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ESTIMATING OPTIMAL RESOURCE ALLOCATION IN THE INPATIENT DEPARTMENT USING SIMULATION AND DATA ENVELOPMENT ANALYSIS

(Menganggar Peruntukan Sumber yang Optimal di Jabatan Pesakit dalam Menggunakan Simulasi dan Analisis Pembangunan Data)

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ABSTRACT

The inpatient department is one of the important departments at Universiti Sains Malaysia Hospital (HUSM) which ensures that the patients will get their first checkup by the nurse within 15 minutes after getting bed. The inpatient department encounters problems as it wrestles with the long waiting time for patients getting first checkup, and the shortage of nurses and beds in the management of patients. This study demonstrate the application of hybrid method of Discrete Event Simulation (DES) and two types of Data Envelopment Analysis (DEA) specifically the Bi-Objective MCDEA BCC model and the Cross-Efficiency model to determine the most effective resource allocation in the inpatient department. The result of the simulation model has shown that the utilization of nurses per day exceeds 100% and the utilization of beds is relatively higher. Besides, the waiting times for patients to get their checkups are too long that exceeds 15 minutes in the inpatient department. The findings of the research show the number of nurses used in the inpatient department increased from 16 to 18, and the number of beds also increased from 36 to 38. The waiting time for patients to get their first checkup has been reduced to under 15 minutes. These additions and reductions can restore the problems faced by the inpatient department. Lastly, the optimum resource identified will enhance the quality of nurses, beds, and the flow of patients in the inpatient department to meet the Key Performance Indicators (KPI) of HUSM.

Keywords: inpatient department; discrete event simulation; data envelopment analysis

ABSTRAK

Jabatan pesakit dalam merupakan salah satu jabatan penting di Hospital Universiti Sains Malaysia (HUSM) yang memastikan pesakit mendapat pemeriksaan pertama oleh jururawat dalam tempoh 15 minit selepas mendapatkan katil. Jabatan pesait dalam menghadapi masalah kerena ia bergelut dengan masa menunggu yang lama oleh pesakit mendapat pemeriksaan pertama, dan kekurangan jururawat dan katil dalam pengurusan pesakit. Kajian ini menggunakan kaedah hibrid menggabungkan Simulasi Peristiwa Diskret (SPD) dan model Analisis Penyampulan Data (APD) seperti model Bi-Objektif MCDEA BCC dan model Kecekapan-Silang untuk menentukan peruntukan sumber yang paling berkesan untuk penambahbaikan semasa di jabatan pesakit dalam. Hasil daripada model simulasi telah menunjukkan bahawa penggunaan jururawat sehari melebihi 100% dan penggunaan katil secara relatifnya lebih tinggi. Selain itu, masa menunggu pesakit untuk mendapatkan permeriksaan adalah terlalu lama sehingga melebihi 15 minit di bahagian pesakit dalam. Penemuan penyelidikan menunjukkan bilangan jururawat yang digunakan di jabatan pesakit dalam meningkat daripada 16 kepada 18, dan bilangan katil juga meningkat daripada 36 kepada 38. Masa menunggu pesakit untuk mendapatkan pemeriksaan pertama telah dikurangkan kepada bawah 15 minit. Penambahan dan pengurangan ini dapat memulihkan masalah-masalah yang dihadapi oleh jabatan pesakit dalam. Akhir sekali, sumber optimum yang dikenal pasti akan meningkatkan kualiti jururawat, katil dan aliran pesakit di jabatan pesakit dalam untuk memenuhi Petunjuk Prestasi Utama (KPI) HUSM.

Kata kunci: jabatan pesakit dalam; simulasi peristiwa diskret; analisis penyampulan data

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