

PERSONNEL PLANNING OF A RETAIL STORE USING POS DATA

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Abstract

The competitiveness of retail stores depends heavily on the ability to handle the challenges of reducing control costs and increasing customer service levels. One element that affects cost significantly is labour costs. This paper addresses proposing a procedure of finding the optimal solutions of personnel planning, especially by making use of the actual Point of Sales (POS) data and considering several frequency patterns of customers entering a store. First, a simulation model of the payment process is designed to establish the conditions for an integer programming (IP) model. Second, this study proposes the IP model to find the initial optimal patterns of salesclerk allocation; that is, the allocation pattern is optimal at each interval. Finally, the simulation model is used to examine the service level. With the assistance of the simulation result, the optimal solution can be obtained to satisfy a predefined service level by repeating the simulation model.

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Key Words: POS, Personnel Scheduling, Integer Programming

1. INTRODUCTION

Problems related to personnel scheduling have been studied for many years due to the importance of planning in the overall performance of a business in terms of quality of service to the customer and cost to the organization [1]. For instance, Takakuwa and Okada [2] proposed that simulation modelling in conjunction with integer programming and direct-search methods can be used for operations planning of a inbound call centre to minimise personnel expenses. Takakuwa and Wijewickrama [3] developed a discrete-event-simulation to optimise doctor schedules in all departments of an outpatient hospital ward of the Nagoya University hospital. Wijewickrama and Takakuwa [4] presented a simulation analysis of patient flow aiming to shorten waiting time by identifying an optimum doctor mix. The objective of all above studies was to minimise personnel expenses or achieve increased satisfaction in service levels.

In the recent decade, POS system has been spread quickly among Japanese retailers because it is an accurate data management to respond more accurately and quickly to sales trends. As the competition in retail industry increases, retailers are becoming much more obligated to optimise their store performance [5]. Simulation has been a widely accepted tool in analyzing performance in the service industry (e.g., [6]). Several studies have focused on various issues concerned with POS data. For instance, Fu and Piplani [7] developed a model making use of POS data for collaborative inventory management in supply chains. King and Moon [8] used POS data for a case study about quick response replenishment. Joines et al. [9] employed POS data for multi-objective optimisation. Adams, Flatto and Gardner [10] applied POS data in spreadsheets simulation of Beer Game. Miwa and Takakuwa [11] presented a procedure of simulation modelling for in-store merchandizing in order to examine customer flows in retail stores. At present, the review of literature indicates that no studies have been

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