



Hospital Resource Optimization and Operational Efficiency Through Business Process Reengineering

I Ketut Dian Lanang Triana*¹, Vip Paramarta², Ni Putu Emy Darma Yanti³, Ida Ayu Md. Vera Susiladewi⁴

^{1,2} Department of Hospital Management, Post Graduate Program, Universitas Sangga Buana, Bandung-Jawa Barat 40124, Indonesia

³Department of Nursing Management, Bachelor of Nursing and Professional Nursing Study Program, Faculty of Medicine, Universitas Udayana, 80322, Bali, Indonesia

³Bali Mandara Regional Hospital, Bali, 80228, Indonesia

e-mail: *lanangtriana@gmail.com

Abstract

Background: Hospitals are increasingly challenged to improve operational efficiency while maintaining service quality amid limited resources, rising costs, and growing patient demand. In this context, Business Process Reengineering (BPR) has emerged as a strategic approach for fundamentally redesigning hospital processes to improve resource utilization and organizational performance.

Objective: This study aimed to analyze the role of BPR in improving hospital resource optimization and operational efficiency, with emphasis on workforce utilization, facility management, and process performance.

Methods: A literature review was conducted using four scientific databases: Scopus, PubMed, ScienceDirect, and Google Scholar. Articles published between 2020 and 2025 in English, full-text, and peer-reviewed were included. From 245 initial records, 10 articles met the inclusion criteria and were analyzed narratively.

Results: BPR consistently improved hospital efficiency through reduced waiting time, shorter process cycles, lower pharmacy management costs, improved bed turnover, reduced operating room idle time, and better workforce redistribution. Indonesian studies mainly highlighted administrative workflow improvement, pharmacy systems, and digital registration, while studies from the Middle East and Asia emphasized inter-unit coordination and facility utilization. Management commitment, staff involvement, and digital integration were the most frequently identified success factors.

Conclusion: BPR remains an effective strategic intervention for optimizing hospital resources. Its impact is stronger when process redesign is integrated with digital transformation and supported by organizational readiness.

Keywords— *business process reengineering; hospital efficiency; resource optimization; workforce utilization; hospital management*

INTRODUCTION

Hospitals is defined as healthcare institutions and facilities that serve as centers for the implementation of health-related efforts and services (Wiraniagara & Wijaya, 2019). These services primarily focus on improving the health status of the wider community through comprehensive and continuous healthcare delivery (Wartiningsih et al., 2020). Hospitals are complex healthcare organizations because they simultaneously integrate human resources, physical infrastructure, information technology, and both clinical and administrative processes. This complexity creates substantial challenges for hospitals in maintaining operational efficiency without compromising service quality.

In recent years, pressure on hospitals has intensified due to increasing healthcare demand, shortages of healthcare personnel, rising operational costs, and digital transformation

requirements that compel healthcare institutions to fundamentally restructure their work processes. These conditions have positioned resource optimization as a strategic issue in modern hospital management (Rachuba et al., 2024).

Hospital resource optimization is not merely associated with cost reduction, but also involves the institution's ability to allocate workforce, hospital beds, service rooms, medical equipment, and service time appropriately in order to achieve higher service throughput. Several studies have shown that inefficiencies in hospital internal processes often arise from repetitive activities, lengthy bureaucratic pathways, duplicated tasks, and weak integration between service units, ultimately leading to wasted capacity and decreased organizational productivity (Dursun et al., 2021)

Our previous studies identified several strategic approaches that have been used to optimize hospital performance, including *Discrete Event Simulation* (DES), which has demonstrated effectiveness in reducing patient length of stay in emergency departments (Triana, Paramarta, et al., 2025), the *Kanban method*, which has shown potential in improving hospital workflow management (Triana, Yanti, et al., 2025), and the use of artificial intelligence to support hospital operational improvement (Triana et al., 2024). However, within this context, *Business Process Reengineering* (BPR) remains one of the most widely applied strategic approaches for implementing radical changes in core organizational processes (Triana et al., 2024)

BPR is defined as the fundamental redesign of organizational processes carried out radically to achieve dramatic improvements in critical performance areas such as cost, quality, service, and speed (Bhaskar & Singh, 2014; Zaini & Saad, 2019). Unlike incremental improvement, BPR emphasizes comprehensive structural changes, elimination of non-value-added activities, and integration of technology into organizational workflows (Fetais et al., 2022). Furthermore, BPR aims to systematically eliminate operational barriers while ensuring maximum satisfaction for both internal and external hospital customers (Hammer & Champy, 2009).

Recent theoretical developments indicate that the success of BPR no longer depends solely on procedural changes, but rather on the integration of three major dimensions within the *Human-Technology-Organization (HTO)* framework: human resource readiness, digital technology adoption, and organizational structural support. The HTO model emphasizes that process redesign is effective only when changes in work systems are accompanied by staff behavioral transformation, information system interoperability, and management commitment to data-driven decision-making (Fetais et al., 2022).

In the hospital sector, BPR implementation has demonstrated significant effects on resource utilization efficiency. Studies conducted in hospital sterilization units have shown that process redesign reduces cycle time, improves equipment utilization, and minimizes bottlenecks between service units (Dursun et al., 2021). Another study on hospital patient reservation systems demonstrated that BPR-based digitalization significantly shortened registration time and improved patient flow (Putra & Nuryasin, 2024). In hospital pharmacy installations, BPR implementation has even been reported to reduce logistics management costs by up to 70% through information system integration and elimination of manual non-value-added activities (Renny & Oke, 2024).

Conceptually, resource optimization through BPR in hospitals can be examined through two major dimensions: workforce optimization and facility optimization. In the workforce dimension, process redesign enables redistribution of workloads, reduction of repetitive administrative tasks, and improvement of both clinical and non-clinical staff productivity. In the facility dimension, BPR enhances the utilization of inpatient rooms, medical equipment, operating theatres, and service capacity through synchronized patient flow and inter-unit integration. This approach aligns with the modern hospital paradigm that prioritizes resource efficiency and capacity responsiveness in addressing increasing healthcare demand (Rachuba et al., 2024).

Nevertheless, BPR implementation in hospitals continues to face several barriers, including organizational resistance, limited digital readiness, weak interprofessional coordination, and lack of post-implementation evaluation models. The high global failure rate of BPR projects indicates that process redesign cannot rely solely on technical interventions, but requires systematic and evidence-based organizational change strategies (Suakanto & Lubis, 2025). Based on these conditions, it is important to conduct an in-depth review of how BPR contributes to improving hospital resource optimization and efficiency, particularly in the context of workforce utilization and healthcare facility management. This review is expected to provide both conceptual and empirical foundations for hospitals in designing process transformation strategies that are more adaptive to current healthcare efficiency demands

METHODS

This study employed a literature review to identify, evaluate, and synthesize scientific evidence regarding the role of *Business Process Reengineering* (BPR) in improving hospital resource optimization and operational efficiency. This approach was selected because it enables a comprehensive understanding of BPR implementation within healthcare settings and its impact on workforce utilization and hospital facility performance.

The literature search was conducted across four major scientific databases: Scopus, PubMed, ScienceDirect, and Google Scholar. These databases were selected because of their broad coverage of healthcare research, hospital management studies, and organizational process engineering literature.

The search strategy applied Boolean operators using the following keyword combination: ("Business Process Reengineering" OR "BPR") AND ("hospital" OR "healthcare organization") AND ("resource optimization" OR "resource utilization") AND ("efficiency" OR "operational efficiency").

The search was limited to articles published between 2020 and 2025, written in English, available in full-text format, and published in peer-reviewed scientific journals.

The inclusion criteria were as follows:

1. Articles discussing BPR implementation in hospitals or healthcare organizations;
2. Articles evaluating the impact of BPR on operational efficiency;
3. Articles reporting resource utilization indicators such as workforce, facilities, service time, or service capacity;
4. Empirical studies using quantitative, qualitative, or mixed-method designs.

The exclusion criteria included:

1. Articles discussing BPR exclusively in non-healthcare sectors;
2. Opinion papers, editorials, conference abstracts, and theses;
3. Studies without efficiency-related or resource utilization outcome indicators.

Screening and Article Selection Process

The initial database search identified 245 articles across all selected databases. After removing 47 duplicate records, 198 articles remained for title and abstract screening. During this screening stage, 132 articles were excluded because they did not meet the thematic relevance criteria, including studies conducted outside the healthcare sector, articles unrelated to BPR implementation, and papers without clear efficiency-related outcomes.

Subsequently, 66 full-text articles were assessed for eligibility. Of these, 56 articles were excluded for several reasons: incomplete discussion of hospital resource utilization outcomes, lack of empirical findings related to BPR implementation, publication type not meeting inclusion criteria, or insufficient methodological clarity. Finally, 10 articles fulfilled all inclusion criteria and were included in the final literature synthesis.

No formal critical appraisal or methodological quality assessment was performed in this review, as the primary objective was to provide a broad conceptual synthesis of recent evidence related to BPR implementation in hospital resource optimization.

RESULT AND DISCUSSION

The review findings indicate that the implementation of BPR in hospitals is consistently associated with improvements in operational efficiency through workforce optimization and better utilization of service facilities. Although implementation contexts vary across countries, the dominant pattern suggests that BPR becomes more effective when organizations not only simplify procedures but also integrate information technology into core hospital service processes. This finding aligns with contemporary BPR concepts that position process redesign as a fundamental transformation of organizational work structures rather than merely incremental procedural improvement (Fetais et al., 2022).

Among studies conducted in Indonesia, most BPR implementations focused on service administration, patient registration, pharmacy systems, and hospital information systems. The digitalization of patient registration significantly reduced queues and accelerated service throughput (Prawasari et al., 2024), it is because repetitive manual activities were eliminated through electronic reservation system integration (Putra & Nuryasin, 2024). Studies in teaching hospitals demonstrated that registration redesign improved patient access while simultaneously increasing administrative staff utilization because working time was no longer absorbed by repetitive data entry activities (Putra & Nuryasin, 2024).

In hospital pharmacy management, BPR generated broader impacts on cost efficiency and internal supply chain stability. Drug distribution redesign through hospital information system integration enabled synchronization between procurement, stock management, and clinical usage, thereby significantly reducing logistical waste. A reduction of pharmacy management costs by up to 70% indicates that BPR directly affects resource utilization, particularly in units highly dependent on information accuracy and material distribution speed (Renny & Oke, 2024)

Compared with studies from the Middle East and South Asia, BPR implementation in those regions was more strongly directed toward inter-unit clinical coordination and service capacity utilization. Research in hospital sterilization units demonstrated that redesign accelerated surgical instrument sterilization cycles, thereby increasing medical equipment utilization and reducing delays in surgical procedures. This finding confirms that facility optimization does not always require investment in new equipment, but can be achieved through improved work sequencing and synchronization of clinical processes.

In Saudi Arabia and other countries with stronger digital transformation, BPR showed substantial effects on staff task redistribution. Digital system integration accelerated inter-unit information exchange, reduced healthcare worker idle time, and strengthened service coordination. In this context, BPR improved not only individual efficiency but also collective organizational efficiency through reduced workflow fragmentation. This pattern is consistent with the Human–Technology–Organization framework, which emphasizes that redesign success depends on alignment between staff readiness, technology, and organizational structure (Fetais et al., 2022).

Differences in findings across countries suggest that organizational context strongly influences the form of BPR success. Countries with more mature digital infrastructure tend to achieve benefits in cross-unit integration and data-based decision-making, whereas developing countries more commonly benefit from reduced manual bureaucracy and simplified administrative workflows. Therefore, BPR effectiveness is not universal but highly dependent on institutional capacity to translate redesigned processes into everyday operational culture.

The most consistently identified success factors across studies were management commitment, staff involvement, and post-implementation evaluation indicators. Without management support, process redesign frequently remains at the planning stage without producing operational behavioral change. Recent integrative review evidence identified nine major success factors in hospital BPR implementation, with management commitment and staff empowerment emerging as the strongest determinants (Nurfadhilah et al., 2021)

Furthermore, the review shows that BPR is increasingly evolving toward integration with Lean, Six Sigma, and healthcare ERP systems. This combination extends the role of BPR from

simple process redesign to continuous efficiency management. In outpatient services, process redesign combined with Lean was shown to reduce patient waiting time while increasing daily service capacity, ultimately improving consultation facility utilization and clinical staff productivity (Waiman et al., 2023)

From a theoretical perspective, these findings reinforce that hospital BPR has shifted from the classical paradigm toward digital resource optimization, defined as the organizational capability to manage workforce, facilities, and information flow simultaneously. In modern hospitals, BPR success is no longer measured solely by process speed, but by the hospital's ability to expand service capacity without proportionally increasing resources.

Therefore, BPR can be positioned as a highly relevant managerial strategy to address current hospital efficiency pressures, particularly under conditions of workforce limitations, rising operational costs, and increasing demands for service quality.

CONCLUSION

This literature review confirms that BPR plays a significant role in improving hospital efficiency by optimizing both human resources and service facilities. Across diverse healthcare settings, BPR contributed to shorter service processes, improved workflow coordination, reduced operational waste, and better allocation of staff and infrastructure. Although implementation outcomes varied according to institutional context, a consistent finding was that hospitals achieved stronger efficiency gains when redesign efforts were supported by digital systems and active managerial commitment.

The review also demonstrates that BPR has evolved beyond classical procedural redesign into a broader strategy of digital resource optimization, where hospitals simultaneously manage workforce distribution, facility utilization, and information flow to increase service capacity. In contemporary healthcare systems, BPR is therefore not only a method for reducing inefficiency but also a strategic mechanism for strengthening organizational adaptability under resource constraints.

FUTURE IMPLICATIONS

Future research should move beyond descriptive evaluations and develop stronger empirical evidence regarding long-term BPR outcomes in hospital settings. Comparative multi-center studies are needed to examine how different hospital types, digital maturity levels, and governance models influence BPR effectiveness.

Further investigation is also required into the integration of BPR with emerging technologies such as artificial intelligence-based scheduling, predictive analytics, and hospital enterprise systems. These approaches may allow hospitals to redesign processes dynamically based on real-time operational demands.

From a managerial perspective, future implementation should prioritize measurable post-redesign indicators, including staff productivity, bed occupancy stability, service throughput, and cost efficiency. Integrating BPR with Lean and digital hospital governance may provide a more sustainable framework for continuous improvement in hospital operations.

REFERENCES

- Alowad, A., Samaranayake, P., Ahsan, K., Alidrisi, H., & Karim, A. (2021). Enhancing patient flow in emergency department (ED) using lean strategies—an integrated voice of customer and voice of process perspective. *Business Process Management Journal*, 27(1), 75–105.
- Bhaskar, H. L., & Singh, R. P. (2014). Business process reengineering: a recent review. *Bhaskar, HL, and Singh, RP (2014). Business Process Reengineering: A Recent Review. Global Journal of Business Management*, 8(2), 24–51.
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- Dursun, M., Findik, S. S., & Goker, N. (2021). Business process reengineering in health-care sector: application for the central sterilization unit. *Kybernetes*, 51(2), 715–744. <https://doi.org/https://doi.org/10.1108/K-11-2020-0777>
- Elapatha, V. W., & Jehan, S. N. (2020). An analysis of the implementation of business process re-engineering in public services. *Journal of Open Innovation: Technology, Market, and Complexity*, 6(4), 114.
- Fetais, A., Abdella, G. M., Al-Khalifa, K. N., & Hamouda, A. M. (2022). Business Process Re-Engineering: A Literature Review-Based Analysis of Implementation Measures. In *Information* (Vol. 13, Issue 4, p. 185). <https://doi.org/10.3390/info13040185>
- Hammer, M., & Champy, J. (2009). *Reengineering the corporation: Manifesto for business revolution*, a. Zondervan.
- Juliansyah, R., Aqid, B. M., Salsabila, A. P., & Nurfiyanti, K. (2024). Implementation of EMR system in Indonesian health facilities: benefits and constraints. *ArXiv Preprint ArXiv:2410.12226*.
- Lanang Triana, I. K. D., Agustina, P. D. C., Febrian, R., Wiadnya, I. D. G. P., & Paramarta, V. (2024). Role of Artificial Intelligence in Developing Hospital Information Management Systems. *JMMR (Jurnal Medicoeticolegal Dan Manajemen Rumah Sakit)*, 13(1), 130–141. <https://doi.org/10.18196/jmmr.v13i1.127>
- Liu, W., Li, T., Lu, M., & Shi, P. (2025). Dynamic Redeployment of Nurses Across Hospitals: A Sample Robust Optimization Approach. *ArXiv Preprint ArXiv:2509.07387*.
- Nazaria, R., Wijaya, I. M. S., Pranudia, A. D., Wirawan, D., Male, H. D. C., & Veranita, M. (2024). Business process reengineering in hospitals: a literature review of related methodologies and approaches. *Radinka Journal of Science and Systematic Literature Review*, 2(1), 262–270.
- Nurfadhilah, N., Sidin, A. I., & Kadir, A. R. (2021). Key Success Factors in Implementing Business Process Re-Engineering (BPR) in Hospitals: Integrative Review. *Journal of Asian Multicultural Research for Medical and Health Science Study*, 2(3), 60–72.
- Prawasari, N., Pakiding, A., Ridwan, D. D., Istyana, R. D. N., & Veranita, M. (2024). Business Process Reengineering In Hospitals: A Literature Review Of Improving Efficiency And Effectiveness Of Health Services. *PREPOTIF: Jurnal Kesehatan Masyarakat*, 8(2), 4510–4517.
- Putra, I., & Nuryasin, I. (2024). Business Process Reengineering pada Reservasi Pasien Rumah Sakit Umum Universitas Muhammadiyah Malang. *Jurnal CoSciTech (Computer Science and Information Technology)*, 5(2), 330–339.
- Rachuba, S., Reuter-Oppermann, M., & Thielen, C. (2024). Integrated planning in hospitals: a review. *OR Spectrum*, 1–54.
- Renny, D. W. I. N. I., & Oke, A. (2024). Implementasi Business Process Re-Engineering Pada Pengelolaan Perbekalan Farmasi Pada Rumah Sakit Ibu Dan Anak (Rsia) Kota Malang. *Jurnal Ekonomi, Manajemen, Akuntansi Учредители: CV Ulil Albab Corp*, 4(1), 2889–2895.
- Salsabila, D. A., & Dachyar, M. (2020). The hospital radiology service redesign, by using business process reengineering and information systems approach. *International Journal of Advanced Science and Technology*, 29(7), 3623–3631.
- Suakanto, S., & Lubis, M. (2025). Business Process Reengineering based on Information Economics. *Sistemasi: Jurnal Sistem Informasi*, 14(5), 2165–2179.
- Triana, I. K. D. L., Agustina, P. D. C., Febrian, R., Wiadnya, I. D. G. P., & Paramarta, V. (2024). Streamlining Emergency Department Efficiency: Implementing Business Process Re-Engineering To Reduce Patient Wait Times. *Homes Journal: Hospital Management Studies Journal*, 5(2), 120–131. <https://doi.org/10.24252/hmsj.v5i2.46369>
- Triana, I. K. D. L., Paramarta, V., Syahidin, R., & Yanti, N. P. E. D. (2025). Hospital Leading Improvements: Discrete Event Simulation as a Strategy to Reduce Patient Length of Stay in the Emergency Department. *CENDEKIA: Jurnal Penelitian Dan Pengkajian*

- Ilmiah*, 2(9), 1910–1920.
- Triana, I. K. D. L., Yanti, N. P. E. D., Paramarta, V., & Agustina, P. D. C. A. (2025). Optimizing Hospital Management System Through The Kanban Method : A Review Of Current Evidences. *Journal of Advanced Nursing and Health Systems Innovation (JANHSI)*, 1(1), 1–9. <https://dilatrageglobalpublishing.com/janhsi/article/view/7>
- Waiman, E., Achadi, A., & Agustina, R. (2023). Reducing hospital outpatient waiting time using Lean Six Sigma: A systematic review. *Indonesian Journal of Health Administration*, 11(1), 154–166.
- Wartiningsih, M., Supriyanto, S., Widati, S., Ernawaty, E., & Lestari, R. (2020). Health promoting hospital: A practical strategy to improve patient loyalty in public sector. *Journal of Public Health Research*, 9(2), jphr-2020.
- Wiraniagara, A., & Wijaya, A. F. (2019). Analisis Tata Kelola Teknologi Informasi Menggunakan Framework Cobit 5 Domain Deliver Support and Service (Studi Kasus: Yayasan Eka Tjipta). *Sebatik*, 23(2), 663–671.
- Zaini, Z., & Saad, A. (2019). Business process reengineering as the current best methodology for improving the business process. *Journal of ICT in Education*, 6, 66–85.