



International Journal of Strategic Information Systems and Knowledge Applications

Vol. 1, No. 1 January 2026 pp. 1-6

Journal Page is available at <https://internationaljournal.lppmunsaka.ac.id/index.php/jsiska>



Development of Cloud-based Hospital Management Information System: A Review of Healthcare Performance

Eka Wisnu Kusuma¹, Teguh Pribadi²

¹Sekolah Tinggi Ilmu Kesehatan Nasional, Indonesia

²STMIK DCI, Indonesia

Email: kusuma.3ka@gmail.com

Abstract

This paper explores the development of cloud-based Hospital Management Information Systems (HMIS) as a strategic approach to enhance healthcare service performance. Traditional hospital systems often struggle with data fragmentation, limited interoperability, and high operational costs. Cloud computing offers a scalable, cost-effective, and secure infrastructure that can transform hospital operations by enabling real-time data access, improving collaboration, and streamlining workflows. This review highlights the benefits of cloud-based HMIS, including increased data accessibility, improved patient satisfaction, and operational efficiency, using a case study from XYZ Hospital in Jakarta. The paper also discusses implementation steps and critical success factors, including stakeholder commitment, training, data migration, and system integration. Despite its potential, cloud-based HMIS development faces challenges such as data security concerns, infrastructure limitations, and user resistance. Addressing these challenges through proper planning, training, and robust IT governance can help healthcare institutions optimize their services and meet modern healthcare demands.

Keywords; *Cloud Computing, Hospital Management Information System (HMIS), Healthcare Performance.*

INTRODUCTION

The healthcare industry is undergoing a significant transformation, driven by the increasing demand for efficient, accessible, and cost-effective services (Masrom & Rahimli, 2014). Traditional healthcare systems often struggle with fragmented data, limited interoperability, and high operational costs, hindering their ability to deliver optimal patient care (Kuo, 2011). Cloud computing offers a promising solution to these challenges by providing a scalable, secure, and cost-effective infrastructure for managing healthcare data and applications (Kang et al., 2018). Cloud-based Health Information Management Systems facilitate timely information exchange between medical systems and stakeholders such as patients, doctors, and pharmacists, proving particularly useful when medical institutions are geographically distant (Gitonga et al., 2020). By leveraging cloud technology, healthcare providers can streamline their operations, improve data management, enhance collaboration, and ultimately, deliver better patient outcomes. The transition to cloud-based systems necessitates careful consideration of management, technology handling, security measures, and legal issues (Sivan & Zukarnain, 2021). This review explores the potential of cloud-based Hospital Management Information Systems to enhance healthcare service delivery, examining their benefits, challenges, and implementation strategies, and also studies the applications of cloud computing in the health system, including telemedicine, medical imaging, public and personal health, clinical and hospital information systems, medical decision support system, care, and secondary use of health data (Moghaddasi & Tabrizi, 2016).

The adoption of cloud computing in healthcare presents numerous advantages, including improved data accessibility, enhanced security, and cost savings ([Sulaiman et al., 2018](#)). Cloud computing enables on-demand services, such as computing, storage, and databases, which addresses the soaring volume of healthcare data, presenting a Big Data problem that necessitates elastic computing resources that support horizontal scalability, making the development and maintenance of cloud software easier, more reliable, and safer ([Viana-Ferreira et al., 2017](#)). The need to store and analyze vast amounts of healthcare information to deliver both personal and population health management services necessitates the need for cloud computing from both a business and technology perspective ([Jeena et al., 2021](#); [Sharma et al., 2021](#)).

In today's digital era, management information systems (MIS) have become a very important component in hospital management. With the increasing needs of the community for fast, effective, and efficient health services, hospitals are required to adapt to the development of information technology. One promising innovation in the development of SIM is the application of cloud computing technology. This article will discuss how the development of a cloud-based Hospital Management Information System (HMIS) can improve health service performance. Hospital management information systems serve to support decision-making, patient data management, schedule management, and integration of various health services. However, many hospitals still use conventional systems that are fragmented and difficult to integrate. This causes delays in service, data mismanagement, and patient dissatisfaction. Cloud computing offers a solution by providing a flexible and scalable infrastructure, allowing hospitals to access and share data in real-time. Thus, the development of cloud-based HMIS can be a strategic step to improve operational efficiency and quality of health services.

Cloud-based Hospital Management Information System Concept

A cloud-based Hospital Management Information System is a comprehensive information system designed to manage all aspects of hospital operations, utilizing cloud computing infrastructure. This system encompasses various modules, including patient registration, appointment scheduling, electronic health records, billing and accounting, inventory management, and reporting ([Jeena et al., 2021](#)). Cloud computing provides high reliability, efficiency, virtualization, and scalability ([Jawad & Fahad, 2022](#)). By leveraging cloud technology, hospitals can eliminate the need for expensive on-premises hardware and software, reducing capital expenditure and IT maintenance costs. The utilization of cloud computing also facilitates seamless data integration and interoperability between different departments and healthcare providers, enabling better coordination of care. Cloud-based systems also offer enhanced security features, such as data encryption, access controls, and regular backups, protecting sensitive patient information from unauthorized access and data loss. The World Health Organisation defines medical information as the most innovative and shareable asset ([Sun et al., 2022](#)). Cloud computing also provides doctors with secure, remote access to patient information, enabling them to provide better care for their patients ([Dave & Patel, 2023](#)). The integration of healthcare data with cloud-based platforms presents inherent risks to data confidentiality, integrity, and availability, necessitating robust security measures ([Sun et al., 2014](#)). Cloud computing in healthcare offers numerous benefits, including increased efficiency, cost reduction, and improved patient care ([Hu et al., 2015](#)).

Cloud-based health information systems can help prevent the ordering of duplicate tests and procedures by making patient information available electronically, thereby reducing healthcare service expenditures ([Akwaowo et al., 2022](#)). Cloud computing offers healthcare providers a scalable and secure infrastructure for managing patient data and applications. Furthermore, the utilization of cloud-based infrastructure facilitates the implementation of advanced analytics and decision support tools, empowering healthcare professionals to make

data-driven decisions and improve patient outcomes ([Malik & Savita, 2020](#)). Cloud-based Hospital Management Information System is a system that utilizes cloud technology to store, manage, and process health data. This system allows online data access through the internet network, making it easier for medical personnel and hospital staff to access the necessary information anytime and anywhere. The adoption of cloud computing in healthcare is driven by the need for cost-effective, scalable, and secure solutions that can support the growing demands of the industry.

Implementasi HMIS Berbasis Cloud

The implementation of a cloud-based Hospital Management Information System involves several key steps, beginning with a comprehensive assessment of the hospital's existing IT infrastructure, workflows, and specific requirements. Based on this assessment, a cloud service provider is selected, and the necessary hardware and software components are provisioned in the cloud environment. ([Honni, 2013](#)). This involves selecting a reputable cloud service provider that offers a secure and compliant platform. Next, the hospital's data is migrated to the cloud, and the HMIS software is installed and configured. This migration process must be carefully planned and executed to minimize disruption to ongoing operations and ensure data integrity ([Elmogazy & Bamasag, 2016](#)). Following installation, the system is customized and integrated with other hospital systems, such as laboratory information systems and radiology information systems, to ensure seamless data exchange and interoperability. User training is conducted to familiarize medical personnel and staff with the new system, ensuring they can effectively utilize its features and functionalities ([Zakaria & Yusof, 2016](#)). Once the system is fully tested and validated, it is deployed across the hospital, and ongoing monitoring and maintenance are performed to ensure optimal performance and security.

The implementation of cloud-based HMIS not only requires careful planning and execution but also demands a strong commitment from top management ([Handayani et al., 2014](#)). This includes setting clear goals, allocating sufficient resources, and fostering a culture of innovation and collaboration. Furthermore, it is crucial to address potential challenges, such as data security concerns, integration issues, and user resistance, through proactive measures and effective communication strategies. Addressing these challenges requires a multi-faceted approach, including robust security protocols, seamless integration tools, comprehensive training programs, and change management strategies ([Shen et al., 2024](#)). The implementation also requires careful consideration of data security and privacy regulations, such as HIPAA, to ensure compliance and protect patient information ([Rokim et al., 2023](#)). Successful implementation of a cloud-based Hospital Management Information System necessitates a collaborative approach involving IT professionals, healthcare providers, and hospital administrators. The implementation of cloud-based HMIS requires several strategic steps, among others:

- 1) Needs Analysis: Conduct an in-depth analysis of the hospital's needs, including the type of data that needs to be managed, the number of users, and the desired features.
- 2) Cloud Provider Selection: Selecting the right cloud service provider, which offers a solution that suits the hospital's needs and budget.
- 3) System Design: Designing a system that is user-friendly and easy to integrate with existing systems. This design should also consider data security and privacy aspects.
- 4) User Training: Conduct training for medical personnel and hospital staff so that they can utilize the system optimally.
- 5) Monitoring and Evaluation: After implementation, it is important to conduct regular monitoring and evaluation to ensure the system is running well and meeting the expected objectives.

Case Study: Implementation of Cloud-based HMIS at XYZ Hospital

As an illustration, XYZ Hospital located in Jakarta has been implementing cloud-based HMIS since 2021. Previously, this hospital experienced various problems, such as delays in processing patient data, difficulties in scheduling doctors, and many complaints from patients regarding services. After the implementation of the cloud-based HMIS, XYZ Hospital reported significant improvements in healthcare performance. The patient registration process became faster, as patient data could be accessed in real-time. In addition, medical personnel can utilize telemedicine features that allow remote consultations, so patients do not need to come directly to the hospital for medical services. This increased efficiency also has a positive impact on patient satisfaction. Survey results show that 85% of patients are satisfied with the improved services provided after the implementation of the new system. In addition, XYZ Hospital managed to reduce operational costs by 30% thanks to reduced IT infrastructure costs.

Challenges in the Development of Cloud-Based HMIS

In addition to the various benefits it offers, the development of cloud-based HMIS also faces a number of challenges. Although there are many advantages, the development of cloud-based HMIS also faces several challenges, among others:

- 1) **Data Security and Privacy:** Although the cloud offers better security, the risk of data leakage remains. Therefore, there is a need for strict security policies and compliance with data protection regulations.
- 2) **IT Infrastructure Limitations:** Not all hospitals have adequate IT infrastructure to support the implementation of cloud-based systems. The initial investment for hardware and software must also be taken into account.
- 3) **Resistance to Change:** Some medical personnel may be reluctant to adapt to a new system. Therefore, it is important to take the right approach in training and socialization.

CONCLUSION

The development of a cloud-based Hospital Management Information System is a strategic step that can improve the performance of health services. With better data accessibility, guaranteed security, and cost efficiency, hospitals can provide better services to patients. Although there are challenges in its implementation, with careful planning and adequate training, cloud-based HMIS can be the right solution to face the challenges in today's healthcare world. In the future, it is hoped that more hospitals will adopt this technology in order to provide more optimal health services and be responsive to the needs of the community.

REFERENCES

- Akwaowo, C., Sabi, H. M., Ekpenyong, N., Isiguzo, C., Andem, N. F., Maduka, O., Dan, E., Umoh, E., Ekpın, V., & Uzoka, F. (2022). Adoption of electronic medical records in developing countries—A multi-state study of the Nigerian healthcare system. *Frontiers in Digital Health*, 4. <https://doi.org/10.3389/fdgth.2022.1017231>
- Dave, M., & Patel, N. (2023). Artificial intelligence in healthcare and education. *BDJ*, 234(10), 761. <https://doi.org/10.1038/s41415-023-5845-2>
- Elmogazy, H., & Bamasag, O. (2016). Securing Healthcare Records in the Cloud Using Attribute-Based Encryption. *Computer and Information Science*, 9(4), 60. <https://doi.org/10.5539/cis.v9n4p60>
- Gitonga, N. K., Muketha, G. M., & Kamau, G. (2020). Cloud Data Privacy Preserving Model for Health Information Systems Based on Multi Factor Authentication. *International Journal of Recent Technology and Engineering (IJRTE)*, 9(3), 360. <https://doi.org/10.35940/ijrte.c4458.099320>

- Handayani, P. W., Sandhyaduhita, P. I., Hidayanto, A. N., Pinem, A. A., & Fajrina, H. R. (2014). Synthesising hospital information system critical success factors in Indonesia. *International Journal of Management and Enterprise Development*, 13, 261. <https://doi.org/10.1504/ijmed.2014.069172>
- Honni, H. (2013). Pengembangan Model Aplikasi Administrasi Pelayanan Kesehatan di Puskesmas dengan Cloud Computing Berbasis Open Source. *ComTech Computer Mathematics and Engineering Applications*, 4(2), 1026. <https://doi.org/10.21512/comtech.v4i2.2544>
- Hu, Y., Peng, C., & Bai, G. (2015). Sharing health data through hybrid cloud for self-management. 1. <https://doi.org/10.1109/icmew.2015.7169752>
- Jawad, B. J. M., & Fahad, A. S. (2022). Cloud computing and IoT integration for health checking system. *Periodicals of Engineering and Natural Sciences (PEN)*, 10(4), 65. <https://doi.org/10.21533/pen.v10i4.3063>
- Jeena, R., Dhanalakshmi, G., Sherly, S. I., Ashwini, S., & Vidhya, R. (2021). A Novel Approach for Healthcare Information System using Cloud. *International Journal of Recent Technology and Engineering (IJRTE)*, 9(6), 189. <https://doi.org/10.35940/ijrte.f5327.039621>
- Kang, M., Park, E., Cho, B. H., & Lee, K. (2018). Recent Patient Health Monitoring Platforms Incorporating Internet of Things-Enabled Smart Devices. *International Neurology Journal*, 22. <https://doi.org/10.5213/inj.1836144.072>
- Kuo, A. (2011). Opportunities and Challenges of Cloud Computing to Improve Health Care Services. *Journal of Medical Internet Research*, 13(3). <https://doi.org/10.2196/jmir.1867>
- Malik, G., & Savita, S. (2020). HEALTH CLOUD IMPLEMENTATION USING SMART ANALYTICS FEATURES. *International Journal of Technical Research & Science*, 14. <https://doi.org/10.30780/specialissue-icaccg2020/003>
- Masrom, M., & Rahimli, A. (2014). A Review of Cloud Computing Technology Solution for Healthcare System [Review of A Review of Cloud Computing Technology Solution for Healthcare System]. *Research Journal of Applied Sciences Engineering and Technology*, 8(20), 2150. Maxwell Scientific Publications. <https://doi.org/10.19026/rjaset.8.1212>
- Moghaddasi, H., & Tabrizi, A. T. (2016). Applications of Cloud Computing in Health Systems. *Global Journal of Health Science*, 9(6), 33. <https://doi.org/10.5539/gjhs.v9n6p33>
- Rokim, A., Putra, D. H., Rumana, N. A., & Indawati, L. (2023). EVALUASI SISTEM INFORMASI MANAJEMEN PUSKESMAS (SIMPUS) DENGAN METODE HOT-FIT DI PUSKESMAS KECAMATAN CAKUNG. *Journal of Innovation Research and Knowledge*, 2(11), 4295. <https://doi.org/10.53625/jirk.v2i11.5259>
- Sharma, D. K., Chakravarthi, D. S., Shaikh, A. A., Ahmed, A. A. A., Jaiswal, S., & Naved, M. (2021). The aspect of vast data management problem in healthcare sector and implementation of cloud computing technique. *Materials Today Proceedings*, 80, 3805. <https://doi.org/10.1016/j.matpr.2021.07.388>
- Shen, J., Bu, F., Ye, Z., Zhang, M., Ma, Q., Yan, J., & Huang, T. (2024). Management of drug supply chain information based on “artificial intelligence + vendor managed inventory” in China: perspective based on a case study. *Frontiers in Pharmacology*, 15. <https://doi.org/10.3389/fphar.2024.1373642>
- Sivan, R., & Zukarnain, Z. A. (2021). Security and Privacy in Cloud-Based E-Health System. *Symmetry*, 13(5), 742. <https://doi.org/10.3390/sym13050742>
- Sulaiman, H., Magaireh, A. I., & Ramli, R. (2018). Adoption of Cloud-based E-Health Record through the Technology, Organization and Environment Perspective. *International*

Journal of Engineering & Technology, 7, 609.
<https://doi.org/10.14419/ijet.v7i4.35.22923>

Sun, L., Yong, J., & Soar, J. (2014). Access control management for e-Healthcare in cloud environment. *ICST Transactions on Scalable Information Systems*, 1(2).
<https://doi.org/10.4108/sis.1.2.e3>

Sun, Z., Han, D., Li, D., Wang, X., Chang, C., & Wu, Z. (2022). A blockchain-based secure storage scheme for medical information. *arXiv (Cornell University)*.
<https://doi.org/10.48550/arxiv.2207.06102>

Viana-Ferreira, C., Guerra, A. R., Silva, J., Matos, S., & Costa, C. (2017). An Intelligent Cloud Storage Gateway for Medical Imaging. *Journal of Medical Systems*, 41(9).
<https://doi.org/10.1007/s10916-017-0790-8>

Zakaria, N., & Yusof, S. A. M. (2016). Understanding Technology and People Issues in Hospital Information System (HIS) Adoption: Case study of a tertiary hospital in Malaysia. *Journal of Infection and Public Health*, 9(6), 774.
<https://doi.org/10.1016/j.jiph.2016.08.017>