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SERVICE MANAGEMENT MODEL BASED ON LEAN SERVICE AND SYSTEMATIC LAYOUT PLANNING FOR THE IMPROVEMENT OF CUSTOMER SATISFACTION IN AN SME IN THE RESTAURANT SECTOR IN PERU

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Service Management Model Based on Lean Service and Systematic Layout Planning for the Improvement of Customer Satisfaction in an SME in the Restaurant Sector in Peru

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ABSTRACT

The restaurant industry is a sector of great importance in Peru, which was one of the most affected during the pandemic due to the sanitary measures that prevented its normal operation. Once these measures were diminished and regular attention returned, the sector grew in an accelerated manner. With this growth, restaurants had to face a major problem: low customer satisfaction, as long waiting times and poor service became recurrent issues. Faced with this scenario, it is necessary to optimize the activities in the kitchen in order to have a better production time and to ensure the best quality in the dishes offered. Thus, a continuous improvement model based on Lean Service tools (5S, SMED, Standardized Work) is proposed to increase customer satisfaction through a faster service by making the processes in the kitchen more efficient and standardizing the quality of the dishes. In addition, Systematic Layout Planning was applied in the store to make a more efficient distribution of spaces in order to reduce waiting times. The proposal was validated through a pilot test in the case of Lean Service tools and a simulation in Arena software in the case of Systematic Layout Planning. The results obtained show a reduction in customer service time of 9.84% and an increase in customer satisfaction of 16%.

CCS CONCEPTS

• **Applied computing** → Physical sciences and engineering; Engineering.

KEYWORDS

5S, Small and Medium Enterprises, SLP, SMED, Standardized Work

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1 INTRODUCTION

The restaurant sector is of great importance for the world economy, especially in countries such as Spain, where it represented a third of the national GDP in 2019 [1] and the United States, where it represents 79.4% of the services sector of the country's economy [2]. In April 2020, the sector suffered a significant decline of 93.78%. [3]. On the other hand, the state of emergency brought new trends to the industry, such as the concept of dark kitchen and digitalization in restaurants, which, together with the progressive recovery of the world economy, could mean a great change in the way the sector views and operates [4].

According to the literature collected, the problem to be evaluated in this research, low customer satisfaction in restaurants may be due to various factors such as long waiting times, poor service by staff, lack of standardized processes or lack of electronic elements. This research presents the case study of a restaurant in which problems such as customer dissatisfaction, long waiting times, poor customer service and inconsistency in the taste of the dishes are identified. This causes some customers to decide to leave the premises, which generates a loss equivalent to 7.92% of the monthly income of this company. Likewise, in recent satisfaction surveys, customers have shown a higher degree of dissatisfaction than in previous years, which has the company's management concerned. In view of this, a model will be developed that combines some lean service tools, such as the 5S and standardized work, as well as systematic plant layout planning (SLP). This to reduce the waiting time and a consequent increase in customer satisfaction.

2 STATE OF THE ART

2.1 Lean Service and Restaurant Sector

Tables In current years, customers are not only looking for good tasting food or low prices, but also for fast service, good atmosphere, and treatment, which is now known as service quality [5] [6] [7]. In view of this, the use of Lean tools is becoming more and more

common in organizations, as they are extremely useful for the proper management of their processes [8] [9] and at the same time bring benefits such as reduced waiting times or increased productivity [10] [11]. On the other hand, it should be noted that maintaining a continuous improvement mentality is vital for the application of these tools, since the absence of these can be a major obstacle [12] [13] [14].

2.2 Standardized Work and Restaurant Sector

Standardized work can serve as a first step for the implementation of other lean tools and good business management and then aim at other objectives such as layout improvement [15] [16]. Furthermore, it has a very broad scope, since it is not only used in production processes, but can also be useful for the improvement of administrative processes [17] [18] [19] [20] and brings very attractive benefits for the business such as cost reduction, employee and customer satisfaction and can even serve as training [21] [22].

However, it is necessary to be extremely careful with its application, since the effect of this can be different depending on the region in which it is applied due to cultural aspects [23] [24] and requires constant monitoring of progress [25], for which indicators from recognized documents such as the food codex or ISO standards [16] [25] are often used.

2.3 SLP and Customer Satisfaction

Currently, ensuring product quality and a delivery time that is within the customer's standards promotes customer retention [26] [27] [28]. For this it is important that the workflow is efficient, and the company has a correct arrangement of spaces [29] [30] [31]. This has a positive influence on the work climate [32].

On the other hand, being able to reduce the movements of an operator has a direct impact on his productivity, since being in a workstation that allows him to perform various activities, he can be more productive [33] [34]. In order to make a workstation flexible, it is necessary to identify internal and external factors of the company to plan the order of the relevant activities in the production process in a timely manner [35].

2.4 Customer Satisfaction and Restaurant Sector

Nowadays, customer satisfaction is gaining relevance in service companies, as it can mean a competitive advantage in the market [36] [37] [38]. Therefore, it is important for companies to strive to improve the quality of their service even though an efficient service is enough to make a customer pay [39] [40] [41].

It is obvious that poor quality service will bring a bad reputa- tion among customers, but this can be mitigated with an effective complaint response system [42] [43] [44]. However, it should not be forgotten that there is no possibility of obtaining 100% customer satisfaction, since the wide demographic variety in society makes this an impossible task [45].

2.5 Kaizen and Restaurant Sector

The use of Kaizen methodology in companies is of great strategic importance [46], since this continuous improvement strategy does not limit its impact on companies to the economic aspect, but its benefits can also take on a human and quality character [38] [47]. On the other hand, although the parameters of the Kaizen methodology have a robustly defined base, it is necessary to reinterpret them according to the local culture to maximize the results [38] [46] [49].

Similarly, it is not surprising that the application of this methodology requires multiple active parts in the company for its correct execution. In this case are visible two vital factors for a good functioning of Kaizen, a guide of the philosophy that constantly encourages the monitoring of the parameters of this strategy and at the same time a highly motivated team focused on the application of this system to ensure the achievement of objectives [40] [47] [50].

3 PROPOSED MODEL

For the development of the model for the reduction of waiting times in restaurants, different proposals and lean tools presented in the scientific articles shown in Table 1 were used as a basis. These models present a focus on customer satisfaction, however, the model developed in this research has a specific focus on the reduction of waiting times in restaurants, expecting to obtain an increase in customer satisfaction as a result of the application of our model.

Most of the research that applies the lean tool is done in industrial or mass production areas. The present work seeks to apply this tool and other concepts to achieve replicable improvements in the target sector. Based on the literature reviewed and the problems identified in the company under study and the sector, a service management model based on lean service and SLP is proposed for the improvement of customer satisfaction, as shown in Figure 1.

3.1 Phase 1

In this phase, all the necessary activities are carried out before the application of the model. This consists, first, of the dissemination of the Kaizen culture in all the parties involved, as well as the importance and benefits of lean service and then the current situation of the company is exposed. This is done in order to generate motivation in the organization and to homogenize efforts to achieve the same objective.

Likewise, in this phase the first steps of the implementation of our model are carried out, that is, an initial diagnosis that allows to identify the main ailments of the organization, as well as the cause of these. To do this, a Pareto diagram is made, which is a graph that organizes values and that will allow the identification of the two main problems that the company suffers from by measuring the frequency with which each of the identified problems occurs within a defined period of time.

Next, a root cause analysis is performed, for which a problem tree diagram can be very helpful. This diagram allows the identification of a relationship, in this case causal, of one variable over another from the most recurrent problem found according to the Pareto diagram and thus identify the causes that lead to the problem. Finally, an evaluation of the information gathered is made and the actions to be carried out from this moment on are planned to solve the most frequent problems in the company.

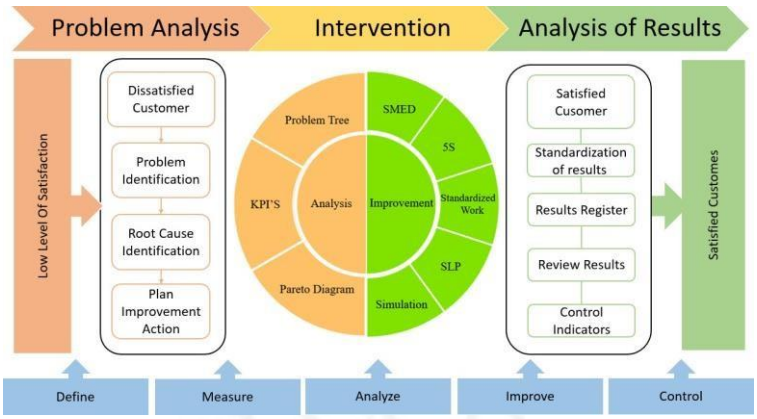

Figure 1: Research Construct

3.2 Phase 2

Phase 2 or intervention phase contemplates the application of all the models and tools proposed for the correction of the problem. The first step is the standardization of the service process from start to finish, in order to make the process as efficient as possible. Then, the implementation of an SLP is carried out, which will allow to carry out a redistribution of the store taking into account the order of the operations of the process and looking for the optimal way to place the different elements of the store (tables, kitchen, cash register, etc.) in order to further increase the efficiency of the process.

Then, the 5S methodology will be applied, which will allow to keep the workstations in the best possible conditions at all times, so that there is greater order within the production area, which will improve the working environment within it. Finally, the SMED philosophy was used to reduce the preparation time of the workstation before starting to work, thus giving greater efficiency to the process and ending this phase.

3.3 Phase 3

The last phase, or results analysis phase, refers to the verification of the results. It starts with the control of indicators obtained with the implementation of our model, followed by the review and recording of the results, this means to verify that there was an improvement compared to the starting point of the company and compile the new indicators to make them the new standard of the company and serve as a reference for future applications. This will be achieved through a pilot test and surveys, which will allow to verify the validity of the data collected and quantitatively measure the improvements on the problems identified, if they could be solved or if any progress was made in solving them.

Finally, the continuous improvement approach is applied, here the results of the surveys and the pilot test will be analyzed in order to identify some improvements or mistakes that were made during the application of the model and then solve these observations, carry out a new measurement of indicators and results (phase 3) and if there are no more observations, close the cycle and start a new one when necessary.

3.4 KPI

4 VALIDATION

4.1 SLP

To begin with the validation, the Systematic Layout Planning (SLP) tool was used to modify the current layout of the premises in order to increase the store capacity and decrease the time that some procedures take to be done by one of the employees. The changes that were made are merge of the kitchen and the beverage area into one and the demolition of a wall that hindered mobility inside the premises. This made it possible to place 2 more tables and increasing the store capacity by 6. Next, the current and the proposed distributions are presented.

4.2 Simulation

To validate the proper operation of the proposed model a simulation of the customer service process with the help of Arena software was carried out as its shown in the Figure 4. Next, the customer service system model as well as the current and proposed layouts are presented.

After simulating of the current model, was concluded that the average waiting time to get a table was 22.54 minutes. Based on the results presented, the proposed model was simulated in which was considered an increase the capacity of the restaurant from 16 to 18 tables and a reduction in order preparation time from 6-10 minutes in a normal attention period to 4-9 minutes. Furthermore, during rush hours the current order preparation time is 8-20 minutes and with the simulation this time was reduced to 6-15 minutes approximately.

4.3 Pilot Test

For the Lean Service tools, standardized work, 5S and SMED, a pilot test was conducted for a duration of 1 month in order to measure the impact they would have on the business. The following is a detailed description of the tools applied, as well as their results.

4.3.1 5S.. For the application of this tool, an initial diagnosis was made to score on a scale of 1 to 10 how developed each of the

Table 1: Considered KPI's

Indicator	Formula	Target
Customer Satisfaction	(Satisfied customers + Highly satisfied customers) /Total customers*100%	85%
Average Waiting Time	Sum of waiting times/No. customers	15 minutes
Customer Service Cycle	Customer's departure time - Customer's arrival time	20 minutes

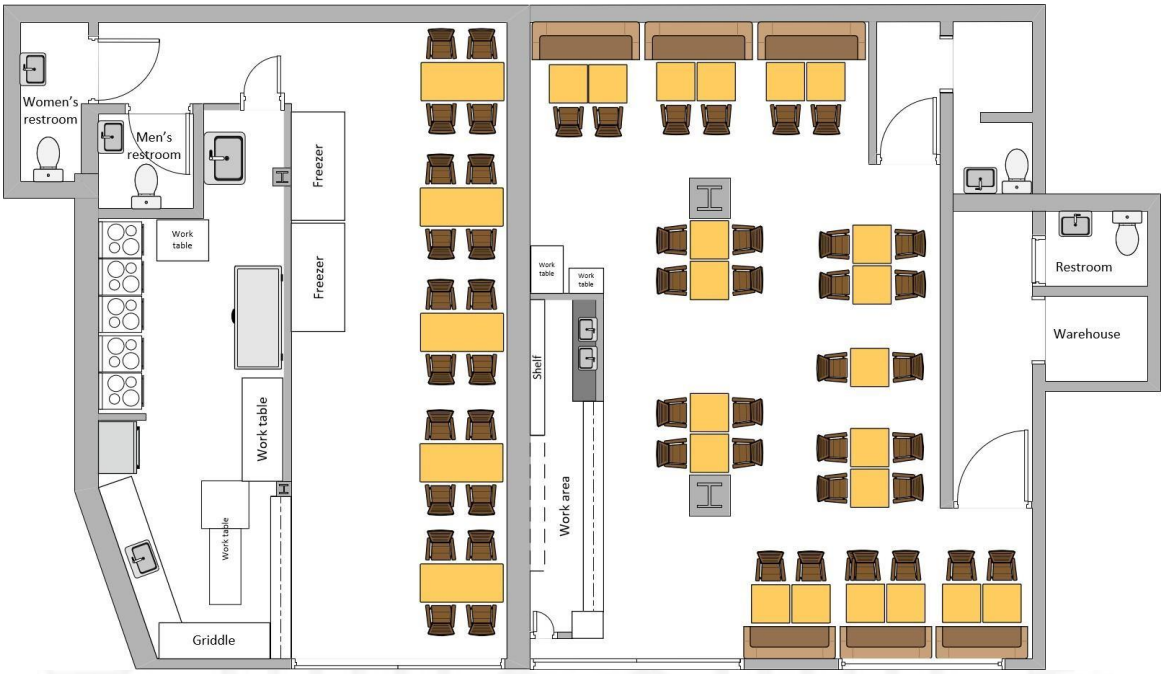

Figure 2: Current Layout

Table 2: 5S Results Comparison

	Seiri	Seiton	Seiso	Seiketsu	Shitsuke
Initial Diagnosis	8	6	5	8	7
Enhanced Scenario	10	9	10	9	8
Difference	2	3	5	1	1

"S's" were in the organization. The actions taken for each "S" are presented below.

1. **Seiri:** No significant changes were made.
2. **Seiton:** Each element was given a place and a way to be fixed and daily inspections were proposed.
3. **Seiso:** A periodic cleaning system was designed with daily inspections.
4. **Seiketsu:** Indicators and standards were established for the previous 3S.
5. **Shitsuke:** Periodic control of the improvements made for continuous improvement.

After the test period, a new evaluation was carried out in the same way to compare the two scenarios, which is shown below.

4.3.2 SMED.. For this tool, an analysis of the current activities performed in the beverage area was carried out, discerning internal and external activities in order to propose a new flow of activities, as shown in Table 4. This improvement consists of having sepa- rate fruit rations for the preparation of juices in order to avoid reprocessing.

4.3.3 Standard Work. This tool focuses on the preparation of bread with crackling since there was a dissatisfaction of 20% of the customers due to the inconsistent taste of the food. Therefore, a list was made of the activities involved in the preparation of bread with crackling and an average standard time was established for each of

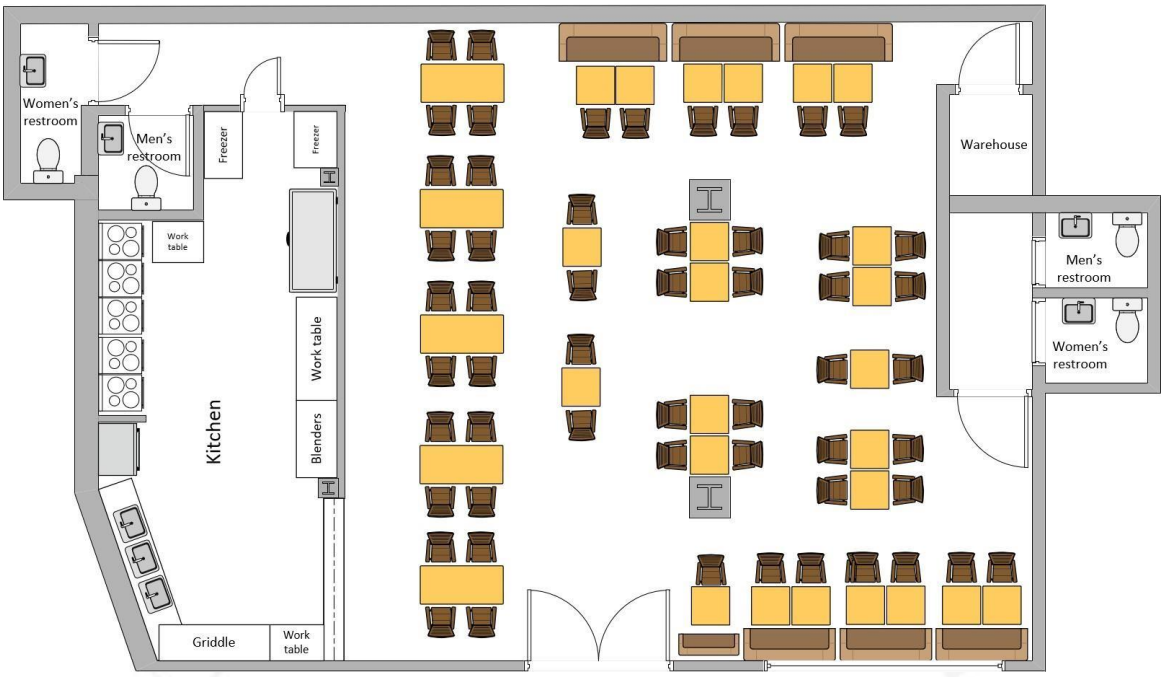

Figure 3: Proposed Layout

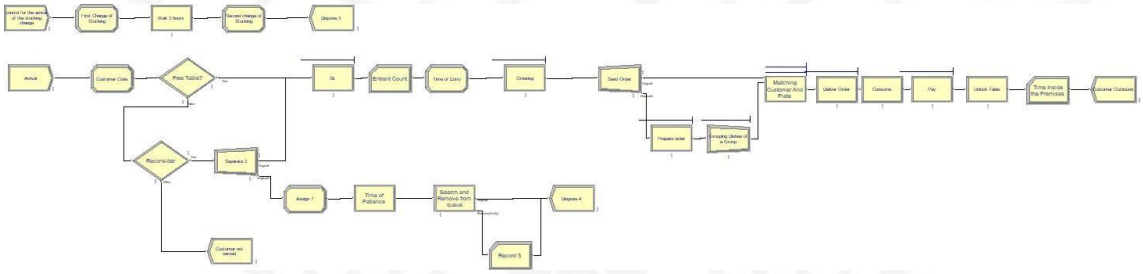

Figure 4: Simulation Model

Table 3: SMED Improvement

Current Process Set-Up		SET-UP TIME (Seconds)		IMPROVE	Proposed Time (Seconds)	
N°	Task/Operation	Internal	Ex ernal		Internal	External
1	Washing the blender	23		Washing the blender	23	
2	Cutting fruit	17		Have fruit rations ready for juicing.	0	
3	Putting inputs in blender	7		Putting inputs in blender	7	
4	Blend		12	Blend		12
5	Packaging	6		Packaging	6	
	TOTAL ACTUAL	53	12	TOTAL IMPROVED	36	12

them. After the pilot test, a new satisfaction survey was conducted, and the following results were obtained.

5 DISCUSSION

In this section, a comparison will be made of the company's key indicators before and after the implementation of the improvement,

Table 4: Average Times for Each Cook

Order	Activity	Average Time (sec)		
		Cook 1	Cook 2	Cook 3
1	Filleting the pork	15	21	30
2	Heat the pork rinds & sweet potato	224	228	234
3	Cutting the bread	3	4	8
4	Assemble the sandwich	12	17	17
5	Plating	6	8	12
6	Take the counter	4	4	4
	TOTAL ACTUAL	264	282	305

Table 5: Proposed Standardized Average Time

Order	Activity	Average Time (sec)
1	Filleting the pork	17
2	Heat the pork rinds & sweet potato	227
3	Cutting the bread	4
4	Assemble the sandwich	14
5	Plating	8
6	Take the counter	4
	TOTAL ACTUAL	274

which, firstly, refers to the application of the SMED, 5S and standardized work tools thanks to the data obtained after 30 days of implementation and, secondly, to the SLP that was validated by means of a simulation. Next, we proceed to analyze the results obtained.

After implementation, we can see that there were favorable changes for the case study and for the company, since production times were reduced and the quality of the products offered was standardized. The key indicator measured in the pilot test was customer satisfaction, which increased from 72% to 91%. The root causes of customer dissatisfaction were also addressed, including the following problems: long waiting times, slow service and poor food taste. Thus, the 9% who were dissatisfied with the service indicated that this dissatisfaction was due to discourteous service, uncomfortable furniture and dissatisfaction with the environment. In addition, it can be observed that with the application of the SLP the average waiting time and average cycle time, which from 25 min and 35 min respectively decreased to 22.54 min and 28.28 min according to the simulation performed. For these two KPIs, the target was 85% in the case of customer satisfaction, an average waiting time of 15 min and an average customer sales cycle time of 20 min. In the case of customer satisfaction, the target was exceeded; however, although there was an improvement in waiting and cycle times, the target was not reached, it is assumed that this was due to the behavior of the local market.

With the improvement in the production and service times of a restaurant, it is expected that more customers can be served and, therefore, reviewing the supply plan could be appropriate for the company, as well as a marketing plan that manages to attract more customers to take better advantage of the workforce.

In the first place, in terms of the application of 5S, positive results were obtained which, although they could be measured quantitatively, have a greater qualitative perception such greater employee commitment and greater optimization of the work area space [10], which were also obtained in this research.

Likewise, regarding SMED, a 26.53% reduction in the setup time of the business was obtained, which is a higher reduction than what other papers show as results, where a reduction of 23.08% in the setup time was obtained [10].

Finally, in terms of standardized work, a 26.39% improvement in customer satisfaction after the improvements' implementation stood out. This is because This is due to the fact that during the literature review, no such positive results were found [12].

In this way, it was possible demonstrate the competitiveness and feasibility of the application of the proposed model in real life, in small and medium-sized companies (SMEs) in the restaurant sector for the improvement of various aspects of the organization, such as the level of satisfaction and efficiency, among others.

6 CONCLUSIONS

This study has improved both the level of customer satisfaction and the production times and processes in general of an SME in the restaurant sector with the application of Lean Service tools (Standardized Work, 5S, SMED) and SLP. The results of the pilot test and simulation resulted in an improvement of the company's current indicators. Diagnostic tools such as the Pareto diagram, Value Stream Map (VSM) and root cause analysis allowed identifying the main causes of customer dissatisfaction in the restaurant under study, being high waiting times, bad taste of the food and poor service. It was identified that in addition to customer dissatisfaction, there was a percentage of customers who gave up or chose not to return to the restaurant for these same reasons. Considering an average ticket defined by the menu offered by this company, it was determined that the loss of these customers was equivalent to a loss of 7.92% of annual revenues. The application of Lean Service tools increased customer satisfaction because the standardized work allowed to ensure the quality of the food offered; the 5S, to create a more organized work environment with fewer errors; and SMED, improved the efficiency of the processes. With respect to the application of SLP, by reorganizing spaces in order to make efficient use of space in the kitchen and table distribution, production

times in the kitchen were reduced and the restaurant's capacity was increased. Thus, customer satisfaction increased from 72% to 91%, average waiting times decreased from 25 min to 21.17 min, and cycle time decreased from 35 min to 27.36 min.

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