



The Prospects of Central Pertamina Hospital MIS-AI Based in Indonesia 2030 Onwards

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Abstract. The development of Artificial Intelligence (AI) technology and Hospital Management Information Systems (HMI) offers significant opportunities to revolutionize healthcare services in Indonesia. This paper aims to explore the prospects for implementing AI-based MIS in Indonesian hospitals post-2030, using a qualitative approach through literature studies, semi-structured interviews, and trend analysis. The results show that although most major hospitals worldwide have begun to adopt digital systems, the use of AI is still limited and faces challenges such as infrastructure, limited human resources, and the absence of specific regulations governing AI in the healthcare sector. However, with the support of national policies, collaboration between stakeholders, and investment in technology and education, the transformation towards an intelligent and integrated MIS-AI system has the potential to be realized starting in 2030. The investigation also included interviews with specialist doctors, Ministry of Health officials, hospital IT experts, Health Tech CEOs, and academics and researchers. This paper recommends the need for a national roadmap and strengthening of national infrastructure, human resources, and the hospital digital ecosystem to welcome the era of smart hospitals in Indonesia. The results of the investigation concluded that the Type A Pertamina Central Hospital (RSPP) is capable of meeting the challenge of becoming an AI- and SIM-based hospital by 2030.

Keyword: Hospital, Management Information System, Artificial Intelligence, Digital Transformation, Indonesia 2030.

INTRODUCTION

Digital transformation in the healthcare sector has become a national strategic agenda, along with technological developments such as Artificial Intelligence (AI) and Hospital Management Information Systems (MIS). In Indonesia, the use of AI-based MIS systems is projected to experience rapid growth from 2030 onwards, to address the challenges of increasingly complex healthcare services, the need for operational efficiency, and the demand for accuracy in clinical decision-making. The use of AI in hospital MIS can include medical data analysis, patient load prediction, administrative process automation, and big data-based early disease detection. Therefore, it is important to evaluate the prospects, challenges, and readiness of infrastructure and human resources to support the adoption of this technology for the advancement of AI technology

in healthcare [1-6].

In the last five years, the technology adoption in Indonesia has begun to use advances in artificial intelligence (AI) ethics to improve healthcare services [7, 8]. This change has had a significant impact on several institutions, especially the hospital industry. This paper provides an overview of hospital institutions in Indonesia that are implementing AI ethics. AI ethics comprehensive review of 54 papers from the Scopus, PubMed and Google Scholar database was used to develop our methodology. The existing literatures, which includes studies from various disciplines such as education, healthcare, information communication technology (ICT), licensing, law, hospitality, and economic services, demonstrated the widespread implementation of AI in these fields. It was found benefit of AI implementation in Indonesian hospital which focusing on increasing patient outcomes and also equalizing of healthcare service. This output can be done with find out the strategy to maximizing its benefit and paralely to decrease and minimizing the rise of ethic risk. This review concludes that AI implementation in Indonesian Hospital come with significantly opportunity for increasing patient healthcare outcome and equality of healthcare services. We provide a new view for organizing governance research, that identifies gaps in the existing literature speciality in healthcare and suggests future directions, for research utilizing technology in AI ethics.

LITERATURE REVIEW

The field of healthcare is fast changing due to artificial intelligence (AI), which presents previously unheard-of possibilities for bettering patient care, expediting medical research, and boosting the delivery of healthcare as a whole. The many facets of AI's influence on healthcare are examined in this review, with particular attention paid to drug research and discovery, personalized medicine, predictive analytics and preventive care, and ethical and legal issues. AI has made tremendous advances in personalized medicine, enabling the creation of individualized treatment regimens based on a patient's unique genetic, environmental, and behavioral characteristics. AI-powered technologies improve treatment plans and make it easier to identify genetic markers, improving the accuracy and potency of medical therapies. AI's ability to analyze large datasets has transformed predictive analytics and preventive care by enabling precise health risk projections and early detection of possible problems. By encouraging ongoing monitoring and individualized preventive care, this proactive strategy enhances both operational effectiveness and health outcomes. Now, the innovation regarding patient care and Patient care and medical research are changing as a result of the application of artificial intelligence (AI) in healthcare [9].

To fully realize the potential of AI technology, collaborative relationships between AI developers and healthcare providers are essential. This study examines the advantages and prospects of collaborating with healthcare professionals to improve healthcare outcomes. Personalized medicine, clinical decision support systems, healthcare process optimization, patient engagement, and ethical considerations are just a few of the areas where AI and healthcare practitioners are collaborating. Significant progress can be made by fusing the knowledge of healthcare professionals with AI's powers in data analysis, pattern recognition, and predictive modeling. Advancements in diagnosis and therapy are a major area of collaboration. Healthcare practitioners can gain from enhanced diagnostic precision, early illness identification, and exact treatment planning by integrating AI algorithms with patient data. Enhanced patient outcomes and improved healthcare delivery are the outcomes [10].

The development of personalized medicine techniques is also made possible by collaboration. Healthcare professionals can customize treatment strategies based on unique genetic markers, biomarkers, and clinical factors by utilizing AI algorithms to examine patient data. This collective effort results in improved treatments and treatment outcomes. Clinical decision support system development is facilitated by collaborations between AI and healthcare professionals. By analyzing patient data, medical literature, and clinical recommendations using AI technology, these systems offer real-time guidance to medical personnel. Clinical decision support systems increase the effectiveness of diagnosis, the choice of treatment, and patient safety by strengthening decision-making abilities. In healthcare settings, collaboration also emphasizes process improvement, increasing effectiveness, and resource management. Artificial intelligence

(AI) algorithms can examine operational data and patient flow patterns to spot inefficiencies, resulting in the simplification of administrative work, enhanced patient scheduling, and better resource management. Costs are reduced, operational effectiveness is raised, and patient experiences are improved as a result. Patient participation and experience are another facet of partnership [11].

Artificial intelligence-enabled virtual assistants and chatbots offer individualized support, respond to patient questions, and deliver health information. These resources improve patient satisfaction, ease of access to healthcare, and patient empowerment in health management. AI and healthcare practitioners working together must take ethical issues and legal compliance very seriously. It is crucial to protect patient privacy, guarantee data security, and abide by ethical standards and regulatory frameworks. Collaborations can improve healthcare results and preserve patient trust by taking these factors into account. AI and healthcare providers working together could change how patients are treated, promote medical research, and enhance patient outcomes. Partnerships that make use of AI technologies and integrate them with healthcare knowledge promote innovation, improve patient engagement, optimize diagnostic and therapeutic procedures, and ensure ethical and legal compliance. AI and healthcare professionals work together continuously to enhance patient outcomes and the standard of care, shaping the future of health monitoring [12].

Artificial intelligence (AI) has rapidly transformed numerous industries, including medicine, with radiography standing to benefit significantly from its capabilities. AI enhances diagnostic accuracy, reduces errors, and improves patient care by leveraging large datasets from digital radiographs commonly used in medical and dental practices. It highlights AI's role in automating tasks, enhancing diagnostic precision, and improving clinical decision-making. A systematic literature search was conducted using PubMed and Google Scholar up to December 2024, with terms including "artificial intelligence," "machine learning," "deep learning," "radiography," and "diagnostic imaging." Furthermore, the implementation of AI raises a lot of critical issues such as data ethics, workforce displacement, and the need for regulatory frameworks to protect patient privacy and ensure equitable access to AI-enhanced healthcare services. The integration of Artificial Intelligence (AI) into healthcare is poised to revolutionize patient care by enabling more accurate diagnoses, personalized treatment, predictive analytics, and operational efficiency. As the global healthcare system grapples with aging populations, rising costs, and medical staff shortages, AI presents itself as a transformative solution. The evolution and future trajectory of AI powered healthcare, examining key technologies such as machine learning, natural language processing, and computer vision. It highlights their applications in diagnostic imaging, virtual health assistants, robotic surgeries, and chronic disease management [13].

RESEARCH METHOD

This paper uses a qualitative-descriptive approach with a literature review method and semi-structured interviews. The methodological steps used are (a) Literature Study, namely analyzing scientific journals, WHO reports, the Indonesian Ministry of Health, and McKinsey/Deloitte reports related to AI and MIS trends in the Health sector from both national and international Health science and technology journals; (b) SWOT Analysis, namely to assess the strengths, weaknesses, opportunities, and threats to the implementation of MIS-AI in Indonesian hospitals; (c) Exploratory Interviews conducted with 5 informants, consisting of the Hospital IT Director, doctors, health data analysts, and regulators from the Ministry of Health and (d) Trend Projection (Foresight Analysis) using 2015–2025 trend data to project developments until 2040 [1].

RESULTS AND DISCUSSION

Analysis of Strengths, Weaknesses, Opportunities and Threats (SWOT)

An AI-enabled hospital means the broad integration of AI technology into clinical (diagnostics, triage, clinical decision-making), operational (scheduling, supply chain, bedside management), administrative (billing, insurance claims), and data governance (interoperability, population analytics). The potential is enormous, but there are technical, regulatory, and social risks that need to be mitigated. Table 1 shows the results of a SWOT analysis of the possibilities and key steps that should be taken to enable Indonesian hospitals to use AI after 2030.

Tabel 1. SWOT Analysis for AI-Based Hospitals in Indonesia.

Strengths	Weaknesses
<p>1. Improved clinical and diagnostic quality — AI can improve diagnostic accuracy (e.g., radiology, pathology, ECG) and aid in the early detection of chronic diseases.</p> <p>2. Operational efficiency and cost savings — optimizing doctor/operating room schedules, managing drug inventory, and predicting ICU needs can reduce operational costs.</p> <p>3. Scalability of services and access — telemedicine and decision support expand access to remote areas and reduce the burden of referrals to referral hospitals.</p> <p>4. Data-driven decision-making — population analytics for prevention, infectious disease management, and capacity planning.</p> <p>5. Improved patient experience — personalized care, faster triage, and digital services (chatbots, medication reminders).</p>	<p>1. Limited IT infrastructure — many facilities still rely on legacy systems, with uneven connectivity and limited data center capacity.</p> <p>2. Skilled talent shortage — few clinical and technical personnel understand AI, data science, and change management.</p> <p>3. High upfront costs — hardware investments, AI licensing, EHR integration, and cybersecurity require significant capital.</p> <p>4. Poor data quality and interoperability — medical records are patchy, and a large amount of unstructured data reduces the performance of AI models.</p> <p>5. Cultural and ethical resistance in clinics — physicians worry about losing decision-making authority, patients worry about privacy.</p> <p>6. Vendor dependency — the risk of locking in to foreign solutions without technology transfer.</p>
Opportunities	Threats
<p>1. Growing demand for healthcare services due to demographics (aging), increasing chronic diseases, and expectations for digital services.</p> <p>2. Digitalization policies and funds—possible government incentives for digital transformation and supportive healthcare financing schemes (BPJS reform, R&D grants).</p> <p>3. Partnerships and ecosystems—collaboration with healthtech startups, universities, and global AI vendors for technology transfer.</p> <p>4. Development of local solutions—adapting AI to the Indonesian context (language, disease patterns, local data) into export/regional products.</p> <p>5. Reducing service disparities—remote diagnostics and triage to help remote areas.</p> <p>6. Innovative financing—outcome-based contracting models, shared savings, or impact investors to cover initial costs.</p>	<p>1. Strict or unclear regulations and compliance — medical AI safety regulations, data protection (e.g., revisions to the PDP Law), and liability can slow adoption.</p> <p>2. Cybersecurity and privacy risks — attacks on clinical systems can threaten patient safety and reputation.</p> <p>3. Clinical adoption failure — if AI produces false positives/negatives, it can lead to malpractice and loss of trust.</p> <p>4. Inequitable access — adoption in large cities but not in rural areas → widening health disparities.</p> <p>5. Global competition and licensing costs — the dominance of a few large vendors makes local solutions difficult.</p> <p>6. Economic/political changes — economic crises reduce investment budgets for health technology. Strategic implications (how to capitalize on strengths and opportunities, and mitigate weaknesses/threats)</p>

Offensive, Defensive, and Adaptive Strategies

This kind of strategy focuses on the followings:

1. Focus on high-value use cases first: diagnostic radiology, intensive care unit (ICU) monitoring, and readmission prediction—areas with a rapid return on investment (ROI).
2. Establish AI centers of excellence (CoE) in hospitals for standardization, clinical integration, and model performance evaluation. Partner with local universities and startups to co-develop models contextualized for Indonesia.

Defensive strategies need to be implemented to mitigate weaknesses and address threats, and these steps are as follows:

1. Incremental investment in infrastructure: hybrid cloud, local backup, and guaranteed connectivity; use controlled pilots before rollout.
2. Establish data governance policies, anonymization pipelines, and security-by-design practices.
3. Design workflows where AI is used for clinical decision support—with clinician review required to reduce liability.

Adaptive strategies address regulatory and market changes. These steps are as follows.

1. Actively participate in regulatory forums, local clinical trials, and national standards for medical AI.
2. Create flexible business models (SaaS, outcome-based, shared savings) to reduce initial costs.

Concrete Operational and Technical Recommendations

The steps that need to be taken are as follows:

1. Start with 3–6 pilot use cases: (a) simple radiology readings (CT/chest X-ray), (b) sepsis prediction in the ICU, (c) claims and coding automation, (d) telemedicine triage;
2. Success metrics (KPIs): diagnostic accuracy vs. baseline, mean time to diagnosis, reduced LOS (length of stay), decreased 30-day readmissions, 3–5-year ROI, patient and staff satisfaction;
3. Data architecture: build a structured data lake + ETL, HL7/FHIR standards, national/hospital master patient index for interoperability;
4. Security and ethics: at-rest/in-transit data encryption, audit trail, informed consent process for data use, AI ethics committee;
5. HR & change management: doctor and IT staff re-skilling program, adoption incentives, and clinical champions in each department and
6. Governance: board-level oversight for AI, SLA agreements with vendors, disaster recovery plans & insurer engagement.

Pilot Roadmap and Examples for 24–36 Months.

The roadmap for 24 to 36 months is as follows:

1. Months 0–3: Readiness assessment, use case selection, stakeholder alignment, budget approval;
2. Months 4–9: Data & infrastructure integration, vendor/university partnerships, initial training;
3. Months 10–18: Pilot launch (3 use cases), close monitoring, clinical & economic evaluation;
4. Months 19–24: Scale-up of successful use cases, SOP revision, security audit;
5. Months 25–36: Full integration of core services, preparation for commercialization/regional collaboration.

Technology and Infrastructure Readiness

Most type A and B hospitals, such as Pertamina Pusat Hospital (RSPP), have begun implementing digital MIS systems, but the use of AI remains limited to electronic medical records and management dashboards. The main obstacles are budget constraints and poor interoperability between systems. For example, AI-based early disease detection achieves 85–90% accuracy and reduces the workload of medical personnel through documentation automation. The main challenges include a lack of a tech-savvy workforce, concerns about ethics and data privacy, and regulations that do not fully address the use of AI in the clinical field. Finally, based on projections, hospitals in Indonesia will experience accelerated digitalization after 2030, primarily through

government policies promoting Smart Hospitals and national data integration. Support from HealthTech startups, foreign investment, and educational consortiums will play a crucial role. In order to convince all stakeholders, comprehensive interviews with experts were conducted and a summary of the interview results can be seen in Table 1.

Tabel 2. Summary of Interviews for Key Resource Persons.

No	Narasumber	Jabatan	Topik Utama	Kesimpulan Utama
1	Dr. Andi S., Sp.PD	Medical Doctor Specialist & Digital Health Advisor	Application of AI for Diagnoses	AI help early detection for metabolic illness
2	Ir. Rini Mulyani, M.Kom	Head IT for Hospital Type A	Readiness of Infrastructures for MIS	80% system ready but not yet integrated
3	Prof. Dr. Hadi Santoso	Academicians and reseachers on AI of Health	Ethics and privacy data	Ethics regulation for AI is needed
4	Dr. Budi Hartono, MPH	Key person from Indonesia Health Ministry	Regulation and national policy direction	The Government need to prepare hosital road map starting from 2030
5	R. Pradana	CEO of Startup Health Tech	Innovation of Local AI	Local Startup should be readily accelerated

Tabel 3. Application of AI at Indonesia Hospitals (2025–2040)

Year	Target
2025	Adoption for basic digital system digital (EMR, billing) \pm 60%
2030	AI application improvement for automatic diagnosis and medical predictive record
2035	AI starts tu apply for big-data based clinical recommendation
2040	Smart Hospitals using MIS-AI integrated full system >80%.

Evaluation of the Readiness of Indonesian Hospitals to Use AI

With hundreds of hospitals and clinics spread from Sabang to Merauke, artificial intelligence (AI) for hospitals can begin to be adopted in several basic ways. One example is AI as a physician assistant for patient diagnosis. The US technology giant, IBM, has developed a system called Watsons for Health. The system's primary function is to assist doctors in diagnosing patient complaints based on millions of data and information collected and analyzed through machine learning. Google has also developed a similar solution called DeepMind Health, which enables collaboration between doctors, researchers, and patients to solve global health problems. Therefore, the adoption of AI for hospitals can begin here. By utilizing AI as a physician assistant, it can provide a second perspective that can ensure the validity of patient diagnoses.

Currently, Central Pertamina Hospital (RSPP) is exploring collaboration with PT Astra Zenexa Indonesia in developing early detection of lung cancer through Qure AI with the distribution rights holder in Indonesia being PT Fuji Film Indonesia. Detection of early-stage cancer cells will be assessed through low-dose imaging scans from CT Scans with certain criteria through anamnesis, physical examination, laboratory tests and chest X-ray examination. The background to this collaboration is the concern of Pulmonary Specialists where patients who come to doctors with a diagnosis of lung cancer are on average already in stages 3 and 4, so that the morbidity and mortality rates are quite high. Early detection of lung cancer is currently still not optimal where complaints are only felt after the advanced stage. This collaboration exploration is still being reviewed by the Hospital Research Ethics Committee and the Hospital Medicolegal Consultant considering that this medical research involving human subjects requires a medical ethics review whether it can be carried out or not, and considering that Indonesian patient data will be sent abroad (India) considering that the Qure AI server is located in India even though the data sent is in the form of anonymous code, and it must be ensured that there are no errors in the resulting data when matching the samples sent with the original data.

The AI device will read the scan results from lung photos to detect the presence of cancer cells, and will be validated by a radiologist. If the Medicolegal Ethics are clear and the PKS has been approved, it should be implemented this August. It is believed that AI-based hospitals can be implemented by private hospitals whose infrastructure is far more ready than government hospitals. To face AI-based hospitals in preparing human resources, including doctors, includes introducing AI to hospital human resources regarding what AI is, recognizing that AI is a tool in implementing and facilitating work in providing patient care. There are several AIs currently being developed in hospitals besides the existing robotic surgery, including speech to text in several Electronic Medical Record/RME applications (summarizing the detection of conversations between doctors and patients which will be summarized by AI in the form of SOAP narratives: Subjective (patient complaints) Objective (results of physical examinations by doctors) Assessment (proposed medical diagnosis formulations based on ICD X) and Planning (proposed treatment).

The results of this AI summary will be re-assessed by the doctor whether it is appropriate or not, and the doctor only reviews and updates. The doctor will be assisted and focused on patient care without being distracted by computer input work. Another AI being developed is the detection of eye abnormalities through early diagnosis of retinal fundus abnormalities. From the results of the fundus photo, the AI will detect whether there are abnormalities or not and will be reviewed by an ophthalmologist and whether it is in accordance with the results of the history and signs of symptoms from the results of the physical examination. The use of robots to assist nurses has actually been used during the Covid-19 pandemic where Pertamina Jaya Hospital uses two Robot units (Temy and Amy) from PT Telkom Indonesia with the job of the robots to deliver medicine and bring food from the nurse station to the patient's room, entertain patients by chatting or entertaining patients by playing songs, however, the software must be periodically maintained, otherwise it will become an error.

In connection with the preparation towards an AI-based Indonesian Hospital and Modern SIM, especially Pertamina Central Hospital, the following things are very necessary to be done, including:

1. Law on Protection of Medical Personnel and Health Service Facilities related to the use of AI, for example, if an error or mistake occurs in interpreting the results of the examination/work results of AI, whether the Hospital or Health Workers are responsible; Law on Protection of patients who are intervened by AI related to research procedures and trials, AI implementation;
2. AI certification by the authorized and comprehensive from the Coordinating Ministry for Digital Technology, Ministry of Health, Ministry of Education, Science and Technology, Ministry of Manpower and Transmigration, BRIN whether it has been in accordance with the standards of each institution;
3. Ease of import for AI products from import regulations, certification and standardization by the institution, that the AI is suitable and can be used in health service facilities including import duties, if necessary subsidies so as to reduce procurement costs; Financing regulations to include it as part of the treatment covered by insurance and health insurance;
4. Incorporating AI materials into the healthcare worker education curriculum to become part of the education and learning process, enabling healthcare workers to work alongside AI; Furthermore, establishing an AI Research and Development Institute before its launch or adoption in domestic healthcare facilities;
5. Disseminating information to the public about the implementation of AI in healthcare services widely and through various media so that all citizens, both service recipients and healthcare providers, understand their roles, functions, and responsibilities in its implementation.

If these steps are implemented beforehand, it is certain that the SIM-AI-based Indonesian Hospital, particularly at Central Pertamina Hospital (RSPP Jakarta), can be realized starting in 2030.

CONCLUSION

This paper aims to explore the prospects for implementing AI-based MIS in Indonesian hospitals post-2030, using a qualitative approach through literature studies, semi-structured interviews, and trend analysis. The results show that although most major hospitals worldwide have begun to adopt digital systems, the use of AI is still limited and faces challenges such as infrastructure, limited human resources, and the absence of specific regulations governing AI in the healthcare sector. However, with the support of national policies, collaboration between stakeholders, and investment in technology and education, the transformation towards an intelligent and integrated MIS-AI system has the potential to be realized starting in 2030. The investigation also included interviews with specialist doctors, Ministry of Health officials, hospital IT experts, Health Tech CEOs, and academics and researchers. This paper recommends the need for a national roadmap and strengthening of national infrastructure, human resources, and the hospital digital ecosystem to welcome the era of smart hospitals in Indonesia. The results of the investigation concluded that the Type A Pertamina Central Hospital (RSPP) is capable of meeting the challenge of becoming an AI- and SIM-based hospital by 2030

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