Analysis of the operations of a butcher, using a model of waiting lines

Análisis de las operaciones de un carnicero, utilizando un modelo de líneas de espera

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Abstract

A PID control structure was modified proposed by K. The consumer or customer, seeks that the service provided, one of the concerns that a person has to go to request whatever the type, is to know if it will be addressed promptly. It will be an unpleasant experience, that when arriving at the place thought, there is a queue and having to wait to be attended. Therefore, the staff that works in the butcher shop is to respond to the demand that is had within it and the resources to supply all customers efficiently through the theory of queues, as it is somewhat uncomfortable to be waiting for a certain time until the turn is reached so that they can attend to it. As for example when going to pay the electricity service, they have to stand for a certain period of time, instead you go to a bank and they offer you a comfortable place. However, the wait has a limit, and the client values the situation of waiting and waiting to be attended, or to leave the line and opt for another establishment.

Analysis, Butcher, Model

Resumen

El consumidor o cliente, busca que el servicio de atención que se le brinda, una de las inquietudes que tiene una persona al acudir a solicitarlo del tipo que fuese, es saber si será atendido con prontitud. Será una experiencia desagradable, que al momento de llegar al lugar pensado, exista una cola y tener que esperar para ser atendido. Por lo tanto, el personal que labora en la carnicería está para responder a la demanda que se tiene dentro de la misma y los recursos para abastecer a todos los clientes en forma eficiente mediante la teoría de colas, ya que es algo incómodo estar esperando durante un cierto tiempo a que se llegue el turno para que le puedan atender. Como por ejemplo cuando se va a pagar el servicio de luz, tienen que estar parados por cierto lapso de tiempo, en cambio vas a un banco y te ofrecen un lugar cómodo. Sin embargo, la espera tiene un límite, y el cliente valora la situación de esperar y aguantar a ser atendido, o a abandonar la fila y optar por otro establecimiento.

Análisis, Carnicero, Modelo

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Introduction

One of the concerns that a person has when going to request a service of whatever kind, is if it will be attended to as soon as possible. It will be an unpleasant experience, that, when arriving at the place thought, there is a queue and having to wait to be attended. A waiting situation, and if it is long, leads people to despair, become restless and in a bad mood for the poor service received. In some situations, the wait may seem longer than usual, when you have some activity at that time, otherwise the wait may seem small, when the person has a pleasant conversation, has fun with a video game or do some other activity With his phone. However, every wait has a limit, and the client values the situation of waiting and waiting to be attended, or to leave the line and opt for another establishment.

Those responsible for different businesses or companies have addressed the problem of these situations. They have encountered the difficulty of how to solve these problems, such as decreasing the time in which the client (which can be a person, a machine, piece, etc.) must wait in line, before being served by a server (this can be a person, a group of people, a machine, etc.). The second question is: should I put a person (sometimes they are machines) more? If we have to increase the number of people (machines, work stations), how much would the number of people? The answers to this type of questions, are added other, which are correlated with the answers to the first, how much more must be invested? And will the weekly, biweekly or monthly operation cost be lower for retained customers?

The answers to these questions have been solved by the people who are in charge of the administration of a business. With the experience gained over time and with a little analysis of the information, you can decide how many people are required to serve customers. In this sense, it is possible to balance the cost of paying additional salaries by adding people in order to improve customer service and the profits obtained from customers who are retained by not abandoning a queue.

With all this, in some cases, where experience and intuition are not enough, it is when you decide to make heavy investments.

This is where, the problem should be analyzed as a problem of waiting lines, with the help of the queuing theory, it is possible to know the efficiency of the work station, to know the time a customer spends in the queue, the number of people who are trained, between some parameters. It cannot be omitted, the cost that is generated both from the server and the waiting client.

This is carried out by a series of instruments and actions such as the evaluation procedure, accreditation and the skills acquired in the work of queuing theory, oriented to service and employment in order to better the waiting time. Since one of the solutions that can be taken into account is to have more skills to dispatch the client and also on the contrary could use the advertising situation in the establishment, to make it known to the neighbors.

The problem in which the butcher shop is located is the number of people who arrive at the place is greater, to the difference of the quantity of personnel that attends, and the resources are not sufficient to supply all the customers and therefore the attention, the waiting time and queues will continue to increase if the business does not seek to have more servers and resources for the attention.

The queuing model shows that customers who come to buy want a service in which the owner provides good service. Each client goes through a theory of queues in which lines are lined up so that they can be dispatched, in which their time passes for a moment in waiting lines.

Analysis, operation of a butcher

The owner of the butcher shop wants to see if it is necessary to increase the number of employees to be able to carry out their activities during the workday because when dispatching a client and then another arrives cannot supply their time in dispatch. By getting the customers in line to go through their meat order quickly and not leave the queue that would be a loss for the owner of the butcher shop. Since the main thing is to know parameters that describe a model of waiting lines for this establishment and another option if it is necessary to conduct a more in-depth study.

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Objectives

- Carry out the research in which we started with the taking of a whole week's time throughout the day to be able to identify which was the peak hour in which there were more people in the queue, and we took the time of service of each person that is attended by the server. With the information collected we can find an alternative solution which will be suggested to the owner of the butcher shop, as the best and least expensive solution.

- Find a solution to the problem of the butcher shop, the long queue that forms at rush hour and see if it is necessary to open another server or see what is the best alternative for the butcher shop, to avoid the loss of customers for the long time they wait to be served by the server

- Provide the owner of the butcher shop with a solution for their queue problem, during peak hours, and thus improve the quality of the service by achieving greater demand.

Methodology

It is important to know the theory of queues because we can see with real data how a queuing theory is analyzed, and so when a problem presents itself in this way in our business they already have a little experience, and we can give an effective result and favorable where we are working.

Achieve a solution to the problem of the carnage, the long queue that forms at rush hour and see if it is necessary to open another server or see what is the best alternative for the butcher shop, to avoid the losses of customers for the long time of wait, to be served by the person who provides the service.

The queue is defined as the place where customers are waiting to receive a service. This tail can be classified into two types, in infinite and in finite. An infinite tail is when you do not set limits, on the total number of customers that must wait to receive service. On the other hand, the finite tail is defined by a limit established by the system's own criteria.

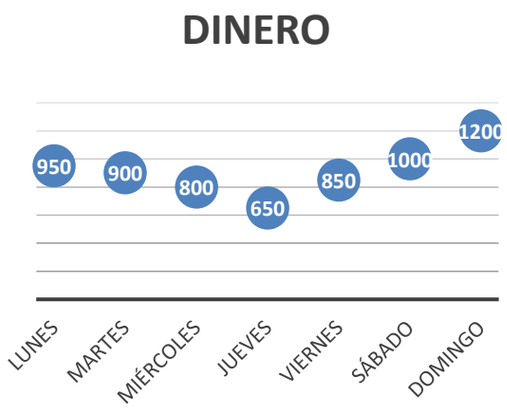
Sales volumes

The discipline of the queue is how the customers will progress when they attend them. The most common use that is used is the first one that enters is the first one that comes out. Of course there are various systems of tail discipline, but this is the most used.

In order to collect this data, a series of activities were carried out. As a first step, we verified how much was sold per day, as shown in the following graph:

Days	Earned money
Monday	950
Tuesday	900
Wednesday	800
Thursday	650
Friday	850
Saturday	1000
Sunday	1200

Table 1 Records of money earned in a week.



Graphic 1 Description of the money earned in a week.

This activity was carried out in only see at the end of the day how much was obtained from sales throughout the day

After this data was analyzed, we determined the day that we had the most sales and as you can see, it was Sunday, so we collected at intervals of every 5 minutes and these are our results.

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The research project in the butcher shop "LA ESPECIAL" has thrown up several problems, but we will only focus on the queues that are formed during the rush hour from 10:00 a.m. to 11:00 p.m., which is the lunch hour, this schedule is where it shows more activity, customers arrive forming only a queue, which is only served by a single person, this problem causes some customers to stop going to the butcher and take another decision.

The following table shows that the data of the arrival rate have a Poisson distribution behavior and the acceptance of the null hypothesis is demonstrated with the following methods.

Hour	No. Of clients
8:00 - 9:00	20
9:00 - 10:00	23
10:00 - 11:00	28
11:00 - 12:00	9
12:00 - 13:00	14
13:00 - 14:00	13

Table 2 Methods of testing the null hypothesis

Take service time

In which we saw what were the 2 hours with more sales and were the following as shown in the following table:

[#3] **Poisson**

Kolmogorov-Smirnov					
Sample Size	5				
Statistic	0.16971				
Rank	1				
α	0.2	0.15	0.1	0.05	0.01
Critical Value	0.494	0.525	0.564	0.624	0.733
Reject?	No	No	No	No	No
Anderson-Darling					
Sample Size	5				
Statistic	0.83331				
Rank	1				
α	0.2	0.15	0.1	0.05	0.01
Critical Value	1.3749	1.6024	1.9286	2.5018	3.9074
Reject?	No	No	No	No	No

Table 3 Customers served per hour in a day

Sample No.	Hour	Customers	Time
1	8:00 – 8:05	0	0.00
2	8:05 – 8:10	2	3.83
3	8:10 – 8:15	2	4.82
4	8:15 –8:20	3	5.00
5	8:20 - 8:25	3	3.00
6	8:25 - 8:30	2	1.78
7	8:30 - 8:35	2	4.00
8	8:35 - 8:40	1	0.78
9	8:40 - 8:45	0	0.00
10	8:45 - 8:50	2	2.45
11	8:50 - 8:55	1	0.83
12	8:55 - 9:00	2	4.03
13	9:00 - 9:05	2	3.08
14	9:05 - 9:10	3	2.02
15	9:10 - 9:15	4	4.82
16	9:15 - 9:20	2	3.05
17	9:20 - 9:25	1	0.50
18	9:25 - 9:30	1	0.33
19	9:30 - 9:35	1	0.75
20	9:35 - 9:40	3	3.15
21	9:40 - 9:45	2	3.00
22	9:45 - 9:50	1	1.45
23	9:50 - 9:55	2	2.25
24	9:55 - 10:00	1	2.02
25	10:00 - 10:05	3	4.75
26	10:05 - 10:10	2	2.58
27	10:10 - 10:15	1	0.78
28	10:15 - 10:20	4	5.00
29	10:20 - 10:25	2	2.25
30	10:25 - 10:30	1	0.83
31	10:30 - 10:35	3	3.82
32	10:35 - 10:40	2	3.47
33	10:40 - 10:45	1	0.88
34	10:45 - 10:50	3	4.48
35	10:50 - 10:55	2	3.18
36	10:55 - 11:00	4	5.00
37	11:00 - 11:05	1	0.65
Sample No.	Hour	Customers	Time
38	11:05 - 11:10	0	0.00
39	11:10 - 11:15	0	0.00
40	11:15 - 11:20	0	0.00
41	11:20 - 11:25	1	0.75
42	11:25 - 11:30	1	0.83
43	11:30 - 11:35	2	4.83
44	11:35 - 11:40	1	0.92
45	11:40 - 11:45	2	3.08
46	11:45 - 11:50	0	0.00
47	11:50 - 11:55	0	0.00
48	11:55 - 12:00	1	0.78
49	12:00 - 12:05	1	3.00
50	12:05 - 12:10	1	2.47
51	12:10 - 12:15	3	0.95
52	12:15 - 12:20	1	4,93
53	12:20 - 12:25	1	3.00
54	12:25 - 12:30	1	0.82
55	12:30 - 12:35	2	3.03
56	12:35 - 12:40	1	0.88
57	12:40 - 12:45	2	3.37
58	12:45 - 12:50	1	1.05
59	12:50 - 12:55	0	0.00
60	12:55 - 13:00	0	0.00
61	13:00 - 13:05	0	0.00
62	13:05 - 13:10	1	1.48
63	13:10 - 13:15	2	3.78
64	13:15 - 13:20	2	2.35
65	13:20 - 13:25	1	1.55
66	13:25 - 13:30	1	2.42
67	13:30 - 13:35	0	0.00
68	13:35 - 13:40	0	0.00
69	13:40 - 13:45	2	2.65
70	13:45 - 13:50	1	0.75
71	13:50 - 13:55	1	0.82
72	13:55 - 14:00	2	2.50

Table 4 Time spent attending clients at 5 minute intervals

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Which went from 9 in the morning to 11 in the morning. And we broke down in more detail the time of each person who visited us

Proof of kind of adjustments for the rate of arrivals

It is necessary to know if the arrival rate is a Poisson distribution. The following table shows the concentration of customers who arrived at the establishment every five minutes, and the clients who arrived at the same place were taken into account the time it took to obtain their meat product during the 8:00 am hours at 2:00 p.m.

Discussion

The theories of queues, implements waiting lines because they are long and expensive in a certain sense, either for a social cost, for a social cost of customer losses, for some other important costs.

The final goal is to achieve an economic balance between the cost of service and the associated cost by waiting for that service. The queue theory itself solves this problem directly, but contributes vital information that is required to make the decisions by predicting some features on the waiting line as the average waiting time.

Having several clients in theory of queuing is an unpleasant thing because the clients then get desperate, when doing this project it will be the establishment with the lowest possible cost if the business goes through this situation of creating very long rows, if necessary do not go through this see if you are generating unnecessary cases, and give suggestions on how you can make your establishment known and your profits are high.

Conclusion

In the realization of this work, we applied the statistical methodology of goodness of fit test for probability distribution and the methodology of queuing theory. The waiting line model was used with Poisson arrival rate and generalized service rate.

The administrator of the butcher shop "La Especial" was informed that his staff did not require any additional person to assist him in customer service, because the activity became critical at times that ranged around 9:00 at 11:00 p.m.

The utilization factor of the person who attends is 29.72%, and the time remaining of the working day does not provide customer service.

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