Queuing Theory Applied in A Common Person Life

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Abstract **- There are many situations in a common man life when a queue is formed. Queuing theory is the study of waiting line and is very helpful in solving the problem of common man's life. Queuing models help to improve the service efficiency and increase the customer satisfaction. In this paper, the idea of queuing theory is adopted to model about practical problem like allocation of beds in hospitals during pandemic and for allocation of vaccine. We have seen that in a common man life queue is formed in many ways for example in temples, banks, airports, chemist shop, post office etc. In this paper, we explain the basic uses of queuing theory and its application in a common man life.**

Index Terms **- Queuing theory, Service efficiency, Service process, Arrival process, Queue length, Customer**

INTRODUCTION

Queuing theory is a branch of mathematics which is very widely used in various real-life situations by suitably modeling and applying appropriately. A queuing system is defined as which consist of customers and servers. Waiting lines or queues are familiar situation which we observe quite frequently in our life. Waiting lines or queuing theory has been applied to a wide variety of business situations. All situations where costumers are involved such as cafeterias, departmental stores, cinema halls, Banks, Post offices, petrol pumps, airline counters, patients in clinic etc. are all have queue**.**

For past many years queuing theory has developed so much and got applied to many practical problems. Some of the practical problems are discussed in this paper. Waiting lines are not only of human beings but also the aero plane seeking to land at busy airport, ship to be uploaded, machine parts to be assembled, cars waiting for traffic lights to turn green. In many post offices, medical stores management has tried to reduce the frustration of customers by increasing the speed of checkout and cashier lines. Although in shopping malls they provide multiple line/multiple checkout system and in restaurant have gone in recent year to a queuing system where people have to wait for the next available cashier. In either case, the problem is to either schedule arrivals or provide number of facilities or both so as to obtain an optimum balance between the costs associated with waiting time and the time.

CUSTOMER

The customers may be persons, machines, vehicles, parts etc. The waiting line or queue management is a critical part of service industry. It deals with issue of treatment of customers in sense reduce wait time and improvement of service. The queue does not include the customers currently being served.

QUEUE LENGTH

The average number of customers in the queue waiting to get service is known as queue length. Short queues could mean either good customer service or large waiting space while long queue could indicate low service efficiency or a little waiting service.

SYSTEM LENGTH

It is the average number of customers in the system waiting to be served and those being served. Long queues imply congestion, potential customer dissatisfaction and need for more capacity.

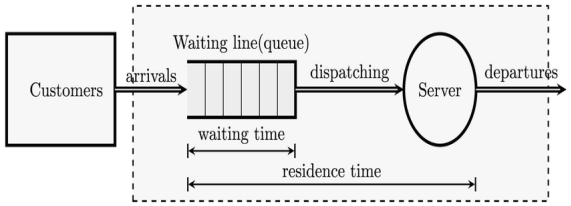
METHADOLOGY OF QUEUING SYSTEM

One thing we have to remember is that when we speak of queue, we have to deal with two elements,
i.e., Arrival and Service facility. Entire queuing system can be completely described by:

1. The arrival patterns
2. The service patterns
3. The queue discipline and

4. Customer behavior

Components of the queuing system are arrivals, the elements waiting in the queue, the unit being served, the service facility and the unit leaving the queue after service. This is shown in figure-



Components of Queuing System

MOTIVE OF THE STUDY

This paper gives basic ideas of some important topics and application of queuing theory in our life. In this paper we study about basic idea that are most common used in a man's life. This paper aims to study of the application of hospitals, temples, market, airports, shopping malls, Petrol pumps, schools and colleges, Restaurant, Bus Stand. Before we look at some basic application it is helpful to understand Little's Law a formula that helps to operationalize queuing theory in many of these applications.

LITTLE'S LAW

Little's Law connects the capacity of a queuing system, the average time spent in the system, and the average arrival rate into the system without knowing any other features of the queue. The formula is quite simple andis written as follow:

$L=\lambda w$

Where:

- L is the average number of customers in the system
- λ is the average arrival rate into the system
- W is the average amount of time spent in the system

SHOPPING MALLS

A shopping Centre is a collection of independent retail stores, services and a parking area conceived, constructed, and maintained by a management firm as unit. Shopping centers may also contain restaurants, banks, theatres, professional offices, service stations and other establishments. Scope of queuing applications in shopping malls are circulation of things, counter service and allied service. The basic tasks on shopping malls are Mall Workers or Employee management Checklist for Shopping Centers, Grouped residential Apartments, Big Retail stores etc.

RESTURANTS

In restaurants the common problem arise is that they lose their customers due to a long wait on the line. Scope of queuing application in restaurants is arrival rate, service rate, utilization rate, waiting time in queue and the probability of potential customers to balk. The problems are solved by using Little's theorem and some models. Some of the analysis that can be derived in the restaurant include the expected waiting time in the queue, the average time in the system, the expected queue length, the expected number of customers served at one time, the probability of balking customers etc. Researchers have previously used queuing theory to model the restaurant operation reduce cycle time in a busy fast restaurant as well as to increase throughput efficiency.

AIRPORTS

Air traffic, worldwide, keeps growing strongly, creating critical capacity situations and traffic congestion. Large delays are suffered by airlines, passengers, and airports authorities alike. The results of queuing theory can be used to analyze airport runway systems, but when airports are too congested, or a more realistic description of the system behavior is necessary. The queuing model in airports helps to reduce long queue. It reduces queue length and actual waiting time, thus improving customer's satisfaction. Also, it helps to keep the discipline in the airports.

BUS STAND

In country like India where buses are the most popular and cheapest means of transportation. It is very difficult to have seats in the buses for the journey. The population of the country that the India has does not match with the number of buses running various routes especially those connecting to metro cities. The queuing system trying to reduce the inconvenience of passenger and it is feasible and the results are effective and practical.

HOSPITALS

Hospitals are doing their best to provide a variety of medical services to increase variety of medical services to increase patient's satisfaction. Queuing theory can be applied to the analysis of waiting lines in healthcare settings. Most of the healthcare systems have excess capacity to accommodate random variations, so queuing analysis can be used as short-term measures, or for facilities or resource planning. Queuing theory also helps to analyze changes in outpatients waiting times before and after the introduction of Electronic Medical Record (EMR) systems. With the help of queuing theory, we can calculate waiting time excluding distorted values from the digital data and distortion factors such as arrival before the hospital open time, which occurs frequently in the initial stage of a queuing system.

TEMPLES

Today temples are one of the most important units of the public. Most temples used standard queuing models. Temples is an example of unlimited queue length. For example, there is too much rush in Banka Bihari temple Vrindavan, but they have solved their problem by using queuing model they had made more than one gate one is for entry and other for exit and they had also put barriers in the temple so that queue may control.

SCHOOL AND COLLEGES

The school and colleges are an organized collection of files, desks, books, audio, CDs, Video tape, science lab material and some other materials like electronic resources. Queuing application in school and colleges are arrangement of files, counter service etc. The basic tasks in school are stacks management, selection of useful things in school and colleges.

CNG PUMPS

The queuing ugly scenario is a quest to strike a balance between average time for motorists, vehicle etc. and the idle time of the attendants in the filling station. The problem of the queues is very popular in the day-to-day activities. We have seen that there are number of cng vehicles and a smaller number of CNG pumps. Our government is trying to make more and more pumps they had decided to make 10,000 more pumps so that queue may control till the year 2030. Queuing model also helps to reduce fuel consumption thereby saving money.

CONCLUSION

Queuing theory is a major system in our society. Every person has to stand in line at one point in their lives. Queuing theory can be used to help reduce waiting times and where waiting time are inevitable, businesses can make the customer experience a positive one. In general speaking queuing system or waiting lines are widely used in each area in the world nowadays. In our paper we see how queuing theory is used in our life. Queuing systems are successfully used for the performance analysis of different systems such as in school, colleges, hospitals, post offices, airports etc. This analysis provides some concepts of queuing theory and the applications.

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