Application of Queuing Theory (Banking Sector)

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ABSTRACT

We face many situations in our daily life when Queue is formed. Queuing Theory applies not in our day to day life but also in sequence Computer Programming, Medical Field, Banking Sectors and Networks etc.The effect of queuing in relation to the time spent by the customers to access bank services is increasingly becoming a major concern. The Obvious implication of customers waiting in long and could result to prolong discomfort and economic cost to them. In this study, the queuing characteristics at XYZ bank were analyzed using a Multi –server queuing model.

- ***Keywords: Queue Theory, Banking System, Multi-Server queuing Model.***

INTRODUCTION

Waiting line is a part of everyday life with too much service involves excessive costs. As commercial banks are major component of the financial system. Commercial banks are still the centre of attraction of many customers who want to carry out one or other transaction through the services provided by them. Now the subject of the customer is dissatisfaction So satisfaction has become crucial elements of the customers and banks are among the organization for which the customer satisfaction is key for success and major source of competitiveness.

To help decision makers make optimal decision, mathematical models are applied to solve the problems of organization and to optimize economic techniques.

The queuing theory is among those mathematical models that analyze and deal with the difficulties of organization.

OBJECTIVE OF THE RESEARCH

- Build an idea about the use of one of the quantitative methods of operational research that is the theory of queues.
- Identify the need for commercial banks to use queuing theory in organizing the queues of their wickets.
- Apply the model of multi channel queues with Poisson arrivals and service times (M/M/S).

Method of Data Collection

The data used for this study were obtained from Primary sources. The method of data collection is through direct observation. I have observed the number of customers, arrival

time of customers, waiting time and service time. The observation was made during the working hours (10:00 a.m-5:00 p.m).The recorded information was used to average waiting time and average service time and utilization factor.

RESEARCH TYPE

- The study is descriptive in the sense that it is carried out with the objective of describing a particular situation.
- The study is analytical in nature as an attempt has been made to find out the cause rather than result.

METHOD OF ANALYSIS

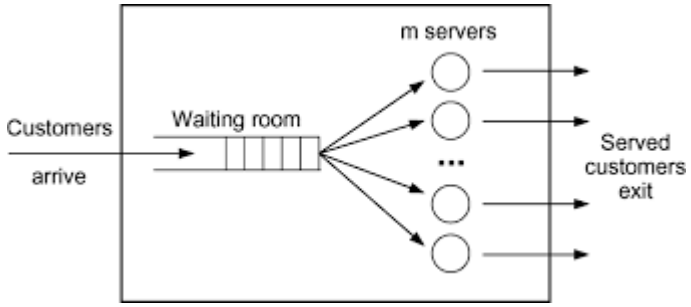
The method of analysis for this study is the multi-server queuing modeling system which follows (M/M/S): (∞/FCFS) specification. In the case, the performance measure analysis including, the arrival time, waiting time service time, priority level, for average customers and the number of servers available were computed using the appropriate tools.

1. QUEUING MODEL NOTATION

λ : Mean arrival rate
μ : Mean service rate
s : Number of service channels
n : Number of customers
Ls : Average number of customers in the system (waiting or being served)
Lq : Average number of customers waiting in the queue
Ws : Average time customers spend in the system
Wq : Average time customers wait in the queue
ρ : System utilization
P_0: The probability that there are zero customers in the system
Pw: The probability that a customer has to wait
Pn: The probability that there are n customers in the system

2. Multiple-Server Queuing Model with Poisson Arrivals and Exponential Service Times (M/M/s)

The model adopted in this paper is multiple channel queuing system, in which two or more servers or channels are available to handle arriving customers. Let still assume that customers waiting service form one single line and then proceed to the first available server. For this queuing system, it is assumed that the arrivals follow a Poisson probability distribution with rate λ. Each of these channels has an independent and identical exponential time distribution with mean $1/\mu$.



Equations for Multi-channel queuing Model:

Utilization factor

$$p = \lambda / s\mu$$

The probability that there are zero customers in the system:

$$P_0 = \left[\sum_{n=0}^{s-1} \frac{(s\rho)^n}{n!} + \frac{(s\rho)^s}{s!(1-\rho)}\right]$$

The probability of having n customers in the bank:

$$P_n = P_0 \rho^n$$

The average number of customers in the bank:

$$L_s = L_q + \frac{\lambda}{\mu}$$

The average number of customers in the queue:

$$L_q = P_s \frac{\rho}{(1-\rho)^2}$$

The average waiting time in the queue:

$$W_q = \frac{L_q}{\lambda} = P_s \frac{1}{s\mu(1-\rho)^2}$$

The average time spent in the bank, including the waiting time:

$$W_s = \frac{Ls}{\lambda} = W_q + \frac{1}{\mu}$$

CONCLUSION

In this study we presented the concept of the Banking system as a multiple Queuing model. The applications of queuing theory extend well beyond waiting in line at a bank. It may take some creative thinking, but if there is any sort of scenario where time passes before a particular event occurs, there is probably some way to develop it into a queuing model. Queues are so commonplace in society that it is highly worthwhile to study them, even if only to shave a few seconds off one's wait in the checkout line.

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