EFFECTIVE MANAGEMENT OF WAITING IN QUEUES

ABOUT THE AUTHOR

Gjergji Shqau

Affiliate
University "Aleksander Xhuvani", Elbasan, Albania
Research field
Organizational Behavior, Leadership, Business Communication, Consumer Behavior
Email
gjergjishqau@yahoo.com

ABOUT THE AUTHOR

Vaso Qano

Affiliate
Vice Rector, Faculty of Economy, Canadian Institute of Technology, Tirana, Albania
Research field
Education, Teaching Physics, Physics and Astronomy books for high schools

ABOUT THE AUTHOR

Elda Shqau (Sulkja)

Affiliate
Regional Directorate of Health Elbasan City
Research field
Management

Abstract: Effective management of queues can significantly improve the performance of the organization in general or the unit where it applies in particular. Effective management of queues is most needed when the service is face to face, ie "tangible", visible and that actually happens in a certain unit. This work aims at identifying the role of several factors (skills, technology, etc.) in the queuing model. The focus of selective surveillance is on all those organizations that have service systems. Service time in the system depends not only on the management of the model but also on some factors which if evaluated (taken into consideration) can significantly improve service results. After a detailed review of the literature, we created the possibility of designing the most effective techniques and methods for gathering information, which was then processed with various computer programs. The proposed model as well as the decision tree is the main results of the presents work. The study has managed to achieve its purpose, as well as to give at the end some recommendations for all those service systems where the queue is applied.

Key words: system, waiting, queuing, time, service, customer.

I. Introduction

In a reception (waiting in queues) system, managers must decide what level of service to offer. A low level of service can be cheap, at least in the short term, but can cause high costs of customer dissatisfaction, such as future lost business and actual grievance costs. A higher level of service will cost more to provide and will result in lower cost of dissatisfaction. Because of this exchange, management must consider what the optimal level of service to provide is. In some operations there is total production, while in other operations the dominance of production decreases and the dominance of service increases. The goal of the decision maker is to minimize the queue, the smallest possible expectations in the system and to achieve this at minimal cost.

This work aims to identify the role played by the queuing decision-making model in the effectiveness of the service system which reflects a high customer satisfaction at an

optimal cost. Today's challenge is that many operations with service nature create long queues, waste of time and customers (clients) dissatisfaction. Although we are in the age of high technology and internet, providing face-to-face service is often unavoidable. In these conditions the paper aims to identify those factors that significantly improve queuing. The originality of this paper is to provide a model of how the variables work in queuing and at the same time the decision tree which calculates the scenarios for each alternative considered.

II. The metodology of study

This study aims at reducing the queues by proposing in the best management three factors that according to the literature significantly affect performance. It is for this reason that in the proposed model the performance indicator from the point of view of calculating the service time in the system (W) is considered constant. The purpose of the study consist of three additional factors: f1-skills of persons involved in the system; f2-technology implemented in the system, andf 3-other factors which include many elements such as values, personality of the persons serving, their experience, motivation, culture, conditions where the service is performed, environment, etc.

As an object of study are taken into account those organizations (companies, businesses, institutions, etc.) public or private which have service systems? To create a clearer vision the object of study includes mainly: supermarkets, various payment counters, and banks of the second level, registration counters, and reception offices for people with different needs, fast food, confectionery and bakery, etc. The reason that the selective study was done in these settings is the fact that are often queues which are caused not only by ineffective management of the queuing model, but also by the three factors that are the subject of our study.

Study methodology: information was collected on the basis of field observations, mainly during peak periods (those with service loads). Different measurements of working hours for persons serving in the system, performed on the basis of a series of factors (according to the object of study). Various surveys of persons served in the system, processing of information with various computer programs, etc. At the same time the study is set up on a theoretical basis based on literature and materials with an academic level. The study generates a model which then provides opportunities for empirical calculations. The results of the study are included together with the conclusions in the practical part.

III. Theoretical part of study

Waiting in line is part of everyday life. Some estimates say that even in some powerful countries, expectations exceed 37 billion hours a year. The next theory is the most important part of service operations. This theory can be described as valuable tools for managers of decision-making and those operations especially of a service nature. The service industry such as retail providers, supermarkets, various service counters (postal, water, energy, etc.), banking, fast-food, etc. are constantly looking for an opportunity to reduce customer dissatisfaction by waiting in line. long and often slow.

For the service industry or operations with a primarily service nature, speed is the factor that ensures the efficiency of the service operations of any fast food chain. [16]. To choose the correct order of a computerized device, most of the client will refer to certain criteria which include the waiting time and how long the waiting line lasts, etc. [15] .The task of management is to avoid negative perception of the customer while waiting to be served and replace it with a positive experience [13]. They could lose their customers if they did not live up to the promise of providing fast quality service. The customer will often decide to change the ordering system based on the length and amount of time it must "spend" (waste) to get the service [1].

We wait in line at cinemas, dining rooms on campus, registration offices, in the Motor Vehicle Division, etc. The time we wait in line depends on a number of different factors.

Your reception is a result of the number of people served in front of us, the number of computers running and the amount of time it takes to serve each individual customer. [2].
The waiting time is influenced by the design of the rotating waiting system. A waiting line system is defined by two elements: the source of its customer population and the service system. In this context we consider the elements of the waiting line systems and the appropriate performance measures. Different performance characteristics can be calculated for different waiting line systems. [3].
Every time there is more customer demand for a service than can be provided, a queue occurs. Consumers can be either people or inanimate objects. Examples of items to wait in line include a car waiting to be repaired, a customer ordering to be processed at a manufacturing plant (or as it is considered as an inventory of work in progress), online emails, and ships or trains waiting for download. [4].

In a reception system, managers must decide what level of service to offer. A low level of service can be cheap, at least in the short term [10], but can cause high costs of customer dissatisfaction, such as future lost business and actual grievance costs. . [13] A higher level of service will cost more to provide and will result in lower cost of dissatisfaction. [11] For this reason, management must consider the optimal level of service provided. [12]
There are some operations there is total production, while in other operations the dominance of production decreases and the dominance of service increases. Queue Analysis (A.P.R) takes into account inputs that may be customers, cars, citizens, other objects waiting to receive service and leave the system. [5] The goal of the decision maker is to minimize the queue, for the smallest possible waiting in the system and to achieve this at minimal cost. The general form of A.P.R is schematically presented as follows [6]:

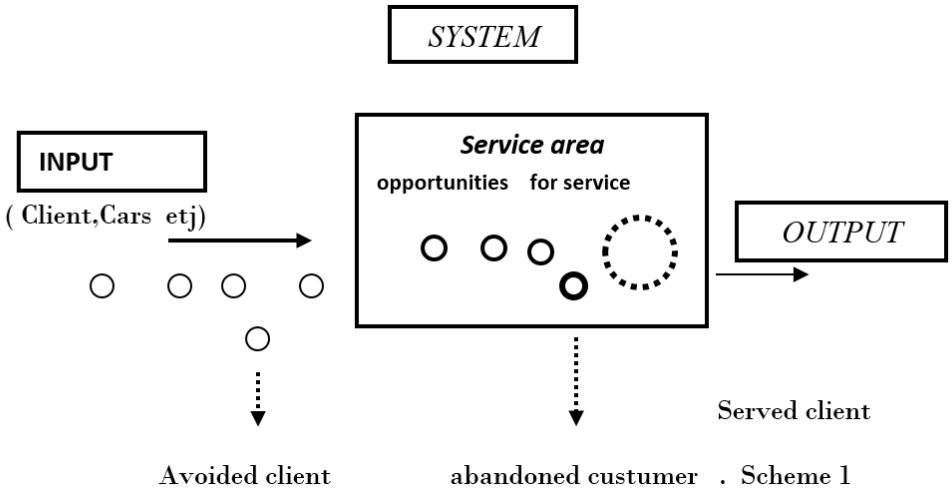

Figure 1: waiting in line proposed classic model

Queuing can be presented in different forms such as: in a straight line, two or more parallel queues for a service opportunity, etc. The average number of achievements or achievement distribution rates is determined by the formula: P (X) = λX * e-λ / x! (x = number of inputs per unit of time. λ = average number of inputs per unit of time. e = 2.71. [7] The average service rate is calculated with the indicator (μ). The average time of a The average time that a customer (input) stays in the system (W) is calculated using the formula W = 1 / (μ -λ) The average time of customers in the queue Wq = λ / μ * (μ - λ) These elements (and not only) become part of the calculation of the waiting cost in the system. [8]

The philosophy of queuing suggests that poor management of queuing can cause various psychological problems in people waiting or planning to be served in a particular system. According to her, there are six possibilities to take into account the stress of the people waiting in line:

1. Uncovered work time feels longer than work-covered time.
2. People want to start right away from what they have planned
3. Uncertain expectations are longer than secure expectations
4. Unexplained expectations are longer than explained expectations.
5. Unfair expectations are longer than honest expectations
6. Anxiety makes expectations feel longer.

The skills that people have at work, in all the processes they are involved in, significantly affect the performance and results expected from the planned work. At the same time, high values, personality, motivation, experience, environment, culture, working conditions, etc. significantly affect work performance. [13] [14]

The quality of technology, methods used in operations, scheduling of operations, operations management techniques, etc., significantly affect the performance of the work and the product ranking. [15] [16].

IV. Effective management of waiting in line

Effective management of queues can significantly improve the performance of the organization in general or the unit where it applies in particular. Queue management is usually applied to organizations primarily service-oriented. Organizations have different natures, totally productive, service and production or totally serviceable. In all cases where services are evident in the life of the organization, the effective management of queues takes on an importance for the organization.

In the systems with services we can include the cases of banks, airports, hospitals, postal services, services for energy, water, telecom, warehouses, supermarkets, etc. There are cases that some people can not be served all on-line, do not have the opportunity, or do not know how to use the vending machine (service unit) on-line, etc.

Queue expectation models aim to find solutions on the quantitative side, good time management only according to the applications of more appropriate quantitative, mathematical models, while effective queue management aims to add other elements to improve time of expectation not only quantitatively (mathematical, algorithmic, etc.) but also by other indicators that have an impact on the service system.

Effective management of queues is most needed when the service is face to face, ie "tangible", visible and that actually happens in a certain unit. The servant and the served are close to each other and at the same time in this system it is expected to serve other people as well.

A service system is considered an interaction between people and the means to accomplish a particular service. If we take the simplest service system, it consists of a service person, a service person and a counter where the service operation is performed, the vehicle that processes the service and the people waiting in line within the system to be served. The counter itself or the service unit has the tool that helps and influences the service. Studies show that all service systems have a similar pattern in a form like the following scheme:

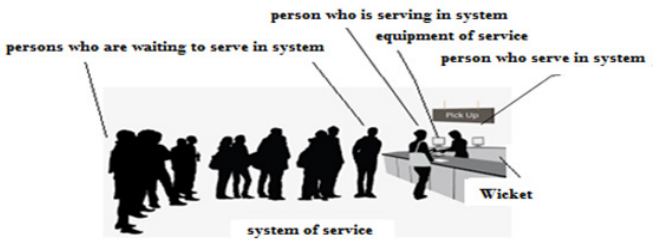

Figure 2: The interaction between cleints and wicket at wainting in line

Studies show that the better the queue management, the more satisfied the served persons are with the system. Studies show that many people can waste time or are too tired from a slow or poorly planned system. In such cases the organization may have various losses from the deviations of the clients served in the

system, or it may create an unfavorable image to the customers and consumers, etc.

Figure 3: emotions and feelings of the people at waiting in line

The basic factors that affect the service system is not only the accurate calculation of the number of counters available on the basis of the average time of arrival in the system and the average time of service, but also by some other indicators that must be taken into account. .

The study aims to identify other indicators that can turn the system into a more effective management of queues. This is also in line with the objective or purpose of the study: Identification of "invisible" factors and their better management in order to improve queuing times.

The study shows that the main factors that affect the improvement of the system service time and at the same time the number of people waiting to be served, the time they spend waiting in line are:

a) Quantitative mathematical model used for queuing expectations management

b) Skills of the person serving in the system

c) Quality of system tools and equipment (technology in service)

d) Other factors that may help the system

The study aims to mainly identify the importance of factors b, c and d and to influence their improvement. At the same time, the study may propose a quantitative model that may be more effective for better window management.

These factors can have a relative impact on the waiting time in the queue depending on the nature of the organization, the type of service, the conditions where the service is provided, etc.

In general, the basic factor (a) is dominant and according to the study occupies weight in% of the first level (pr1) in managing expectations in the queue while the skills of the person (b) serving in the system according to the study occupies weight in% of second level (pr2), the quality of the tool and equipment (c) that perform the service occupying an important weight in% of the third level (pr3), (technology in support of the service), while the other factors according to the study occupy a weight in % of the fourth level (pr4). Other factors (d) according to the study affect the values that the person has, experience, motivation, personality, conditions, environment, culture in which the service is performed, etc.

These factors, although in a small percentage in the result of service and to customers, have an impact on service time. , etc., then it is implied that values have an impact on the result. At the same time if people who are open-minded or self-controlled are seen as more fortunate than those who are closed or manipulative. Favorable conditions with lighting, suitable temperatures, etc., or favorable culture such as that of support, collaborative managerial environment, etc. have a positive impact according to the study on customer service time.

At the same time if in each factor taken in the study (which we have considered as a qualitative indicator) we categorize it into quantitative indicators of the system with points (from minimum min (l) = 5 points to max (k) = 10 maximum points) and knowing the weight of the importance of each of them we can model the most effective way of waiting in line. Schematically the factors that affect the effective management of queues can be presented as follows:

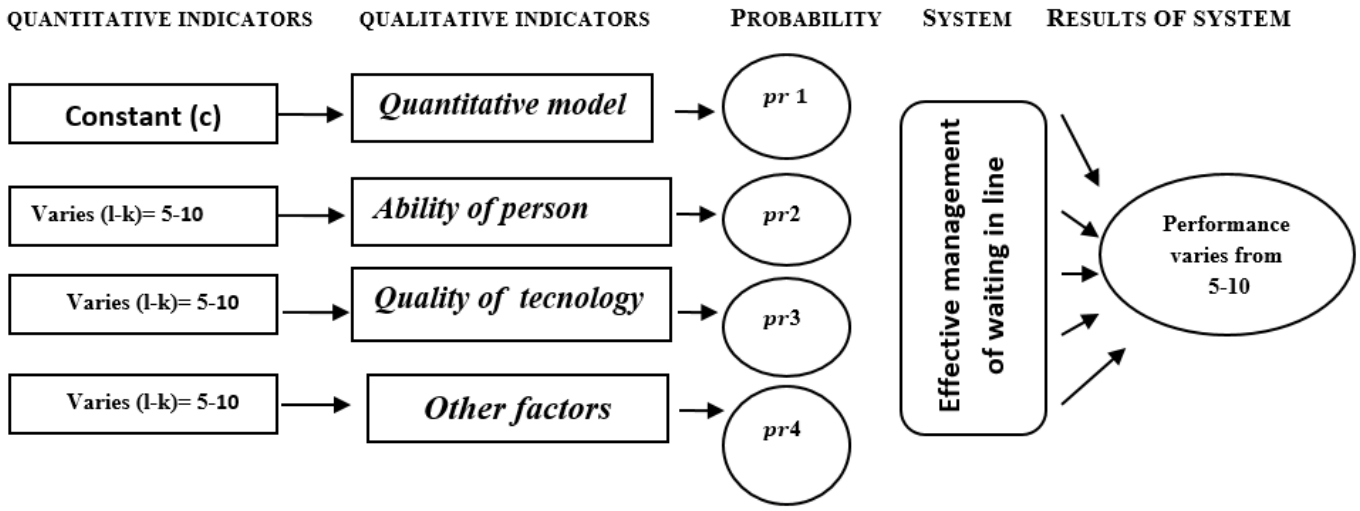

Figure 3- proposed effective management model of waiting in line

The model shows that the higher the skills of the person serving in the system (from 5-10 points) the more he will have a positive impact on the faster completion of the service or on minimizing the waiting time in queues and in the system. At the same time, in the same logic, the better the equipment that performs the service (from 5-10 points), the faster the service will be performed and the customers will be satisfied. As for the other factors, they are implied by the explanation of each of them but at the same time on the basis of the logic used for factors (b) and (c). Factor (a) is not the object of the study and is considered constant, but if the study will improve the quantitative model, this factor will significantly increase the time of service or reduce the waiting time.

Results of model operation on the basis of simulation

Let us consider the basic and main factor constant with proximity of 7.5 points. While the factor b = 7.5 points, the factor c = 7.5 points and the factor d = 7.5 points. By simulation we determine the weights of importance of each factor, where it turns out that the performance of the service or the result of the system will be 7.5 points.

According to the simulation of the service system that is considered part of the study, the basic factor (a) is considered to occupy a weight of 60% importance in the management of queues, while the skills of the person (b) serving in the system according to the study are assumed to be about 20%. , the quality of the tool and equipment (c) that perform the service, (technology to assist the service) are assumed about 15% while other factors according to the study are estimated to be about 5%.

Result of system =Performance= 7.5(0.6)+7.5(0.2)+7.5(0.15)+7.5(0.05)=7.5 points

If the indicators are at ***minimum values***, and the base factor is constant, then the result of the system will be: 7.5(0.6)+5(0.2)+5(0.15)+5(0.05)=7.5(0.6)+5(0.4)=9.5 points

If the indicators are at ***maximum values***, and the base factor is constant, then the result of the system will be: 7.5(0.6)+10(0.2)+10(0.15)+10(0.05)=7.5(0.6)+10(0.4)=11.5 points

In the latter case the real value of each factor is taken and replaced by the model equation:

$$\mathbf{Rsys=Perf==}\ \sum_{n=1}^{4}(F^n * pr^n)$$

F^n-is the factor that can be concern by from fourth selected, pr^n its specific weight of every factor. Base of the calculation we can build at least three scenarious:

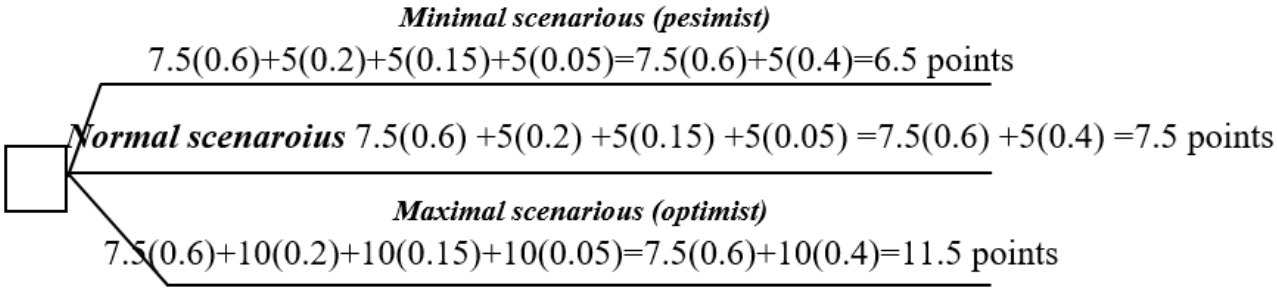

Figure 4: Possible scenarios according to the simulation

V. Conclusions and Recommendations

The study reaches some important conclusions for the good management of queuing systems which do not depend only on the basic models and measurements applied in certain cases. There are a number of factors "invisible" or "unappreciated" by management which can significantly improve the services and time available to all those waiting to be served.

The skills of the people who serve in the various systems where services are provided, can significantly affect the performance, efficiency, quality and speed of service. All these elements for the person who is expected to be served in the system are considered as gained time, or less time lost. Reducing boredom, dissatisfaction is an important indicator of the image and success of the organization or business that provides the services.

The technology that provides the service significantly affects the amount and quality of time that the service "consumes" in the system

The personality of the persons serving in the system from the study is considered a factor in the time spent in the system by reducing the expectation, in order to complete as soon as possible without compromising the quality of service.

At the same time, values, motivation, experience, conditions, culture, business environment, etc., are defined as other additional factors, although with less impact than the above factors.

Conclusions regarding queue management are valid for all units that have service systems, regardless of the private or public sector.

On the basis of the study in general and its specifics, the possibility of recommendations in the interest of better management of service systems is created, which not only continuously apply models as effective as possible measurement of service times and those of achievements, (which then determine the optimal number of people serving in the system), but also the minimum cost of the system. At the same time it is recommended that the skills be detailed based on the type of service that the system offers taking into account the skill set that is most needed for the type of service. The skills of not being distracted are some specific mental skills.

Service systems are required to continuously improve their technologies and all parameters that serve the technology. This is considered another important factor for services.

Job personalities should be well studied with different tests or methods for a better match with the personality required by the job. It is difficult to identify the values of persons, but if with some observations, interviews, tests, etc. it is possible to understand, persistence, flexibility, integrity, etc. positive values, these persons are considered favorable to service systems.

At the same time, the continuous improvement of the conditions where the service is provided in all possible possibilities, the favorable managerial environment, the continuous improvement of the culture, people with experience and motivation, is considered another recommendation for increasing the effectiveness of the service system.

VI. References

[1] Jackson, J. (2011). "Kinds of Food Service in a Restaurant". http://www.ehow.com/info_8570902_kinds-food-servicerestaurant. html (accessed May 4, 2013)

[2] Walker, J. R. (2011). "The Restaurant: from Concept to Operation", 6th ed. New Jersey. John Wiley and Sons, Inc.

[3] Zhao, X., Lau, R.S.M, and Lam, K. (2002). "Optimizing the service configuration with the least total cost approach." International Journal of Service Industry Management, Vol. 13 No. 4, pp. 348-361.

[4] Kumar, R & Sharma (2012) Queueing Model with Retention of Reneged Customers and Balking, American Journal of Operational Research; 2(1)

[5] *Albright, S. Christian, and Wayne Winston*. "Essentials of Practical Management Science". Mason, OH: Cengage, 2005.

[6] *Hall, Randolph W.* "Queuing Methods for Services and Manufacturing". Englewood Cliffs, N.J.: Prentice-Hall, 1991.

[7] *Moore, P.M. Queues,* "Inventories and Maintenance". New York: Wiley, 1958.

[8] *Ragsdale, Cliff T.* "Spreadsheet Modeling & Decision Analysis". Fifth Edition. Stamford, Conn.: Thomson, 2008
.

[9] Real Queuing Examples: http://www2.uwindsor.ca/hlynka/qreal.html This site contains excerpts from news articles that deal with aspects of waiting lines.

[10] ClearQ: http://clearq.com/ This company produces "take-a-number" systems for service facilities (e.g., delis), but also provides performance information about the waiting line.

[11] Qmatic: http://us.q-matic.com/index.html This company produces informational displays and other products to keep customers informed about waiting times.

[12] "Queuing Presentation" by Richard Larson, given at the Institute for Operations Research and the Management Sciences: http://caes.mit.edu/people/larson/MontrealINFORMS1/sld001.htm

[13] Stephen P Robins "Organizational behavior". PEARSON 17th edition (2016)

[14] Gregory Moorhead & Ricky W. Griffin "Organizational behavior" (USA 1999).

[15] Anderson, Sweeney, Williams "Quantities methods for business" (2010)

[16] Bennett, David.. "Technology and Operations Management" (Volume 4). (2006)