

Title	シミュレーションと多目的最適化による病院資源管理滞在期間と医師割り当ての改善を通じた患者満足度の向上戦略
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論文題目	Simulation and Multi-Objective Optimization Based Strategies for Enhancing Patient Satisfaction through Length of Stay and Physician Assignment in Hospital Resource Management		
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論文の内容の要旨

Patient well-being is crucial for effective healthcare systems, which face ongoing challenges in resource allocation and satisfaction improvement. This research develops a comprehensive integrated approach to enhance patient satisfaction, focusing on Length of Stay (LOS) and physician assignment, by combining discrete event simulation (DES) modeling, multi-objective optimization (MOO), and decision-making guidelines.

The study investigates the impact of resource allocation strategies, patient flow patterns, and physician assignment on clinic performance and patient satisfaction. Data collection involved surveys, observations, and interviews to understand the hospital environment comprehensively. A unique formula was derived to compute satisfaction scores from survey data, which informed the development of a simulation model. The research applies a weighted max-min fuzzy multi-objective optimization methodology to balance competing objectives. By incorporating priority weights and scenario analysis, this integrated approach enables decision-makers to effectively manage trade-offs between different goals.

A case study of the Ophthalmology department at Thammasat University Hospital (TUH) in Thailand demonstrates the practical application of this integrated approach. The outcomes provide tailored improvement suggestions for hospitals of different sizes. For large hospitals, enhancements positively impact both LOS and physician assignment satisfaction. For medium and small-sized hospitals, two distinct options focusing on either LOS satisfaction or physician assignment satisfaction.

The findings underscore the importance of patient satisfaction as a central objective in healthcare optimization efforts and highlight the potential of advanced modeling techniques in addressing complex healthcare challenges. This research offers an adaptable, comprehensive workflow applicable to other hospital departments, promoting a holistic strategy for healthcare system enhancement. Future research directions include aligning this integrated approach with sustainable development goals to

ensure long-term improvements in healthcare quality and accessibility.

Keywords: Patient satisfaction, Resource management, Multi-objective optimization, Simulation, Healthcare

論文審査の結果の要旨

Ensuring the well-being of patients is crucial for the effective functioning of healthcare systems. To achieve this, healthcare systems face ongoing challenges in optimizing resource allocation and improving patient satisfaction. Balancing resources while maintaining high standards of care is essential for meeting patients' needs and ensuring the overall effectiveness of healthcare delivery. The main objective of this dissertation is to develop a comprehensive framework for hospital resource management capable of enhancing patient satisfaction, specifically addressing Length of Stay (LOS) and physician assignment issues. The main contributions are summarized as follows.

This research developed a patient-centered resource management framework that integrates patient satisfaction directly into resource management strategies, providing a holistic approach to healthcare optimization. Within the proposed framework, a method based on discrete event simulation (DES) modeling and multi-objective optimization (MOO) for predicting patient satisfaction was also proposed. A case study using data collected at Ophthalmology Department of Thammasat University Hospital was conducted to demonstrate the practical applicability of the proposed framework, providing insights into its effectiveness in improving OPD operations.

This dissertation has made good contributions both theoretically and practically in the problem of resource and service management in healthcare systems. The research work presented in this dissertation has resulted in one journal paper and one refereed conference paper.

In summary, Ms. CHEMKOMNERD Nittaya has completed all the requirements in the doctoral program of the School of Knowledge Science, JAIST and finished the examination on August 02, 2024, all committee members approved awarding her a doctoral degree in Knowledge Science.

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