



OPTIMIZING HOSPITAL MANAGEMENT SYSTEM THROUGH THE KANBAN METHOD: A REVIEW OF CURRENT EVIDENCES

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Abstract

Background-- Hospitals, as essential providers of healthcare services, face significant challenges in managing diverse inventories, including pharmaceuticals, medical equipment, and daily operational supplies. Inefficient inventory management often leads to increased costs and resource wastage, underscoring the need for systematic approaches to enhance efficiency.

Objectives – This study aimed to review the literature on the application of the Kanban method in hospital inventory management and to evaluate its potential benefits in cost reduction and waste minimization.

Methods – A literature review was conducted using a replicable protocol to identify relevant peer-reviewed articles indexed in Google Scholar. The search was restricted to publications in English and Indonesian from January 2020 to January 2025. Boolean search strategies were employed with keywords including *Kanban Method*, *hospital inventory management*, *cost reduction*, and *efficiency*. Eligible articles were thematically analyzed to synthesize the findings.

Results – The review highlights that the Kanban method, originally developed for manufacturing industries, can be effectively adapted to hospital settings. Its implementation demonstrates potential to optimize resource utilization, reduce operational costs, and alleviate waste production. However, challenges remain, particularly cultural resistance among healthcare staff and the need for systematic planning and organizational commitment to ensure successful adoption.

Conclusion –the Kanban method offers a viable and effective approach for improving hospital inventory management. This findings offer practical insights for hospital administrators and policymakers seeking cost-effective and sustainable inventory management strategies, while also identifying gaps for future empirical research.

Keywords: *Cost and Waste Reduction, Efficiency, Hospital, Inventory Management, Kanban.*



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INTRODUCTION

Hospitals, as essential providers of medical services to the community, encounter various complex challenges in managing their inventories, including medical equipment, pharmaceuticals, and everyday supplies. Effective inventory management is a vital component of hospital operations and plays a significant role in ensuring the delivery of efficient healthcare services (Abu Zwaida et al., 2021; Silva-Aravena et al., 2020). A lack of proper inventory management can adversely affect the hospital system. Neve & Schmidt (2022) emphasized that inaccuracies in inventory records can disrupt the hospital supply chain and lead to frequent shortages. Additionally, insufficient inventory management may result in overstocking, where excess items accumulate in inventory, thus impairing cash flow and hindering the organization's growth (Balkhi et al., 2022).

Hospital inventory management faces several challenges that affect operational effectiveness and efficiency. One of the significant challenges is maintaining a balance between adequate stock availability and the risk of excess, which can lead to wastage or shortages that hinder service delivery (Ahmadi et al., 2022). In addition, the management of medical equipment and medicines requires careful maintenance to ensure optimal performance and compliance with stringent health regulations. Other issues include effective cost control amidst fluctuating needs and budgets and ensuring efficient integration of management systems to minimize search and procurement time (Masui, 2024). All these challenges require the right strategies to improve hospital operations and ensure quality healthcare services for patients.

Kanban, a Japanese lean production method, has been increasingly adopted by healthcare organisations to improve inventory management and reduce waste (Kumar et al., 2022). The key principles of Kanban, such as pull-based replenishment, visual signals, and work-in-progress limits, have been shown to enhance inventory visibility, optimise stock levels, and streamline supply chain operations in hospital settings (Karekatti & Tiwari, 2021). Implementing the Kanban method offers a streamlined approach to address the complexities involved in hospital inventory systems. This visual and flexible framework allows healthcare facilities to monitor stock levels and trigger replenishment based on real-time usage data, minimising waste and ensuring necessary resources are always on hand (Kindlundh & Larsson, 2021). The Kanban system empowers interdepartmental collaboration by prioritising efficiency and communication, fostering a proactive environment where supply chain bottlenecks can be identified and resolved swiftly (Senapathi & Drury-Grogan, 2021). As hospitals increasingly seek to optimise operations amidst growing demand, integrating the Kanban method emerges as a transformative strategy for enhancing inventory management's efficacy and reliability.

The successful implementation of the Kanban method in hospital inventory management has been well-documented in the literature. Existing research highlights the potential for the Kanban method to revolutionise inventory management in hospitals, leading to enhanced efficiency, cost savings (Gurumurthy et al., 2021; Lanza-León et al., 2021), and improved patient care (Pakdil et al., 2020). These studies provide a strong foundation for further exploring and applying this lean production approach in the healthcare sector.

The results of this study are expected to provide in-depth insights into the importance of inventory management in the hospital context and provide a basis for developing and implementing better strategies. This study will assist hospitals in designing more efficient inventory management systems, contributing to improved quality of healthcare services and better resource management. With a better understanding of inventory management, hospitals can improve their operations, ensure patient satisfaction, and comply with applicable regulations, thereby contributing to the overall goal of providing quality and sustainable healthcare services.

METHODS

Design

A structured literature review was conducted following a reliable and replicable research protocol, enabling the systematic retrieval of relevant studies from Google Scholar. The search targeted original peer-reviewed articles published in English or Indonesian between January 2020 and January 2025. The inclusion criteria focused on studies addressing the implementation of the Kanban method and its association with hospital inventory management to enhance operational efficiency. Search terms applied included “*Kanban Method*,” “*Hospital Inventory Management*,” “*Hospital Inventory*,” “*Kanban*,” “*cost reduction*,” and “*efficiency*.” Articles that fulfilled the eligibility criteria were subsequently reviewed and thematically synthesized. No formal journal quality appraisal was undertaken in this study.

RESULT AND DISCUSSION

The implementation of the Kanban method in hospital inventory management provides a structured framework that enhances operational efficiency by minimizing costs. Originally developed for manufacturing industries to visualize workflows and regulate inventory processes, the Kanban approach can be effectively adapted within healthcare settings. In hospitals, its application extends to the management of diverse inventories, including pharmaceuticals and medical equipment, thereby ensuring resource availability and promoting optimal utilization.

Inventory Management Optimization

The research stated that Kanban could optimize inventory management, ensuring that essential supplies and medications are available as needed rather than being stored in excess (Yuniarti et al., 2020). By leveraging the principles of Kanban, Hospital can optimize their inventory control and reduce waste. The key is to obtain information from various departments, including suppliers, customer service, purchasing, human resources, equipment, and financial accounting, to perform stock-keeping unit management and determine the optimal quantities of items needed in inventory (Ong et al., 2022; Powell, 2018). This not only reduces the capital tied up in unused inventory but also minimizes the risk of expiration and wastage. Furthermore, Kanban principles can be applied to streamline various hospital processes, such as

patient flow, laboratory testing, and pharmacy operations, eliminating unnecessary steps and improving overall productivity (Maione, 2020)

Research has demonstrated that implementing Kanban in hospital inventory management can significantly improve supply chain efficiency (Gurumurthy et al., 2021; Lanza-León et al., 2021). Implementing the Kanban method in hospital inventory management has gained increasing attention as a way to optimize supply chain operations and enhance patient care. Effective implementation of the Kanban system in hospital inventory management can significantly enhance operational efficiency. Hospitals can streamline procurement by visualizing inventory levels and utilizing pull signals, ensuring that essential medical supplies are available precisely when needed (Mouaky et al., 2019). This proactive approach mitigates the issues of overstocking and stockouts, which can compromise patient care and inflate the hospital system. Moreover, the Kanban method fosters a culture of continuous improvement, empowering staff to identify bottlenecks and optimize workflows through real-time data analysis and feedback loops (Leopold & Kaltenecker, 2015).

The integration of Kanban principles not only transforms inventory management practices but also aligns with broader hospital goals such as improving patient outcomes (Pakdil et al., 2020) and maximizing resource utilization (Третяк, 2024). Adopting this system necessitates a comprehensive training program for staff, coupled with management's commitment to support these operational changes.

Hospital Cost and Waste Reduction

Kanban, a lean manufacturing technique, focuses on minimizing inventory and work-in-progress, streamlining processes, and improving overall efficiency (Ghelani, 2021). In hospitals, it can significantly reduce their operating costs and eliminate waste throughout their operations (de Souza Moraes et al., 2022). This statement is supported by correlated literature stating that by avoiding excess stock and optimizing ordering frequency, hospitals can reduce carrying costs and minimize the risk of damage or expiration of goods (Sriyanto & Ika, 2022). Additionally, tighter monitoring and more efficient management reduce the need for unnecessary maintenance or purchases, thereby saving the budget and improving financial management (Yuniar et al., 2023).

Hospitals can enhance their financial sustainability by embracing kanban while delivering better patient care through a more efficient and waste-free

system (de Souza Moraes et al., 2022; Ong et al., 2022; Powell, 2018). Implementing the Kanban methodology in hospital settings can significantly reduce waste and improve operational efficiency (Logrono & Zu'bi, 2021). Hospitals can streamline their processes by identifying and eliminating non-value-added activities (Sriyanto & Ika, 2024) and free up resources for more critical patient-centric tasks. The Kanban system implementation can manage critical medical and pharmaceutical supplies as well as surgical equipment, leading to reduced inventory costs (Lanza-León et al., 2021), improved stock availability (Braga et al., 2020), and reduced medical errors (Hegde, 2020).

Challenges in Implementing Kanban

While Kanban offers significant potential to enhance the Hospital System's efficiency, its implementation is not without obstacles. Cultural resistance to change often presents a formidable barrier, as employees and management may hesitate to abandon familiar practices. Integrating Kanban with existing processes can prove complex, requiring careful planning and execution to ensure seamless adoption. Moreover, maintaining discipline and fostering a culture of continuous improvement demand ongoing commitment and effort from all stakeholders. These challenges underscore the need for a strategic approach when implementing Kanban, balancing its benefits with the realities of organizational dynamics and established workflows.

CONCLUSION

This literature review concludes that the Kanban method offers a viable and effective approach for improving hospital inventory management. Its application has the potential to enhance operational efficiency, reduce inventory-related costs, and minimize waste across hospital supply chains. Despite these advantages, successful implementation requires strong organizational commitment, adequate staff training, and adaptation to the unique cultural and operational characteristics of healthcare settings. Future studies are recommended to explore empirical evaluations and comparative analyses of Kanban-based systems to strengthen evidence-based decision-making in hospital management.

REFERENCES

Abu Zwaida, T., Pham, C., & Beauregard, Y. (2021). Optimization of inventory management to prevent drug shortages in the hospital supply chain. *Applied Sciences*, *11*(6), 2726.

Triana, I.K.D.L., Yanti, N.P.E.D., Paramarta, V., & Agustina, P.D.C. (2025). Optimizing Hospital Management system Through The...

- Ahmadi, E., Mosadegh, H., Maihami, R., Ghalehkhondabi, I., Sun, M., & Sürer, G. A. (2022). Intelligent inventory management approaches for perishable pharmaceutical products in a healthcare supply chain. *Computers & Operations Research*, *147*, 105968.
- Balkhi, B., Alshahrani, A., & Khan, A. (2022). Just-in-time approach in healthcare inventory management: Does it really work? *Saudi Pharmaceutical Journal*, *30*(12), 1830–1835.
- Braga, W. L. M., Naves, F. L., & Gomes, J. H. F. (2020). Optimization of Kanban systems using robust parameter design: a case of study. *The International Journal of Advanced Manufacturing Technology*, *106*, 1365–1374.
- de Souza Moraes, A. I., da Silva, L. F. C., Trovo, S., Pardim, R. P. P., Santo, L. M. E., & Rorato, E. M. (2022). Controle e redução de custo do centro de custo dos setores de internação por meio da implementação da ferramenta Kanban: Control and cost reduction of the cost center of the inpatient sectors through the implementation of the Kanban tool. *Brazilian Journal of Development*, *8*(11), 74196–74203.
- Ghelani, H. (2021). Advances in lean manufacturing: improving quality and efficiency in modern production systems. *Valley International Journal Digital Library*, 611–625.
- Gurumurthy, A., Nair, V. K., & Vinodh, S. (2021). Application of a hybrid selective inventory control technique in a hospital: a precursor for inventory reduction through lean thinking. *The TQM Journal*, *33*(3), 568–595.
- Hegde, J. (2020). *Can the Kanban Technique Reduce Medical Errors?*
- Karekatti, C., & Tiwari, M. (2021). Process balancing. In *Lean Tools in Apparel Manufacturing* (pp. 257–289). Elsevier.
- Kindlundh, A., & Larsson, S. (2021). *Remote Monitoring and Visualization of Inventory Levels*.
- Kumar, N., Hasan, S. S., Srivastava, K., Akhtar, R., Yadav, R. K., & Choubey, V. K. (2022). Lean manufacturing techniques and its implementation: A review. *Materials Today: Proceedings*, *64*, 1188–1192.
- Lanza-León, P., Sanchez-Ruiz, L., & Cantarero-Prieto, D. (2021). Kanban system applications in healthcare services: A literature review. *The International Journal of Health Planning and Management*, *36*(6), 2062–2078.
- Leopold, K., & Kaltenecker, S. (2015). *Kanban change leadership: Creating a culture of continuous improvement*. John Wiley & Sons.

- Logrono, K. J. U. N., & Zu'bi, B. S. (2021). *Reduction of Wastes and Costs Through the Modified Kanban System in Unit Storerooms of HGH: A Value-for-Money Quality Improvement Initiative*.
- Maione, E. (2020). *Lean healthcare application for patient flow analysis in Cardiology department*. Politecnico di Torino.
- Masui, L. S. (2024). *Medical Stores Department, Tanzania: Struggling to Reconcile Demand and Supply of Medical Supplies in Tanzania*. SAGE Publications: SAGE Business Cases Originals.
- Mouaky, M., Berrado, A., & Benabbou, L. (2019). Using a kanban system for multi-echelon inventory management: the case of pharmaceutical supply chains. *International Journal of Logistics Systems and Management*, 32(3–4), 496–519.
- Neve, B. V., & Schmidt, C. P. (2022). Point-of-use hospital inventory management with inaccurate usage capture. *Health Care Management Science*, 25(1), 126–145.
- Ong, Y. L., Kang, C. K.-T., & Ding, J.-F. (2022). Use of the AHP Method to Evaluate Key Inventory Control Indicators: Case Study of a Taiwanese Manufacturer in China. *International Journal for Engineering Modelling*, 35(2 Regular Issue), 43–63.
- Pakdil, F., Harwood, T. N., & Isin, F. B. (2020). Implementing lean principles in the healthcare industry: a theoretical and practical overview. *Delivering Superior Health and Wellness Management with IoT and Analytics*, 383–413.
- Powell, D. J. (2018). Kanban for lean production in high mix, low volume environments. *IFAC-PapersOnLine*, 51(11), 140–143.
- Senapathi, M., & Drury-Grogan, M. L. (2021). Systems thinking approach to implementing kanban: A case study. *Journal of Software: Evolution and Process*, 33(4), e2322.
- Silva-Aravena, F., Ceballos-Fuentealba, I., & Álvarez-Miranda, E. (2020). Inventory management at a Chilean hospital pharmacy: Case study of a dynamic decision-aid tool. *Mathematics*, 8(11), 1962.
- Sriyanto, S., & Ika, R. D. (n.d.). Designing An E-Kanban System To Improve Drug Availability And Minimise Inventory Waste At The Hospital Pharmacy Installation. *J@ Ti Undip: Jurnal Teknik Industri*, 19(2), 70–73.
- Yuniar, C. R., Riana, W., Maa'idah, U. N., & Rakhmawati, E. A. (2023). *Effectiveness of Supply Chain Management Using Kanban System in Hospital Pharmacy Logistics: A Case Study*.

Triana, I.K.D.L., Yanti, N.P.E.D., Paramarta, V., & Agustina, P.D.C. (2025). Optimizing Hospital Management system Through The...

Yuniarti, I. I., Made Kariasa, I., Waluyo, A., Keperawatan, M., Keperawatan, I., Indonesia, U., & Keperawatan, F. I. (2020). Efektifitas Intervensi Self-Management pada Pasien Stroke. (*JKG*) *Jurnal Keperawatan Global*, 5(1), 6–17. <https://doi.org/10.37341/JKG.V5I1.94>

Третьяк, В. (2024). Implementing Lean Management Principles To Optimize Healthcare Facility Operations. *Економіка Та Суспільство*, 62.