformation at Clinic MAS from the perspective of Digital Analytics in Business. The research employs a qualitative descriptive approach with a case study design. Data were collected through semi-structured interviews, observation, and documentation involving the clinic director, administrative staff, and healthcare workers. Data analysis was conducted using the Miles and Huberman model through data reduction, data presentation, and conclusion drawing. The results show that EMR implementation has eliminated queue build-ups, minimized prescription errors, reduced fraud potential, reduced paper usage through a paperless system, and lowered operational costs. Furthermore, EMR has increased clinic revenue by 60% to 70% within one year and enabled real-time business monitoring. The findings confirm that EMR transformation serves not merely as an administrative innovation but as a digital business intelligence strategy that supports profitability, business efficiency, and clinic competitiveness in the digital era.

Keywords: Business, Efficiency, Healthcare, Electronic Medical Record, Digital Transformation.

I. Introduction

The development of digital transformation has transformed various business sectors, including healthcare, through the integration of information technology that can improve operational efficiency and service quality. In the context of the healthcare business, digitalization not only functions as an administrative tool but also becomes a strategic instrument in data-driven decision-making, operational optimization, and increasing organizational competitiveness. Digitalization enables healthcare institutions to manage information more quickly, accurately, and in an integrated manner, thereby supporting the creation of services

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that are more responsive to patient needs while strengthening organizational managerial effectiveness. One concrete form of digital transformation in the healthcare sector is the implementation of Electronic Medical Records (ERs), which are digitized, integrated patient health information management systems that enable faster data access than manual systems based on physical documents. Consistent implementation of ERs can improve administrative efficiency in healthcare facilities and hospitals, through rapid data access, minimizing the risk of data loss, improving communication, reducing recording errors, supporting effective coordination, and data-driven decision-making (Alharbi, 2025). Furthermore, the proper design and utilization of EMRs positively contribute to patient safety, particularly by minimizing prescription errors, reducing medication errors, and reducing the usability of healthcare services (Cahill et al., 2025). In primary healthcare, EMRs have strategic value, serving not only as patient health documentation but also as predictive analytics, healthcare service evaluation, and strengthening population-based healthcare planning (Johnson et al., 2023).

EMRs are no longer viewed solely as administrative documentation tools; they have shifted and evolved into digital business intelligence instruments that support increased productivity, cost efficiency, operational control, and healthcare business sustainability. In the context of primary care in developing regions, healthcare transformation is crucial due to limited access to healthcare facilities, high patient burdens, and resource requirements, which are often key challenges. Tapin Regency, South Kalimantan, is one area facing limited access to healthcare services, where the distance to referral hospitals is relatively long, and government-provided primary healthcare facilities (community health centers) are often overloaded. This condition encourages the presence of MAS Clinic as a strategic solution to provide affordable health services to the community, providing fast, accurate and adaptive services. In its development, the MAS Clinic has not only strived to provide primary healthcare services but has also undertaken digital transformation through the use of Electronic Medical Records (EMR), which has been instrumental in improving work system efficiency and productivity, providing excellent service, reducing the potential for administrative errors and improving organizational governance, and increasing company profits. Prior to the implementation of EMR, the service system was hampered by patient queues, repetitive manual recording, the potential for prescription errors, a high administrative burden, and limited operational monitoring. Following the implementation of EMR, significant changes have occurred, including accelerated service delivery, reduced long-term operational costs through the implementation of a paperless system (reduced paper use), real-time data presentation, reduced fraud risk, operational cost efficiencies, and increased revenue.

However, the transformation from a manual to a digital system is not without challenges. Many primary healthcare facilities still face various obstacles, such as limited technological infrastructure, the need for significant initial investment, low digital literacy among human resources, and resistance to changes in work culture. The previously used manual system often resulted in slow registration processes, inefficient patient data retrieval, high administrative burdens, and the potential for documentation errors. This situation not only impacts the quality of patient care but also the overall operational effectiveness of the organization. Therefore, the success of RME implementation needs to be analyzed not only from a technological perspective but also from an operational efficiency and economic perspective.From a Digital Analytics in Business perspective, evaluating EHR implementation is crucial for understanding how digital transformation contributes to clinic operational efficiency. In many mid-sized clinics, the use of manual systems still creates various problems such as high administrative costs, service delays, the risk of data loss, and low operational efficiency. This can hinder organizational productivity and reduce the quality of the patient experience.

Although research on EHR has advanced rapidly, most still focuses on large hospitals or large-scale health systems. Studies on EHR implementation in primary care clinics in developing regions from a Digital Analytics in Business perspective, particularly regarding operational efficiency, cost-benefit, and organizational profitability, are relatively limited. Therefore, this study is crucial to analyze how EHR implementation at the MAS Clinic in South Kalimantan contributes to work system changes, service efficiency, economic benefits, and strengthened healthcare organization competitiveness through a Digital Analytics in Business approach. This research is expected to provide theoretical contributions to the development of digital transformation studies in the healthcare sector, while also providing practical recommendations for

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primary healthcare organizations in optimizing digitalization as a strategy to improve business efficiency and service quality.

II. Literature Review and Hypothesis Development

a. Digital Analytics in Business

Digital Analytics in Business is a strategic approach that utilizes digital data to understand operational patterns, user behavior, process efficiency, and organizational decision-making more accurately. In the modern business context, digital analytics is no longer limited to digital marketing activities but has evolved into a managerial instrument for evaluating organizational performance through technology-based data collection, measurement, analysis, and interpretation. Digital analytics plays a crucial role in generating data-driven decision-making, enabling organizations to improve productivity, service effectiveness, and operational cost efficiency through the use of real-time information, particularly in business sectors transforming from manual to digital systems (Tawil et al., 2023). It serves as a key foundation for business competitiveness in the healthcare sector through the integration of technology, data, and business performance evaluation (Depi et al., 2025). Digital analytics is not merely an evaluation tool but a strategic foundation for modern business. In the service sector, digital analytics helps organizations identify operational bottlenecks as the main source of operational inefficiency, measure system performance, evaluate the impact of technology transformation on business processes, and enable organizations to systematically and data-drivenly detect key business bottlenecks (Muchtar et al., 2026). It also allows organizations to identify operational bottlenecks, diagnose them, and repair them more systematically (Kumbhar et al., 2023). In the healthcare sector, digital analytics serves as the foundation for patient information management, service monitoring, and evaluating the effectiveness of digital systems such as Electronic Medical Records (EMR). Therefore, the application of digital analytics in the healthcare business is not only oriented towards the use of technology, but also on how the resulting data can create strategic value for the organization.

b. Digital Transformation in the Healthcare Sector

Digital transformation in the healthcare sector is the process of integrating digital technology into all aspects of healthcare services to improve service quality, operational efficiency, and patient experience. This transformation encompasses the use of health information systems, telemedicine, big data analytics, artificial intelligence (AI), the Internet of Medical Things (IoMT), and Electronic Medical Records as the primary foundation for digitizing healthcare services. The World Strategy on Digital Health 2020-2025 emphasizes that digital health is a strategic component in strengthening healthcare systems through improved service access, optimal use of health data, increased service effectiveness, and evidence-based decision-making that supports sustainability, equity, and resilience of healthcare services (WHO, 2025). In practice, digital transformation in the healthcare sector involves more than simply replacing manual systems with digital ones; it also transforms organizational culture, work patterns, and service strategies. This process often faces challenges such as limited infrastructure, high initial investment, human resource resistance, and the need to improve digital literacy. However, digital transformation can provide significant benefits such as accelerated service delivery, reduced human error, data integration, and operational cost efficiency. Therefore, the success of digital transformation depends heavily on the organization's readiness to manage change comprehensively.

c. Electronic Medical Records

Electronic Medical Records (EMR) are digital-based systems designed to electronically record, store, manage, and provide access to patient health data in healthcare delivery. The introduction of EMR marks a shift from conventional paper-based recording systems to integrated information systems, enabling faster, more precise, secure, and sustainable access to information. EMR is a key foundation for the digital transformation of the healthcare sector because it supports service coordination, enhances data protection, improves administrative efficiency, and promotes clinical health quality through the availability of real-time

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patient information (Finnegan & Mountford, 2025). EMR serves not only as a medium for medical documentation but also as a strategic instrument that contributes to strengthening the effectiveness and performance of healthcare organizations.

Optimizing EMR significantly contributes to improving the quality of healthcare documentation, interoperability, accessibility, strengthening coordination between service units, and increasing managerial efficiency in healthcare organization management (Harahap et al., 2021). EMR can also improve workflow efficiency, reduce documentation redundancy, enhance patient safety, reduce medical errors, and strengthen service quality through better data management. However, EMR implementation faces various challenges, such as the need for digital infrastructure, technology investment, gaps in human resource (HR) training, system inoperability, and inadequate patient information security systems. The main obstacles to EMR implementation often lie in organizational cultural resistance, limited employee digital literacy, and issues regarding data security (Ariyanto et al., 2025). Therefore, the success of EMR implementation depends not only on technology but also on the organization's adaptation to changes in digital work systems. EMR can be positioned as a multidimensional instrument that integrates technological aspects, operational efficiency, service quality, and business strategy to support the sustainability of the modern healthcare ecosystem.

d. Operational Efficiency

In the use of EMR at the MAS Clinic, operational efficiency is reflected in the clinic's ability to optimize various resources through the digitization of healthcare processes. The implementation of EMR allows the MAS Clinic to increase service output by accelerating patient registration, simplifying access to medical records, reducing administrative time, and minimizing the use of physical documents that previously required higher operational costs. Operational efficiency relates to an organization's ability to reduce waste, increase productivity, simplify work processes, and optimize resource utilization to achieve more economical and competitive performance (Ng'andu & Haabazoka, 2024). Furthermore, digital transformation through technology-based healthcare systems has also been shown to improve service quality and organizational effectiveness through data integration and process automation. Furthermore, data analysis enables organizations to identify bottlenecks and optimize resources (Alruwaili et al., 2024). Digital maturity positively contributes to operational efficiency; the higher the level of digital maturity of an organization, the greater the organization's ability to increase productivity, simplify work processes, and reduce organizational inefficiencies (Syahruddin, 2025).

e. Cost Benefit Analysis

Cost Benefit Analysis (CBA) is an evaluation method used to compare the total costs incurred with the total benefits derived from an investment or policy. In a business context, CBA serves as a strategic analysis tool to determine whether an innovation or transformation is feasible based on its economic value. Boardman et al. explain that CBA helps organizations assess investment efficiency by identifying direct costs, indirect costs, financial benefits, and non-financial benefits. Thus, EMR is viewed not only as a technology investment but also as an instrument for improving the economic value and overall performance of healthcare services. In implementing healthcare technologies such as EMR, the costs analysed include investment in hardware, software, human resource training, and system maintenance. Benefits include reduced administrative costs, increased work time efficiency, increased productivity, data accuracy, and service quality (Nguyen et al., 2020). In primary healthcare organizations, CBA is crucial because it helps assess whether digital transformation provides long-term benefits compared to legacy manual systems. Therefore, cost-benefit analysis assesses not only financial aspects but also strategic benefits in supporting organizational sustainability and competitiveness.

The costs of implementing a digital system such as EMR include software procurement, technological infrastructure, human resource training, and system maintenance costs. Meanwhile, the resulting benefits are not only financial, such as operational cost savings, but also non-financial, such as improved patient safety, healthcare worker efficiency, and increased organizational productivity. These findings reinforce the idea that

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EMR implementation is a strategic investment that provides long-term value for the sustainability and competitiveness of healthcare facilities (Nguyen et al., 2024).

III. Research Method

This research used a descriptive qualitative approach with a case study design at the MAS Clinic in South Kalimantan. The qualitative approach was chosen to explore and understand in-depth the processes, practices, and dynamics of Electronic Medical Records (EMR) implementation to improve operational efficiency and improve clinic business benefits (Ratnaningtyas et al., 2023). Meanwhile, a descriptive design was used to provide a comprehensive overview of the EMR system implementation at the research site. The research location was the MAS Clinic in South Kalimantan, which was purposively selected because it has implemented an integrated EMR system in healthcare services. The study subjects included all clinic staff and management, approximately 40 individuals directly involved in the use and management of the EMR system. The research data consisted of primary and secondary data. Primary data were obtained through semi-structured interviews with leaders, administrative staff, and healthcare workers, focusing on experiences, adaptation processes, and the impact of EMR implementation on clinic operations. Secondary data were obtained through direct observation and system documentation, including digital workflows and the use of EMR features in services. Data collection techniques included interviews, observations using a systematic checklist, and documentation studies to strengthen the validity of the information. Data analysis used the Miles and Huberman interactive model, which includes three main stages: data reduction, data presentation, and conclusion drawing/verification. Data presentation was presented in narrative form, tables, and simple visualizations to facilitate interpretation of the findings. To ensure data validity, this study employed source and technique triangulation, member checking with respondents to ensure the accuracy of interview data, and an audit trail to systematically and transparently document the entire research process. With this approach, the study is expected to provide a comprehensive understanding of the implementation of EMR at the MAS Clinic, particularly in relation to digital transformation, operational efficiency, and improving the quality of healthcare services.

IV. Results and Discussion

4.1. Research Result

Based on in-depth interviews involving the owner, administrative staff, and healthcare workers at the MAS Clinic in South Kalimantan, the implementation of Electronic Medical Records (EMR) has brought substantial changes to the clinic's operational system, increased service efficiency, controlled operational costs, and strengthened the MAS Clinic's overall business performance. Field findings indicate that the digital transformation implemented through the use of Electronic Medical Records (EMR) has not only reformed administrative mechanisms but also had a significant impact on organizational effectiveness and business profitability in the healthcare sector.

a. Improving Service Speed and Reducing Patient Queues

Before the implementation of Electronic Medical Records (EMR), the registration and patient data recording process at the MAS Clinic was still manual, often resulting in long queues, especially during peak service hours. After the EMR system was implemented, the process of inputting, searching, and managing patient data became faster, more integrated, and systematic, thus minimizing queues in the patient registration area.

As stated by one informant:

> "*Now, it's easier for patients. There are no queues in the registration area because patient data is directly input into the system. Searching for patient data is much faster than before.*"

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These findings indicate that the implementation of EMR contributed to increased efficiency in patient service time by accelerating the administrative flow, simplifying the registration process, and optimizing overall patient care management.

b. Improving Medical Service Accuracy and Eliminating Prescription Interpretation Errors

Before the implementation of Electronic Medical Records (EMR), the use of a manual system for medical record-keeping had the potential to lead to errors, particularly in reading doctors' handwriting when writing prescriptions. This situation can lead to the risk of misinterpretation by pharmacists and other medical personnel. However, after the implementation of EMR, all patient medical data and prescriptions are digitally documented, clearer, standardized, and easily accessible to all relevant service units.

As one informant stated:

> *"Before the implementation of EMR, I could sometimes misread the writing on prescriptions, so I had to read them more carefully. Now, the doctor's prescription is clear because it appears directly in the system."*

These findings indicate that the digitalization of MAS Clinic data through the implementation of Electronic Medical Records (ER) plays an important role in improving the accuracy of medical services, strengthening patient safety, and minimizing the risk of human error that previously often occurred in conventional medical service processes.

c. Reducing Fraud and Increasing Operational Transparency

Research results show that the implementation of Electronic Medical Records (EMR) not only impacts service aspects but also strengthens the internal control system in clinic operations. Through integrated digital recording of transaction data, medical services, and administration, all operational activities can be systematically documented and facilitate oversight. This significantly reduces the potential for data manipulation, abuse of authority, and fraudulent practices that were previously more likely to occur under conventional systems. As stated by one informant:

> *"With the current system, everything is recorded, making patient data more secure and minimizing recording errors."*

These findings indicate that the implementation of EMR serves as a strategic instrument in organizational governance, particularly in improving accountability, business transparency, and the overall operational security of healthcare services.

d. Paperless System and Operational Budget Efficiency

The implementation of Electronic Medical Records (EMR) at the MAS Clinic has contributed to the realization of a paperless system, which has a direct impact on reducing the use of paper and books, eliminating duplicate records, and the need for office stationery. Prior to digitalization, patient administration and medical record processes relied on multiple record books, resulting in administrative inefficiencies and wasted operational budget. After the implementation of EMR, all patient data, administration, and service documentation are centrally stored in a digital system, significantly minimizing the need for manual record keeping.

As one informant stated:

> *"Now, there are no longer duplicate records; all data is stored in the system. Stationery expenses have decreased."*

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These findings demonstrate that digital transformation through EMR not only improves administrative efficiency but also generates operational cost efficiencies through optimized resource utilization, thus supporting economical, effective, and sustainable clinic management.

e. Significant Increase in Clinic Revenue

One of the most significant findings in this research is the substantial increase in Clinic MAS revenue after Electronic Medical Record (EMR) implementation. Based on interview results with the primary owner of Clinic MAS, the implementation of the digital system contributed to a revenue increase of approximately 60% to 70% within one year compared to the previous conventional method. This increase was influenced by various factors, including service acceleration, increased patient handling capacity, human resource efficiency, and a more structured and controlled business management system. Informant statement:

"After using EMR, revenue increased drastically, around 60% to 70% in one year."

This finding indicates that digital transformation through EMR implementation not only provides benefits in administrative and operational aspects but also directly contributes to organizational financial growth. Thus, healthcare service digitalization can be positioned as a business strategy capable of improving productivity, competitiveness, and economic sustainability of healthcare institutions.

f. Reduction in Operational Expenditure and Optimization of Business Monitoring

In addition to contributing to revenue increase, Electronic Medical Record (EMR) implementation also has a significant impact on reducing clinic operational expenditure and strengthening overall business monitoring functions. Through an integrated digital system, the primary owner of Clinic MAS has full access to monitor various operational aspects in real-time, including transaction data, patient visit numbers, patient treatment classification, service processes, available drug stock, supplies, service processes, infrastructure utilization, and overall business operational performance, anytime and anywhere. Informant statement:

"I can access clinic operational conditions anytime in real-time; EMR implementation in this business makes my task easier in controlling business conditions."

This finding shows that EMR not only functions as a health administrative tool but also serves as a digital business intelligence instrument capable of supporting fast, accurate, and data-driven strategic decision-making processes. With more optimal monitoring capabilities, organizations can improve expenditure efficiency, strengthen managerial control, and promote more competitive healthcare business sustainability.

Table 1. Summary of Research Findings

Theme of Finding	Post-EMR Implementation Condition	Organizational Impact
Work Productivity	A faster and more systematic service delivery	Operational efficiency improved
Inter-Unit Communication	Integrated data facilitates coordination	Service collaboration more effective
Decision Making	Real-time data supports owner monitoring	Faster and more accurate decisions
Patient Queue Minimization	No more queue build-ups at registration area	Faster, more precise, and efficient service
Human Error	Meminimalisasi terjadinya human error.	Service accuracy increased
Prescription Reading	Minimized human error occurrence	Patient safety increased.
Zero Fraud	Fraud potential and data manipulation significantly decreased through digital transparency	Transparency, accountability, and internal control improved
Nosocomial Infection	Zero nosocomial infections from physical documentsc	Service hygiene improved

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Paperless System	Reduced paper usage and duplicate records	Stationery savings and operational cost efficiency
Revenue	Increased 60%–70% per year	Profitability and financial performance improved
Owner Monitoring	Business monitoring can be done in real-time	Business control, strategic oversight, and decision-making more effective

Overall, the research results show that Electronic Medical Record (EMR) implementation at Clinic MAS South Kalimantan has driven multidimensional organizational transformation, including operational efficiency improvement, service quality optimization, operational cost burden reduction, internal control system strengthening, and financial performance improvement through clinic revenue growth. These findings confirm that EMR not only functions as a form of technological modernization in health administration but has evolved into a strategic instrument in business digitalization that significantly contributes to organizational sustainability, managerial effectiveness, and competitiveness strengthening of healthcare institutions amid the dynamics of digital era transformation.

g. EMR Dashboard as Real-Time Monitoring and Digital Business Intelligence Instrument

As part of the digital transformation, Clinic MAS has implemented a web-based Electronic Medical Record (EMR) system that begins with user authentication through an integrated login page. The presence of this system indicates a formal digital infrastructure that supports access security, data management, and centralized clinic operations. EMR implementation at Clinic MAS South Kalimantan not only transformed service administration into a more digital system but also introduced a dashboard as an operational monitoring and digital business intelligence instrument. Through this dashboard, owners and management can monitor clinic performance in real-time, measurably, and integratedly, ranging from daily, monthly, and annual patient visit numbers, visit reason distribution, critical stock conditions, to healthcare service segmentation in one centralized system. The existence of this dashboard shows that digital transformation at Clinic MAS has evolved from mere medical documentation digitalization toward strategic data utilization as a basis for productivity evaluation, operational efficiency, logistics control, and managerial decision-making. In the Digital Analytics in Business perspective, the EMR dashboard represents a concrete demonstration that healthcare service data can be processed into high-value business intelligence to support more effective, adaptive, and sustainability-oriented organizational governance.

As part of the digital transformation, Clinic MAS has implemented a web-based Electronic Medical Record (EMR) system that not only functions as a health service documentation medium but also as a foundation for integrated clinic operational management. Before users can access the main dashboard and all operational features in the EMR system, the initial process begins with a login page as a form of user authentication to ensure system security and access control, as shown in Figure 1. This mechanism shows that Clinic MAS has implemented a formal digital infrastructure that prioritizes data security, user control, and system governance as important parts of technology-based healthcare operations.

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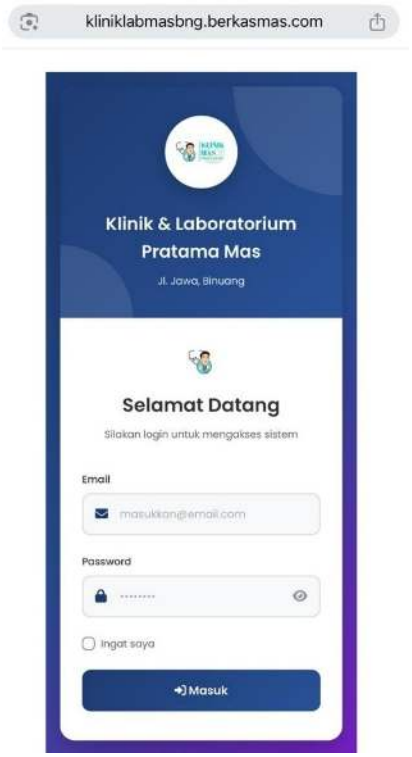

Figure 1. EMR System Login Page of Clinic & Primary Laboratory MAS

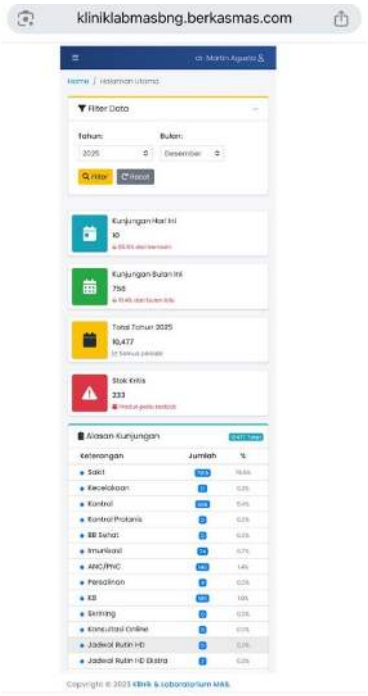

Figure 2. EMR of Clinic MAS South Kalimantan

Figure 2 shows the main dashboard of Clinic MAS South Kalimantan's EMR, which functions as the center for real-time and digital-based clinic operational monitoring. Through this dashboard, management can monitor various service indicators in real-time, such as patient visit numbers, service distribution,

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operational stock, and clinic service activities in an integrated manner. This finding indicates that EMR implementation at Clinic MAS not only supports administrative digitalization but also strengthens monitoring functions, performance evaluation, and data-driven decision-making.

4.2. Discussion

The research results show that Electronic Medical Record (EMR) implementation at Clinic MAS South Kalimantan has produced fundamental changes in the clinic's operational system through transformation from manual work patterns to integrated digital systems. This transformation not only impacts administrative aspects but also influences service effectiveness, cost efficiency, organizational transparency, and overall clinic business growth. In the Digital Analytics in Business perspective, EMR implementation at Clinic MAS reflects how digital technology can function as a strategic instrument to increase organizational value through data optimization, processes, and decision-making. Digitalization implementation through Electronic Medical Records (EMR) at Clinic MAS South Kalimantan shows that transformation success is not only determined by technology but also by the readiness of human resources across professions, ranging from general practitioners, dentists, specialists, midwives, nurses, analysts, radiographers, dental therapists, nutritionists, to medical record staff. Digital integration across various service units demands infrastructure readiness, continuous training, work culture adjustment, and adaptive organizational policy support. Although initial implementation faced challenges such as infrastructure needs and resistance to change, the research results show very significant impacts on productivity, communication, and organizational decision-making quality.

Healthcare service digitalization through Clinic MAS's EMR has produced various strategic achievements, such as zero human error, zero medication misreading, zero fraud, zero crowded queues, as well as supporting paperless systems and real-time data. EMR implementation has proven to contribute to improving patient safety through reduction of medication errors, efficient and accurate administrative recording, and inter-unit coordination, indicating that digital systems are able not only to improve administrative efficiency but also to strengthen patient safety, service transparency, and operational control effectiveness, as aligned with the digital health service principles recommended by the World Health Organization (WHO, 2025). Furthermore, the transformation contributes to operational cost reduction while significantly impacting clinic revenue increase, realized through operational cost efficiency improvement, revenue cycle management optimization, and reduced revenue leakage risk, which generally contributes to improved clinic financial performance (Modi & Feldman, 2022). These findings show that healthcare service digitalization through Electronic Medical Records (EMR) is a transformational strategy that not only focuses on administrative efficiency improvement but also serves as a strategy to strengthen governance, improve patient safety, and support comprehensive healthcare business sustainability.

The existence of the dashboard shows that Electronic Medical Record (EMR) implementation at Clinic MAS not only functions as a digital administrative system but has also evolved into an operational monitoring instrument, service evaluation, and real-time data-based managerial decision-making support. The findings shown in Figure 1 display the login page interface, which functions as an entry point for all system users, both medical personnel, administrative staff, and management, to access various service features according to agreed access rights. This page also shows alignment with several studies emphasizing the urgency of security and access control aspects in Electronic Medical Record (EMR) systems. The implementation of authentication and authorization mechanisms serves to ensure patient data protection from potential unauthorized access (Manoj et al., 2022). This condition aligns with the Clinic MAS EMR login system, which has adopted user credentials as a form of initial access control in maintaining system security. Clinic MAS's EMR has a simple and user-friendly design, thus positively contributing to operational service smoothness. Improved ease of EMR use can accelerate form filling processes, improve clinician experience, and encourage optimal EMR system usage (Buivydaite et al., 2022).

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Table 3. Clinic MAS EMR Dashboard Analysis

Dashboard Indicator	EMR Data System	Analysis / Strategic Implications
Today's visits	10 patients	Daily productivity monitoring and service capacity evaluation
Monthly visits (December)	758 patients	Monthly service performance analysis and visit trends
Total visits in 2025	10.477 patient	Annual service volume and operational growth
Critical stock	233 items	System supports inventory control and logistics efficiency
"Sick" category	7.915 patient (75,5%)	Dominance of curative services, basis for main service planning
Accidents	17 patients (0,2%)	Relatively low incidental service needs
Control	569 patients (5,4%)	Indicates potential repeat services and patient loyalty
Immunization	74 patients (0,7%)	Basis for preventive service development
ANC/PNC	146 patients (1,4%)	Potential for strengthening maternal and child health services
Labor	4 patients	Specific service with low volume
Family Planning	105 patients (1,0%)	Supports family planning service promotion strategy
Online consultation	0	Opportunity for additional digital service development
Healthy Weight / Screening	0	Shows preventive service diversification opportunities
Real-time data	Yes	Supports fast and data-driven decision-making
Paperless system	Yes	Reduces administrative costs and increases efficiency
Automated service clustering	Yes	Supports patient segmentation, marketing strategy, and health reporting

Table 3 shows that the Clinic MAS EMR dashboard not only functions as a medical documentation tool but has evolved into a strategic monitoring instrument capable of presenting service information, inventory management, patient segmentation, and operational evaluation in real-time. The integration of various data reinforces the role of EMR as digital business intelligence in supporting operational efficiency improvement, more targeted business planning, strengthening healthcare marketing strategies, and more precise and data-driven organizational decision-making. This finding aligns with research showing that data utilization from EMR through dashboards enables real-time service quality measurement and data-driven decision-making (Ebbers et al., 2023). Furthermore, the use of visual data-based dashboards can present information more clearly and easily interpretable, thereby improving the effectiveness of performance monitoring and clinical and managerial decision-making (Samadbeik et al., 2024).

a. Work System Transformation and Operational Efficiency

One significant change after Electronic Medical Record (EMR) implementation is increased operational efficiency, particularly in the patient registration process, medical data retrieval, and service coordination. In the pre-digitalization phase, the use of conventional systems tended to create long queues due to slow recording and patient file retrieval. However, after EMR implementation, service flow became faster, more structured, and integrated, so patient waiting time could be minimized. This finding aligns with the concept of operational efficiency that emphasizes optimizing resource utilization to produce more effective and productive services. Administrative digitalization through EMR enables work process automation, redundant activity reduction, and productivity improvement for healthcare and administrative staff (Ng'andu & Haabazoka, 2024). This efficiency has strategic implications because it directly relates to service capacity, service quality, and patient satisfaction levels. Therefore, EMR implementation can be positioned as a key factor in improving Clinic MAS's operational performance sustainably. This finding is

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relevant to the healthcare sector, where digital system implementation such as Electronic Medical Records (EMR) can improve service speed, administrative accuracy, data integration, and real-time information-based decision-making effectiveness (Syahruddin, 2025).

b. Service Quality Improvement and Patient Safety

The research results show that Electronic Medical Records (EMR) significantly contribute to service quality improvement, particularly through reducing prescription reading errors and patient medical data accuracy. The digital system enables medical information to be stored more clearly, systematically, and facilitates healthcare workers' access to it. This condition effectively minimizes the potential for human errors that were previously more common in manual handwriting-based systems. From a healthcare service quality perspective, information accuracy is a crucial element in ensuring patient safety (WHO, 2025). Digital technology integration in EMR systems can improve medication-related outcomes and strengthen patient safety through more accurate and structured information management (Murthi et al., 2024). Therefore, EMR implementation not only impacts administrative efficiency improvement but also strengthens overall clinical service quality. These findings confirm that digital transformation in primary healthcare can generate dual benefits: organizational efficiency improvement and medical service quality enhancement.

c. Paperless System as a Cost-Saving Strategy

Electronic Medical Record (EMR) implementation at Clinic MAS shows significant impact through the adoption of a paperless system that tangibly reduces dependence on physical documents, duplicate recording books, and office stationery usage. The elimination of repetitive manual recording processes not only simplifies administrative flow but also directly contributes to operational cost efficiency, particularly in routine administrative expenditures. This finding aligns with research showing that EMR implementation can significantly reduce operational costs through reduced paper usage (paperless system) and administrative workload, with cost reductions reaching over 30% in medical record units (Septiana, 2023).

Within the cost-benefit analysis framework, operational cost reduction reflects that investment in digital technology can generate long-term economic value. Digitalization in healthcare business, including EMR implementation, contributes to cost reduction and provides Return On Investment (ROI) through operational process optimization and resource waste reduction (Nguyen et al., 2024). Improved EMR system functionality is associated with decreased operational costs in healthcare facilities, particularly through administrative process and data management efficiency (Rhoades et al., 2022). EMR also improves organizational cost performance by reducing operational inefficiencies and enhancing optimal resource management. Although the initial stage requires costs for device investment and training, in the long term EMR is able to reduce administrative costs. This indicates that EMR implementation is a strategic and appropriate decision. In other words, digitalization through EMR can transform the clinic's cost structure to be more efficient and productive, representing a rational business strategy oriented toward organizational financial sustainability.

d. Internal Control Strengthening and Fraud Prevention

The finding regarding reduced fraud potential indicates that EMR functions as a more transparent internal control mechanism compared to manual systems. All service activities, transactions, and administration are systematically recorded in the digital system, minimizing opportunities for data manipulation or operational irregularities because every activity can be traced in real-time. EMR implementation can improve accountability and data integrity by utilizing access tracking systems accompanied by technology-based control strengthening, through authentication and authorization mechanisms that serve to ensure patient data protection and strengthen data security, preventing unauthorized access and reducing fraud (Manoj et al., 2022). In the perspective of organizational governance, data transparency is an important element in building accountability and management effectiveness. EMR enables owners or clinic management to conduct more accurate and real-time supervision of all business

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activities. Thus, digitalization not only improves efficiency but also strengthens good governance in healthcare organizations.

e. EMR as a Digital Business Intelligence Instrument and Revenue Increase

One of the most important findings is the increase in Clinic MAS revenue by approximately 60% to 70% within one year after EMR implementation, aligning with (Modi & Feldman, 2022). This increase shows that digitalization has much broader business implications for business performance than mere administrative efficiency. Faster service enables greater patient service capacity, more accurate data management reduces operational leakage, and real-time monitoring allows clinic owners to make faster and more strategic decisions. Within the Digital Analytics in Business framework, this condition positions EMR as a digital business intelligence tool—a system that not only stores data but also transforms it into information for strategic decision-making. The availability of real-time operational data enables owners to monitor clinic operational performance, evaluate productivity, and formulate development strategies based on actual conditions. Thus, EMR serves as a bridge between digital transformation and organizational profitability improvement.

f. EMR's Potential as a Basis for Disease Clustering and Health Reporting Support

In addition to improving operational efficiency and organizational profitability, Electronic Medical Record (EMR) implementation at Clinic MAS also holds strategic value as a population-based health data source through disease clustering or patient disease categorization. Systematically organized digital data enables the clinic to identify dominant disease patterns, whether based on diagnosis type, age group, visit frequency, or disease trends emerging in specific periods. Through standardized data management, such as using diagnosis classification based on the International Classification of Diseases (ICD), this information is not only beneficial for internal clinic needs but also serves to support reporting to regional and national health systems and population-based strategic decision-making. In the Digital Analytics in Business perspective, the EMR's ability to generate structured epidemiological data positions the clinic not only as a primary healthcare provider but also as a generator of strategic data that can be used in public health decision-making. Thus, digital transformation through EMR expands the organization's role from mere administrative efficiency toward broader contributions to public health governance, particularly in supporting disease pattern monitoring and more responsive health policy planning.

g. Disease Clustering as a Basis for Digital Marketing Strategy and Health Education

In addition to functioning as an operational efficiency instrument and health reporting, disease clustering data generated through Electronic Medical Records (EMR) also has strategic value in the development of digital marketing for healthcare services. Dominant disease patterns among patients, such as high cases of ARI, hypertension, diabetes, or gastritis, can serve as a basis for clinics to design marketing communication strategies based on community health needs. In the Digital Analytics in Business perspective, such aggregate data enables clinics to create educational content, preventive campaigns, service promotions, and social media advertising that are more relevant to local audience needs. For example, increasing cases of hypertension can encourage the creation of routine blood pressure check campaigns, while the dominance of ARI cases can serve as a basis for promoting respiratory consultation services or seasonal disease prevention education. Thus, EMR not only produces administrative efficiency but also supports data-driven marketing strategies that strengthen community engagement, increase service utilization, and expand clinic positioning as a healthcare provider responsive to population needs. Nevertheless, the use of this data must still adhere to ethical principles, data anonymization, and patient privacy protection so that digital transformation remains aligned with responsible health governance.

h. Implementation Challenges: Initial Investment and HR Adaptation

Although providing many benefits, EMR implementation still faces challenges, particularly in initial technology investment needs and human resource adaptation. The shift in work culture from manual to

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digital systems demands staff competency improvement to operate the system optimally. This indicates that digital transformation is not merely a technological matter but also involves comprehensive organizational change. The success of EMR implementation heavily depends on managerial readiness, continuous training, and organizational support for the change process. Therefore, technology investment must be balanced with investment in human resource development so that the benefits of digitalization can be maximized sustainably.

i. Impact of Digitalization on Productivity, Communication, and Organizational Decision-Making

Digitalization implementation through Electronic Medical Records (EMR) at Clinic MAS South Kalimantan shows significant transformational impacts on work productivity, inter-unit communication effectiveness, and managerial decision-making quality. Based on interview results, digitalization not only changed administrative mechanisms from manual to integrated systems but also created a faster, more accurate, transparent, and real-time data-based work ecosystem. This change is reflected in the drastic reduction of human error potential in administrative and service processes, including the elimination of prescription reading errors due to the use of more structured and clearly readable digital systems. From the productivity side, EMR implementation significantly improved service speed through elimination of dense queues, acceleration of patient registration, and workflow efficiency across units. The digital system enables healthcare workers, administrative staff, and owners to access information simultaneously without delays due to physical document searching. Furthermore, the paperless system implementation also reduces administrative burdens such as duplicate recording, paper usage, and office stationery costs, so operational expenditures can be suppressed more effectively.

In the aspect of organizational communication, digitalization strengthens inter-professional coordination through more accurate and easily accessible data integration, thereby improving service collaboration quality. The availability of real-time data also enables owners to conduct operational monitoring directly, quickly, and evidence-based, ultimately improving strategic decision-making quality. From a governance perspective, this system also reduces fraud potential through higher data transparency. Even in the healthcare context, digitalization also contributes to reducing nosocomial infection risks that may arise from repeated physical document handling. Overall, digitalization at Clinic MAS has produced an organizational condition characterized by minimization of human errors, improved patient safety, cost efficiency, revenue growth, and strengthened business control. These findings confirm that digital transformation through EMR not only improves administrative efficiency but also serves as an organizational strategy that strengthens productivity, communication, and healthcare business sustainability.

j. EMR Dashboard as Real-Time Monitoring and Digital Business Intelligence Instrument

Electronic Medical Record (EMR) implementation at Clinic MAS South Kalimantan shows that digital transformation not only functions as a medical recording system but has evolved into a managerial dashboard that supports real-time operational monitoring and data-driven decision-making. Based on the system dashboard display, Clinic MAS is able to monitor key service indicators on a daily, monthly, and annual basis through integration of patient visit data, service categories, and clinic operational conditions in one centralized system. In 2025, the system recorded a total of 10,477 patient visits, with 758 visits in December and 10 daily visits at the time of observation. The availability of this data shows that clinic owners and management can conduct fast, measurable, and sustainable service performance evaluation.

The dashboard also provides critical stock information for 233 items that need restocking, so digitalization not only improves patient service efficiency but also supports more accurate logistics and inventory management. This feature is important in the context of operational efficiency because it enables the clinic to reduce supply shortage risks while optimizing expenditures. Furthermore, the system displays distribution of patient visit reasons that are automatically clustered, where the "sick" category dominates with 7,915 visits (75.5%), followed by control with 569 visits (5.4%), ANC/PNC with 146 visits, family planning with

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105 visits, and immunization with 74 visits. This data shows that EMR is able to generate healthcare service segmentation that has strategic value for understanding patient needs patterns.

In the Digital Analytics in Business perspective, the EMR dashboard functions as a digital business intelligence instrument that transforms operational data into strategic information. Visit data, service patterns, and logistics stock can be utilized for productivity evaluation, service needs planning, cost control, and marketing strategy development based on patient needs. For example, the dominance of sick category services can serve as a basis for strengthening curative services and relevant health promotion, while ANC/PNC, family planning, and immunization data can support preventive education strategies. Thus, the EMR dashboard not only improves administrative efficiency but also transforms Clinic MAS into a data-driven healthcare organization that is more adaptive, productive, and competitive. Academically, the results of this study confirm that EMR implementation at Clinic MAS South Kalimantan represents a strategic digital transformation that has multidimensional impacts on the organization, including operational efficiency, service quality improvement, cost savings, governance transparency, and business growth. In the Digital Analytics in Business perspective, EMR is proven to function not only as a health administration system but also as a digital business intelligence instrument that strengthens the sustainability, effectiveness, and competitiveness of healthcare organizations. Thus, digital transformation through EMR can be understood as a long-term business strategy relevant for primary healthcare organizations in facing the demands of the digital era.

v. Conclusion

Based on the research results, the implementation of Electronic Medical Records (EMR) at Clinic MAS South Kalimantan has proven to have a significant impact on operational system transformation, service efficiency, and strengthening of organizational business sustainability. EMR implementation has improved operational efficiency through patient service acceleration, queue reduction, manual administrative burden reduction, paperless system implementation, decreased potential for prescription reading errors, and strengthened transparency and internal control. From a cost-benefit perspective, the digital investment made shows tangible economic benefits through operational cost efficiency, administrative expenditure reduction, work productivity improvement, and medium-term clinic revenue growth. Furthermore, EMR implementation at Clinic MAS not only functions as an administrative innovation but has evolved into a digital business intelligence instrument that generates real-time data for operational monitoring, strategic decision-making, and data-based organizational performance evaluation. The data generated through the EMR system also has the potential to be developed as a strategic asset for disease clustering, health reporting, service policy planning, and digital marketing strategies based on community health needs more adaptively and measurably. Thus, EMR can be understood as a foundation for digital transformation that not only improves healthcare service quality but also strengthens competitiveness, profitability, and clinic business growth in the digital economy era. Overall, this study confirms that digital transformation through EMR in primary healthcare clinics is a multidimensional strategy encompassing operational efficiency, governance strengthening, data asset utilization, and organizational development toward a data-driven healthcare organization model.

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