



RESEARCH ARTICLE

EFFICIENT QUEUE MANAGEMENT ON CHOICE BETWEEN SUPERMARKETS

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ABSTRACT

Behavioral research of queuing has focused on customers in the queue. The current paper examines whether queues can also affect customers choice between services associated with different queues. Waiting lines or queues are a common phenomenon in life, especially in the province of organizations that are for profit making. Queues are common in such places as petrol or filling stations, supermarkets stores, clinics, hospitals, motor parks, manufacturing firms, to mention a but a few. An interesting aspect of queuing process resides in the measures of its system's performance, especially in terms of average service rate, systems, utilization and the costs implied for a given capacity level. Specifically, it examines choice between similar super market located near each other. The results show high correlation between the queue length outside each super market and the number of newcomers. However, the effect is much stronger in tourist areas where customers are less familiar with the super markets. Moreover, the relative popularity of super markets is highly unstable in such areas. The findings suggest that in unfamiliar environments, queues may signal quality. Practical and Theoretical implications are discussed.

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INTRODUCTION

Consider the following situation: a customer is faced with a choice between two super market that look similar, except that outside one, but not the other, trails a relatively long queue of customers. Which supermarket the customer should prefer? This question is of interest of many restaurants, cafes, bars, and other services that are typically located in the same area and face hard competition. The thrust of this paper is the queuing theory as it relates to waiting lines events in contemporary supermarket with a focus on the for-profit sector. Owners of businesses especially retailers have been trying to measure and manage queues and customer wait times for years. Basically, a lot of methods have been used. Some have required the use of expensive, inaccurate, and unreliable methods such as expensive entrance/exit traffic counters, proprietary solutions that combine expensive dedicated hardware with proprietary software, industrial engineering studies, and customer satisfaction surveys.

But in spite of all these efforts, today's retail shoppers remain largely dissatisfied with their shopping experiences.

MATERIALS AND METHODS

Extended Abstract

Research and experience in most cases have shown that customers will often leave a store without making a purchase rather than stand in a long or slow moving check-out line. Despite large advancements in technology designed to decrease wait times, queue management remains a challenge for every retailer and shop owner. The truth is that when queues are not well managed, it will definitely result to having unhappy customers, sales decrease, lower customer satisfaction, and loss of customer loyalty. The current research provides a first step towards understanding the effects of queues on customers' choice between services. Specifically, it examines prospective customers who can choose between similar super market that are associated with different sizes of queues. The focus of interest is the question whether the length of the queue can have an effect on the customer's choice between the

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supermarket. The objective of this research was to identify the forces militating against efficient and effective queuing management in the for-profit oriented ventures in supermarket. Precisely, the research was concentrated on the queuing activities as they relate to supermarket organizations/businesses.

Queuing Theory

Delays and queuing problems are the most common features not only in our daily-life situations such as at a bank or postal office, at a ticketing office, in public transportation or in a traffic jam but also in more technical environments, such as in manufacturing, computer networking and telecommunications. They play an essential role for business process re-engineering purposes in administrative tasks. "Queuing models provide the analyse with a powerful tool for designing and evaluating the performance of queuing systems" (Bank *et al.*, 2001). Whenever customers arrive at a service facility, some of them have to wait before they receive the desired service. It means that the customer has to wait for his/her turn, may be in a line. Customers arrive at a service facility (sales checkout zone in ICA) with several queues, each with one server (sales checkout counter). The customers choose a queue of a server according to some mechanism (e.g., shortest queue or shortest workload) (Adan, 2000). Sometimes, insufficiencies in services also occur due to an undue wait in service may be because of new employees. Delays in service jobs beyond their due time may result in losing future business opportunities. Queuing theory is the study of waiting in all these various situations. It uses queuing models to represent the various types of queuing systems that arise in practice. The models enable us into finding an appropriate balance between the cost of service and the amount of waiting.

Costs Associated With Queues

Perhaps one of the most problematic issues in queuing analysis is that of how to attain the very important goal of queuing, which is essentially to minimize total costs. As (Stevenson, 1999) has pointed out there are two basic sets of costs in queuing. These are (1) costs associated with customers waiting for service, and (2) costs related to capacity. "Capacity costs are the costs of maintaining the ability (of the system) to provide service...." (Stevenson 1999:813). The costs of customer waiting include the salaries paid to employees while they wait for service. Other examples include the time lost as carpenters remain idle waiting for tools to be made available by the employer, the fuel consumed by cars or lorries waiting to park, the loss of any business due to customers refusing to wait and possibly going elsewhere next time around (Adam and Ebertm, 2000).

Customer and services

Number of situations and operations have identified in waiting lines which have been sured (Weiss and Gershon, 1989). According to them include the barbershops, gasoline or petrol stations, tollbooths, banks, airports and hospital emergency rooms. Others are the library, offices, computer centres and parking lots. Each of these locations has its corresponding

"customer". Thus, the "customer" for the parking lots or garage is a car, that of mass transportation is a "commuter" and the one for the hospital emergency room is known as a "patient" and soon (Jhingan, 2003; FS 2004). Another interesting aspect of the waiting lines, according to Weiss and Gershon (1989), is the fact that they all have servers. For instance, the server in case of the hospital is the doctor, the server for airport is the runway and the server for the library is a book and the one for the banks is a teller and so on. In a barbershop, the server is, of course, the barber. In short, the fact that queuing system do inevitably engage the services of server implies the need for correct staffing levels in organizations or firms where queuing takes place.

Observations

The empirical examination is conducted by observations made across pairs of similar super market during prime hours to analyze the potential link between the length of the queue outside each supermarket and the number of customers who choose that restaurant (and join its queue). We manipulated the degree of customers' familiarity with the super market by looking at six pairs of "tourist supermarkets" (i.e., supermarkets that are located in tourist destinations and serves tourists who are not familiar with the supermarket), and six pairs of "local supermarkets"(that the customers are usually familiar with). We hypothesized that if queues are indeed related to customers choice between supermarkets, then the effect will be stronger with tourists because their low familiarity with the service. This stronger effect would be reflected by larger fluctuations between the supermarket's popularity from day to day in tourists but not in local supermarkets (e.g., the supermarket that was more popular in a certain day will become less popular in another day—an effect that we call "inversion effect"). Each pair was carefully selected to ensure that the supermarkets were indeed similar in terms of product type, quality of the product served, number of seats available, and pricing. In addition the two supermarkets in each pair were situated adjacent to each other. For each pair, we made six sets of observations over six consecutive days during prime hours. Two main measures were recorded: (a) the length of the queue outside each supermarket at the start of each observation, and (b) the total number of customers who joined each queue during the 20-minute observation period. The results showed a strong positive correlation between the length of a queue and the number of customers who joined the queue, suggesting that customers preferred supermarkets with larger queues. As predicted, this correlation was much stronger in tourist supermarkets ($r \text{ length } join=.86, p<.0001$) than in local supermarkets ($r \text{ length } join=.72, p<.0001$). As expected, the variance in changes of supermarkets' popularity from day to day in tourist areas is significantly larger than in local areas ($F=4.63, p<.0001$, Levine's test). In order to control for possible supermarkets fixed effects (e.g., quality), we regressed the preference for a certain supermarket on the queue length in that particular day, and the average queue lengths of all other 5 days of observation. The regressions results showed that the effect of the queue length on choice was significant even when such fixed effects are controlled. Specifically, in local supermarket there seem to be a fixed effect (e.g., A} B), but the probability of choosing A decreases when the queue for A is

shorter. In tourist areas, there were no evidence for such fixed effects; the only significant effect was that of the queue length on choice.

Judicious inputs utilization in queues

The basic questions that spring to mind when dealing with the staffing levels include what staffing level shall we maintain per week, month and year? How can we increase the number of servers without simultaneously enlarging the wage bills or salaries of the staff? in sum, the problem is largely skewed on how optimality can be attained under the prevailing scarce resources. In other words, the question is essentially: what are the focal parameters to the optimum utilization of limited facilities in organization where queues are not just desired but also where such waiting lines have, as it were become an imperative determinant which must be judiciously managed in order to attain the corporate goals fruitfully.

RESULTS AND DISCUSSION

The findings of the current study have important implications for supermarkets managers, mainly in tourist destinations. The results suggest that such supermarkets face continual competition, with each day starting a new "game." Creating a longer queue outside a supermarket as the prime dining hours begin may have a strong influence on determining the winner in this competition. We believe that in local areas, it will be harder for supermarkets to benefit from herding behavior once their relative positions have been established. Yet, holding longer queues seems beneficial even in local areas. This effect would be probably most relevant whenever a new supermarket is opened. Then, the owners/managers may benefit from keeping supply slightly lower than demand. Informal conversations with supermarket managers reveal that some are already aware of this phenomenon and act accordingly. The current study has also important theoretical implications. First, it is the first empirical study that examines whether herding can occur when it implies a direct and noticeable cost such as waiting longer times. Second, it provides some insights on the effect of queues on prospective customers outside the queue.

The strong association between the length of queues and choice that was demonstrated here suggests that it should be interesting to study similar situations and to further study the cognitive mechanisms associated with such decisions. We think that the positive effect observed here is limited to cases where customers have an obvious choice, and where queue length may hint at service quality (e.g., restaurants, nightclubs). It is probably foolish for a post office to intentionally create longer waiting lines. Yet, at least in the case of supermarkets, trying to eliminate or shorten queues is not a recipe for success. Indeed, the current study demonstrates that "size really counts."

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