

Chapter 8

Supermarket Service Modeling and Evaluation

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ABSTRACT

Supermarkets face the problems of customer queuing and SCM optimizing. Even a series of supermarket service models are adopted currently; however, these issues still exist. This paper examines the framework of this popular service and proposes a quantitative supermarket service metric for evaluation. It introduces three existing supermarket service models and propounds a new hybrid model on the point of improvement which is an integration of e-supermarket and typical model, concentrating on self-service and automated service. The paper gives detailed analysis and comparisons based on Game Theory and simulated experiment by expressions separately for customer, supermarket and supplier and proves the superior feature of the hybrid model. It also suggests a feasible solution using RFID and explains the solution to the biggest challenge about backend bottleneck.

INTRODUCTION

The past decades have witnessed an explosion of development in supermarket. The current strategy widely used is merging self-service (Laura, 2004) with typical one-to-one service. Customers help

themselves picking, choosing, preparing before the final check-out. This form can save a bundle, bring customers convenience but only if it is done right. For daily supermarket, it is always suffering at the cash registers where people pay for the purchase of a set of items, due primarily to the long queue and slow procedure of checking every single item. Customers expect their requirements be met im-

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mediately, thus redundant cost-time turns out to be the main factor influencing whether the customers are satisfactory with the service or will come back next time and the amount of customers has the direct effects on profits gained by vendor. On the other hand, supermarket has heavy pressures on its shoulder in human resource assignment during supplier chain management (SCM) (Narasimhan & Jayaram, 1998; Robert & Ernest, 1998) and commodities distribution. Part of employees is rushing about unloading from suppliers while the other part transporting commodities to the responding shelf from the storehouse. Thus, nowadays, how to speed service against customers' waiting and how to cost less in SCM has become the subject of rapidly growing interest.

Against the background of unsolved pressures mentioned above, vendors and scholars do great efforts on making improvement. The most direct way for efficiency is to add the number of department which performs the check-out service. Customers are separated at the same time so that fixed number of services runs synchronously. Some scholars envision supermarket service in which each item is tagged with an electronic label and all shopping carts feature supporting readers (Fujimura, Masayuki, & Jun, 2000). This thought turning check-out procedure to be one-stop service (Mary, 2006), basing on the concept of item-level tagging (ILT) (Zhang, Zhang, & Cai, 2007; George, 2006) infrastructure, tagging individual products instead of cases and pallets, which may improve inventory system, simplify business processes, reduce labor costs and make check-out service efficiency. On the other hand, some vendors think out to make shopping area and storehouse conjoint in order to save cost. Some of them even construct themselves a special website and allow customers to have a more convenient shopping environment. However, either method has only focused on one point in one stage rather than the whole supermarket service. This is the essential problem of current supermarket model namely short of integration.

Thus, in this paper, we take a close scrutiny at the framework of supermarket service, put up a quantitative metric for evaluation and basing on which, moreover, analyses the existing common supermarket working models basing on Game Theory and simulated experiments. On the point of improvement, we propose a new hybrid supermarket model which emphasizes more on increasing the ratio of self-service and automated service in supermarket. Besides, this paper takes the critical technique used to perform the model and gives the explanation on potential challenges.

The rest of the paper is organized as follows. Section 2 illustrates the framework of supermarket service. Section 3 constructs a metric to evaluate supermarket service and defines related parameters for the further experiment. Section 4 describes the running mode of 3 existing supermarket service models. Section 5 presents a new hybrid supermarket service model to show its advanced improvement. Section 6 applies game theory to prove the necessity of change of supermarket service mode and analysis the profit of three participators under different strategies with simulated experiments according to metrics in Section 3. Section 7 puts up a feasible solution for the model and explains the current big challenge. Section 8 scratches the future work and concludes the paper.

SUPERMARKET SERVICE FRAMEWORK

Supermarket, as a service (Linda, 2006; James, 2005), represents a type of relationships-based interactions between itself and two major service consumers to achieve its business goal. These two consumers are customers and suppliers. As a retailer in the middle, supermarket provides wholesale purchase service for customers at front end and presents as a sale proxy of every supplier at back end. Compared with one-to-one service

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