Analysis of Service of Service by Process Simulation Case Study: School Cafeteria Unirem

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ABSTRACT— ***Today companies are looking to improve their performance and quality of service so that their customers are satisfied. This research project aims, conduct a time study in the area of the cafeteria of the University of Mexico, to determine the current level of capacity and optimize service time students, in order to respond adequate to the demand. The system is analyzed by applying statistical and simulation is used by software PROMODEL ® to evaluate proposals for improvement and optimization of the customer.***

Keywords—work sampling, simulation, improvement proposals.

1. INTRODUCTION

Like many areas, the service has undergone constant changes, especially in recent times; where technology has advanced very rapidly form. These advances have basically obeyed the increasingly demanding the consumer demand. To meet customer expectations, companies must implement strategies to win over the market, giving better service and attention, and thereby achieve customer loyalty, which helps to raise their competitiveness.

Currently the University of the Mexican Republic (UNIREM) has completed 10 years of existence, even if they seem few years UNIREM, as best known was consolidated in education at Middle and Higher. UNIREM Mission is: "To train with the highest academic standards in the field of specialty, contributing to the development of self, society and professional progress of the country."

Another aspect of UNIREM, so the values are governed, which are:

- Develop human beings through study and work to achieve productive field inserted in achieving their development and personal satisfaction.
- Bring science, culture and community work as agents of change and improvement.
- Promote the transformation of individuals, community and society.

UNIREM is located in the Distrito, Federal in Iztapalapa. His address: Avenida Tláhuac, number 4761, colonia. The orchard, your zip code is 09880. Below are shown in Figure 1 Location Google MAP of University of the Mexican Republic

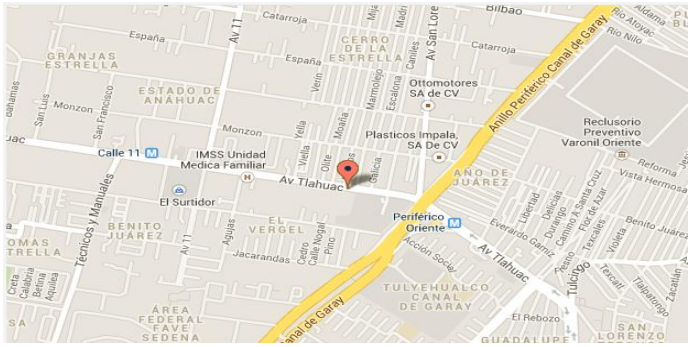

Figure 1: Location Google Map of University of the Mexican Republic

2. HISTORY OF SIMULATION

Simulation is a method of approaching reality. Its utility is manifold especially for educational purposes, research and training (Bolton, 1975, p. 11).

The simulate verb used to describe the old art of building models. Although the word simulation is applied to various forms of modeling such as sculpture and Renaissance paintings, scale models of supersonic aircraft and computer models of cognitive processes, now has a great meaning in the physical sciences and the behavior (Naylor, 1975, p. 15).

Shubik defines a system simulating the operation of a model, which is a representation of the system (Bolton, 1971, p. 14). This model can be attached to manipulations that are impossible to make, too expensive or impractical. The operation of a model can be studied and thereby infer the properties concerning the behavior of the real system.

Simulation is essentially a technique that teaches how to build a model of a real situation coupled with conducting experiments with the model. This definition is broad and may include situations seemingly unrelated, such as flight simulators, games and more.

The ideal goal is to optimize the system performance which assumed control some aspect of a system so that you can get the best possible performance. Usually some aspects of the system are beyond the control of the analyst, and these aspects often impose restrictions on the behavior of the system, which exclude an unlimited optimization. In such cases, the objective is to optimize performance subject to restrictions.

2.1 Advantages and Disadvantages of Simulation

The simulation allows students to experiment with new situations and experimental results that derive learning, but we must also be an expert in statistics. You have to know the advantages of the simulation, which are:

• Through internal and external modifications allowed to know how the system reacts and how it behaves.

• You can better understand how a system works through the simulation.

• The use of simulation can be used to experience new situations, you do not have enough information, which would help to better understand the system and know the behavior of this.

• It helps to know how a system reacts to introduce new elements.

Once you know some advantages of simulation, we must also know what their disadvantages are:

• Enough time for the development and refinement of a simulation model is required.

• It is very expensive, need computer equipment and human resources.

• You can get false results if you do not have the correct variables.

• The simulation is imprecise, because it is not always possible to simulate all reality.

2.2 PROMODEL ®

PROMODEL ® is an animated simulator for personal computers. Can simulate any type of manufacturing systems, logistics, material handling, etc. You can simulate conveyor belts, overhead cranes, assembly, cutting, workshops, logistics, etc.

PROMODEL ® is a simulation package that requires no programming, although it may. Runs on 486 teams on and uses the Windows ® platform. It has the perfect combination of ease of use and flexibility for complex applications.

You can simulate JIT, Theory of Constraints, Systems Pushing, Pulling, Logistics, etc. Practically, any system can be modeled.

Once the model is made, it can be optimized to find the optimal values of key model parameters. Examples include determining the best combination of factors to maximize production while minimizing cost, minimizing the number of trucks without penalizing the service etc.

The optimization module helps to quickly find the optimal solution, instead of just doing trial and error. PROMODEL ® has 2 optimizers available and thus allows exploiting models quickly and reliably.

3. PURPOSE OF THE INVESTIGATION

Modelling supply chain that is done in the School Cafeteria supported on a simulation model with the student version of PROMODEL®, Case applied in University of the Mexican Republic (UNIREM).

3.1 Justification

The University of the Mexican Republic, being an educational institution has its facilities and other services with a space intended to acquire and take a snack or a drink, a coffee shop.

The first concern to be had is whether the service is efficient or not, if they have indicated and necessary to service requests at a set time service personnel for this, different signs of the times were taken after the reverses for this user.

4. METHODOLOGY

This section describes the steps used for this project shall be qualified. This study was conducted in a contemplated Monday to Friday from 18:00 to 22:00. Here are the steps used for this research was broken down.

Step 1. As a first step had working together and there are responsibilities delegated to each of the students who make up the team. Then the matrix shown responsibility assignments see Table 1.

Table 1: Matrix Roles of the Research

Responsible	Responsibilities
Octavio Guerrero Prado	Process Analyst in the School Cafeteria
Rubén Darío Mendoza Zaldivar	Analyst and making process times in the School Cafeteria
Rolando López Domínguez	Simulate the process manager on PROMODEL ®
Karen Rodríguez Domínguez	Responsible for the drafting of Research.
M.C. Arturo González Torres M.C. Fernando Terreros Romero	Research Advisors

Steps 2. He was meeting with analysts Café process and responsible for making beats. This joint work sampling for analysis of the process of the cafe was raised. The formula used was as follows:

$$n = (z^2_{\alpha/2})(p*q)/(B^2) = \text{number of observations}$$

$$n = (1.96)^2(.5*.5)/(.05\ )^2 = 384.16$$

n = number of observations
z = percentage of reliability, the most used is 95%.
p = Probability of success
q = probability of failure
B = Percentage of allowable error.

Given the observations 384.16 results is rounded to 385 observations. The result was circulated for 30 days. This distribution was due within a few hours of study.

Step 3. When had work sampling, the data collection step was performed in this step a team member conducted field research observations; we also performed making process times in the School Cafeteria.

It was first performed 10 shows making time after statistical formula is used with a confidence interval of 95% and a margin of error of 1% for the number of samples that must be performed to successfully complete the time study process the in the School Cafeteria.

Then the statistical formula that was used for the statistical study shows:

$$n = \frac{(z)^2\ (p)(q)}{d} = \frac{(1.96)^2\ (0.9)(0.1)}{0.1} = 3.45$$

$$k = \frac{N}{n} = \frac{120}{3.45} = 34.70 \approx 35\text{samples}$$

Where:
z = confidence interval (1.96)
p = probability of success (.9)
q = probability of failure (.1)
d = margin of error
k = calculating sample size
N = study population
n = preliminary sample

The result means that in order to get a time in a process related to the café activity must perform time 35 shots, 10 shots as mentioned times were performed, only be missing 25 shots over time.

Step 4. When the previous step, we proceeded to build the model. To build the simulation model information is entered menus PROMODEL ® software.

The simulation items used were: locations, entities, path networks, resources, processing, arrivals, user distributions and background graphics. In Figure 2, the version used in the software PROMODEL ® is shown.

Figure 2: Student version of the software PROMODEL ®

Continuing research, shown in Figure 3, which illustrates the simulation model made in software PROMODEL ®.

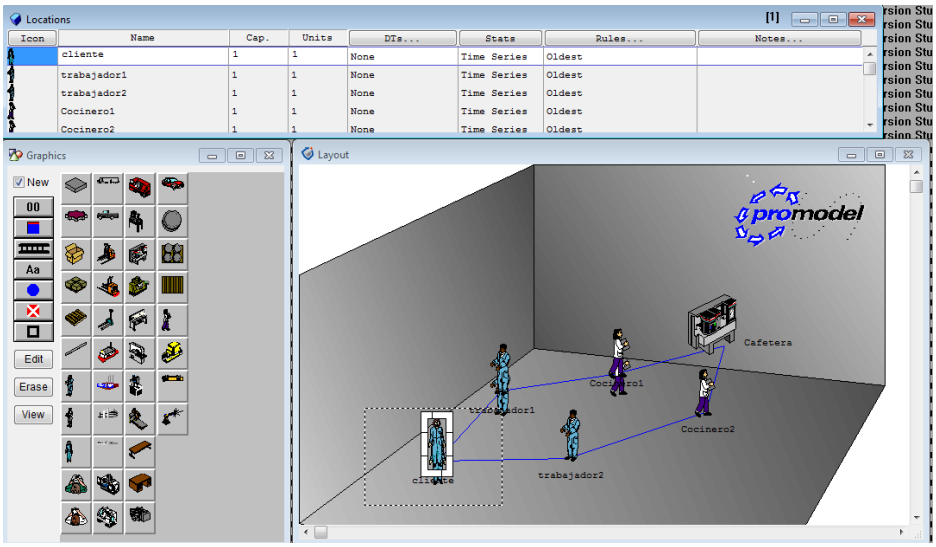

Figure 3: Construction process Café

Step 5. In this he removed pilot runs conducted to determine if the model worked properly represented and whether the current system. Simulation program was run 10 times, which was considered as a number of races for use after pilot simulation model validation.

Step 6. In this step the program ran. The current system model was run 25 times. He was later made the respective modifications to simulate the best alternative, and the results were verified. The finished model shown in Figure 4.

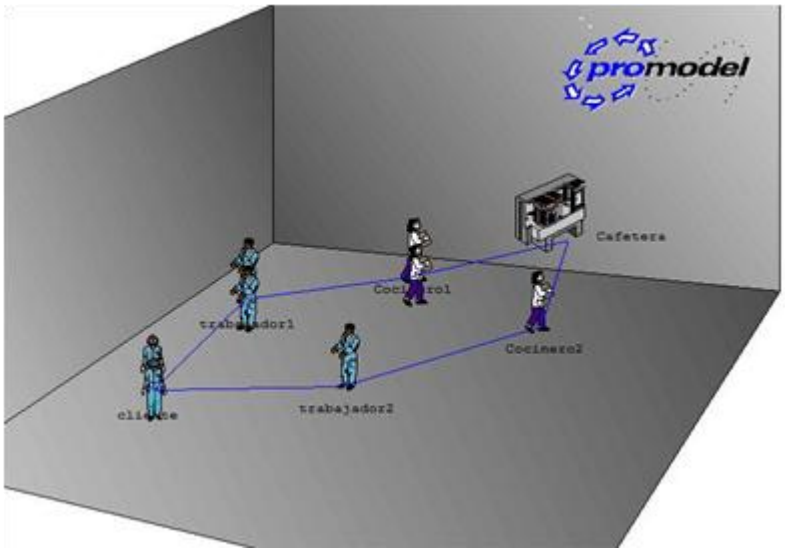

Figure 4: Construction process Café

5. ANALYSIS AND INTERPRETATION OF RESULTS

Once done the simulation results that were corroborated software PROMODEL ®, and analyzed and interpreted. Here in Figure 5 the results are shown:

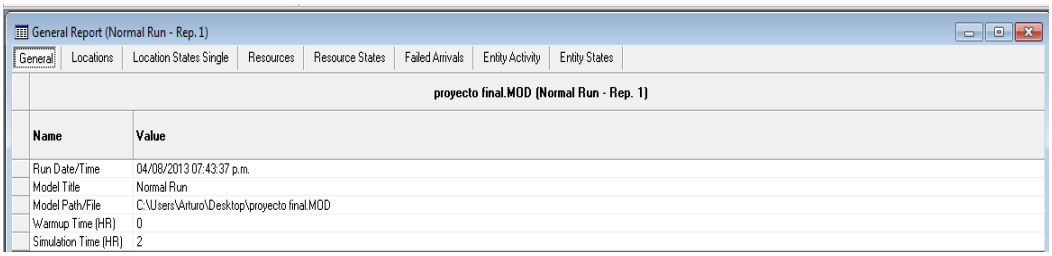

Figure 5: Results of software PROMODEL ®

The results giving software PROMODEL ® helped the team to know how the process cafeteria behaved, the most important was that it showed how many customers were attended in a session of 2 hours, also showed few deliveries and / or how many customers do not were achieved on the same address workday. Here are the results of the footwear shown, see Figure 6.

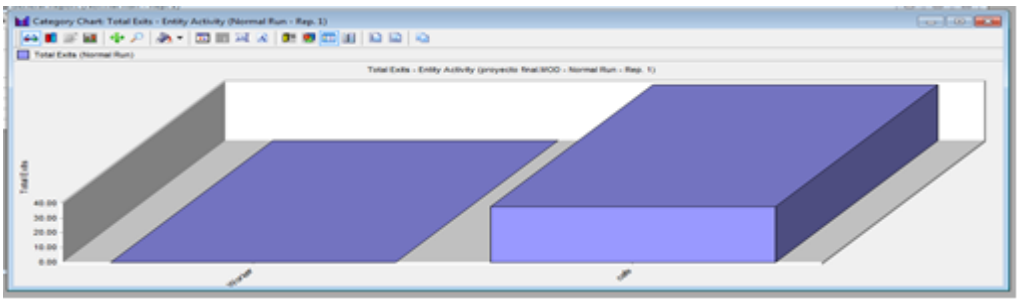

Figure 6: Results of the process during 2 hours

The percentage of process operation in the School Cafeteria was also calculated, Figure 6 shows the performance of the process during the 2 hours of simulation.

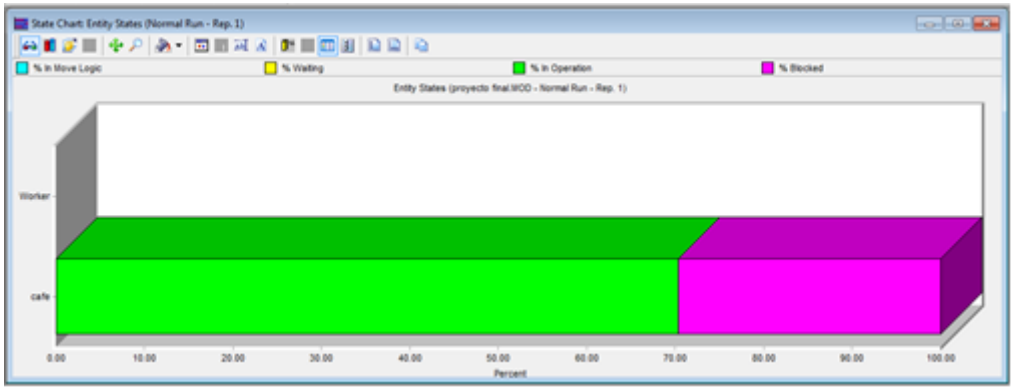

Figure 7: Performance of the process in the School Cafeteria

To conclude the analysis is able to obtain productivity cafeteria; which was 35%, which can show a process with many areas of opportunity. It can also be seen in the following graph 8, which machine is working less in the service of the cafeteria?

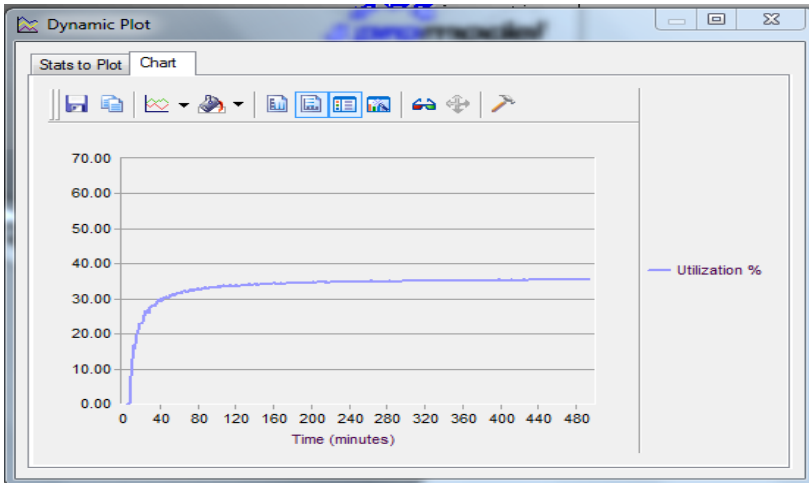

Figure 8: Performance of machine of the process in the School Cafeteria

With the results obtained in this project can show that simulation helps to better understand the processes, as studied in the present investigation.

The methodology presented is used to identify bottlenecks and resources to make the time intervals in which levels below those established by organizational policies service arise.

On the other hand the result obtained in the system with the help of software PROMODEL ®, was to determine the efficiency of the same, giving a 35% productivity.

7. RECOMMENDATIONS

Below are quotes fashion recommendations for conducting future work related to the present investigation, the following suggestions:

Using this simulation model the help of a linear programming model, which comes to maximizing the number of clients served by the system over a period of time, or else a case minimization is proposed average time of travel in the system, iterating the variables considered in this research.

Finally, it is suggested that a more complete simulation over time, as in this investigation were simulated only two hours, time feasibility issues we chose to simulate the time kind of stuff Simulation Systems. But the in the School Cafeteria has a time span of 12 hours work, it is recommended to simulate those 12 hours.

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