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APPLICATION OF THE STANDARD OPERATING PROCEDURE IN AN ICE CREAM PARLOR IN THE INTERIOR OF THE STATE OF SÃO PAULO: A CASE STUDY

APPLICATION OF THE STANDARD OPERATING PROCEDURE IN AN ICE CREAM STORE IN THE INTERIOR OF THE STATE OF SÃO PAULO: A CASE STUDY

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Abstract

Companies today are very competitive and therefore need to stand out in the market. For this reason, standardizing processes is crucial in order to reduce failures and complaints. Given this scenario, one of the tools that helps with this standardization is the standard operating procedure (SOP), because with its application it is possible to standardize the processes that must be followed. The aim of this study was to implement the SOP in an ice cream parlor located in Franca, in the interior of the state of São Paulo. In this work, data was collected to carry out an ABC classification, to identify the class A product and then carry out a chrono-analysis of the production time of this item, to later apply the SOP. With the help of this tool, there was a reduction of 3.41 minutes in production, which is equivalent to a 30.69% reduction in the total time used in this stage of the process.

Keywords: *Standardization; Services; Chronoanalysis.*

Resumo

As empresas atualmente possuem muita competitividade, com isso, há a necessidade de se destacar no mercado. Por esse motivo, realizar uma padronização nos processos é crucial para que haja redução de falhas além da diminuição de reclamações. Diante desse cenário, uma das ferramentas que auxiliam nessa padronização é o procedimento operacional padrão (POP), pois com sua aplicação é possível padronizar os processos que devem ser seguidos. Dessa forma, o presente trabalho teve como objetivo implementar o POP em uma sorveteria localizada em Franca, interior do estado de São Paulo. No presente trabalho, foram coletados dados para a realização de uma classificação ABC, para identificação do produto de classe A e seguidamente, realizar uma cronoanálise do tempo de produção deste item, para posteriormente aplicar o POP. Com o auxílio desta ferramenta houve uma redução de 3,41 minutos na produção, o que equivale a uma redução de 30,69% do tempo total utilizado nessa etapa do processo.

Palavras-chave: *Padronização; Serviços; Cronoanálise.*

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INTRODUCTION

Many companies are experiencing issues related to competition and high levels of customer demand for product quality. These companies often have difficulties with product variation and quality. As a result, there can be high failure rates in their processes, generating further dissatisfaction. To this end, this work sought to apply process standardization through the Standard Operating Procedure (SOP), in order to reduce errors and consequently reduce rework. This standardization of processes aims to avoid variations in the results offered to customers (HAMMES, 2014).

According to Bentes (2016), many organizations in various sectors consider the standardization of their operations to be one of the best ways to guarantee improvements in processes and, consequently, an increase in the quality of their products, generating increased competitiveness in the market, and the SOP becomes an indispensable tool.

Quality is the ability of a product or service to come out according to its design. As a result, companies are opting to standardize their processes so that they can be carried out satisfactorily in relation to their customers' wishes, generating quality.

This POP implementation project was carried out in an ice cream parlor in the interior of the state of São Paulo, which has a wide range of products such as milk shakes, açaís, ice cream shells, filled cups, ice cream drinks and gourmet bowls.

Due to the fact that the ice cream parlor under study is located at a strategic sales point, close to universities and schools, there is a high flow of customers. Therefore, standardization in the preparation of orders and agility in delivery is essential for building loyalty and acquiring new customers. The study carried out is extremely important, as the owner of the establishment has noticed an increase in the number of customer complaints regarding the preparation of the products.

The lack of standardization found in the assembly of bowls and the availability of flavours leads to a series of errors in the final delivery of the product, which is why standardization is sought in these operations with the help of the ABC classification tool to define the priority product. The ABC classification represents the separation of items into classes based on the percentage of the number of items accumulated. In this way, 20% of the total number of items corresponds to almost 50% of the cost, determining Class A. In addition,

around 20% of the cost corresponds to 50% of the total number of items, representing Class C. The remaining items (20 to 30%) belong to Class B (LOURENÇO; CASTILHO, 2006).

Through this analysis, the object of study of this work will be gourmet bowls, seeking to solve the following problem: How to standardize and document all production processes in a way that minimizes errors and is easy to reproduce?

Looking at the market, according to SEBRAE (2021), micro and small businesses generate 27% of Brazil's Gross Domestic Product (GDP) and the production they generate has quadrupled in ten years, resulting in R$599 billion in 2011. Micro and small businesses therefore need to be able to survive in a highly competitive market.

The POP tool was applied to a micro-enterprise in the ice cream sector. According to the Brazilian Association of Ice Cream Industries (ABIS), Brazil has more than ten thousand companies in the sector, 92% of which are micro and small businesses. The niche has a turnover of over R$13 billion a year and provides around three hundred thousand jobs. This data confirms the relevance of the application of the work, as it is an application in a sector of extreme importance to the Brazilian economy.

In this context, the justification for this work is based on the standardization to be applied to processes through the concepts of method engineering, making standardization feasible through the SOP. The aim is to improve and increase control over the production of the products sold by the ice cream parlor, in order to reduce the number of customer complaints regarding the preparation of the products to approximately zero.

THEORETICAL FRAMEWORK

Quality management and standardization

According to Andreoli and Barros (2017), quality management aims to: enable and guarantee compliance with the required standard and specifications, improve organizational processes by identifying and minimizing failures, reduce rework and waste, reduce costs; control and evaluate organizational performance, encourage employee training and qualification, enable constant adjustments and adaptations, thus maintaining the organization's flexibility.

According to Campos (2014), standardization is a fundamental means for companies and is used as the basis for establishing work routines. It is the method for guaranteeing

productivity and competitiveness, and is not limited to just one standard, but also involves training, use and continuous verification of the standardized system.

There are some basic characteristics that standardized models must meet. One of the characteristics mentioned by Campos (2014) is that when creating standardization, it must be easy to understand and use.

Standard Operating Procedure

The Standard Operating Procedure (SOP) is a document with a set of instructions and methods that describe how a process should be carried out so that it can be reproduced correctly in order to achieve a goal (CARSON and DENT, 2007). According to Campos (2014), the SOP must contain all the information necessary for the process to run smoothly, making it a safe and efficient way of achieving the quality requirements sought.

According to Alacoque *et al*, 2015, in order to standardize procedures, it is first necessary to identify which processes should be standardized, as well as understanding their specific needs and the cause-effect relationship of the processes that make up the operation. It is also essential that operators are properly trained, capable of carrying out tasks accurately, following and achieving pre-defined standards.

Mapping a process means obtaining greater precision in the overall view through the opportunity to add details, not only about the process being mapped, but also about the relationship with the parties involved (PRADELLA; FURTADO; KIPPER, 2016). And using the flowchart to map the process in a compact way makes it possible to understand, thus exploiting opportunities for improvement (LIZARELLI *et al*., 2021).

Time Studies and Chronoanalysis

According to Peinado and Graeml (2007), the time study is a way of measuring the work carried out using statistical methods, making it possible to obtain the standard time that is used to determine the productive capacity of a given company in its manufacturing and aims to understand how long each stage takes to complete and thus enable improvements in the necessary stages, while observing the possibility of this improvement (LEÃO, 2019).

Peinado and Graeml (2007) also state that timekeeping alone is not ideal for determining a task's time. It is therefore necessary to sample tasks and obtain an arithmetic average.

ABC classification

According to Slack, Chambers and Johnston (2002), inventories and the items that make them up each have their own particular relevance for the organization, linked to some factor. For the authors, a common and efficient way of finding the level of importance of each item for organizational performance is to classify them according to turnover. Martins and Laugeni (2005) define the ABC curve as the ordering of items consumed according to their financial value.

According to Slack et al (2002), the ABC curve can be described as follows:

> Class A items are the 20% of high-value items that represent 80% of the total stock value. Class B items are those of medium value, usually the next 30% of items that represent around 10% of the total value. Class C items are the low-value items which, despite comprising around 50% of the total items stocked, probably only represent around 10% of the total value of items stocked.

In summary, quality management, standardization, standard operating procedures, time studies, chronoanalysis and the ABC classification are concepts that are interconnected and can be applied as auxiliary tools for solving problems and improving processes, as illustrated by this study, which aimed to reduce the number of customer complaints regarding the production of products.

METHODOLOGY

The study can be classified in terms of its nature, approach, method and data collection technique. The nature of this research is applied, characterized by practical interest, i.e. that the results are used in the application and resolution of possible problems that may arise (MARCONI; LAKATOS, 2017).

Applied research consists of studies designed to solve issues that are found in the vicinity to which researchers have access. Applied research can help expand scientific knowledge and recommend new topics that should be investigated (GIL, 2019).

As for the approach, this study can be classified as qualitative-quantitative, being the combination of qualitative research, which consists of more than one source of data that portrays the opinions and conceptions of the people who are part of the study (YIN, 2016), and quantitative research, where Moresi (2003) explains that in this format the information that is collected must be translated into numbers for analysis and classification.

For this study, a bibliographic search was carried out using Google Scholar and keywords such as: standard operating procedure; process mapping; process standardization; chronoanalysis and flowchart. Books, articles and journals published mainly between 2002 and 2022 were used.

Case planning

According to Miguel (2007), the first stage to be carried out is planning and it is necessary to choose the location of the analysis. Subsequently, it is necessary to choose the techniques and methods for data collection and analysis, and thus establish a protocol containing procedures for carrying out the research. Finally, it is necessary to define a list of variables with questions for the researcher to ask.

The object of the study was an ice cream parlor selling *gourmet* bowls in the interior of the state of São Paulo. For data collection, the company's own system was used to obtain product reports and then carry out the ABC curve. Interviews were also carried out with the employees and the owner of the ice cream parlor, as they have knowledge of all the processes for each item.

Data collection

Initially, a meeting was held with the company's owner to define the objectives to be achieved with the study. At this stage, the questions: "What are the key points for analysis?" and "What needs to be improved?" helped define the study's focus points.

In addition, before starting to collect data, it is important to make initial contact with the main participants in the improvement process, in order to gain access to relevant information that is true to the company's processes. After this stage, the data should be collected and recorded as described in the case plan. Finally, data collection should be completed once sufficient data has been obtained to carry out the research. So, using the company's own system, product sales reports were obtained for the ABC curve.

Data Analysis

At this stage, using the data collected, the observer must draw up a summary of the data in order to carry out the research. Due to the diversity of the products, it was necessary to apply

the ABC Classification to determine the Class A, B and C products and thus select the Class A products to apply the tools to.

Generating the survey report

Each of the aforementioned stages is extremely important and must be faithfully recorded in order to generate a correct research report. The results and ideas obtained formulate a new theory, which can be the key to applying the research. Finally, once the data has been collected and analyzed, it is necessary to validate the reliability of the results found. In other words, the report must frame conclusions based on the research.

RESULTS AND DISCUSSION

Data collection and organization

First of all, a conversation was held with the owner of the company to specify all the objectives that we wanted to achieve with the study. The data that was defined as crucial for development was: access to the sales report by product, assembly of each product, production time and knowledge of the location.

In order to obtain this information, face-to-face visits were made to the company's owner, where observation and a few meetings provided the information needed to draw up the SOPs. In order to determine which of the company's products would be used for the analysis, an ABC Classification was carried out, as described in subtopic 4.2, with the aim of determining the main items and then drawing up the SOP. The chrono-analysis was carried out by timing the production of each product. Subtopic 4.3 presents all the data and calculations used to obtain the results.

Application of the ABC classification

The ABC classification, as described in section 2.5, is a widely used tool for identifying which products are the best sellers. Initially, the total sales figures for the period from 01/09/2021 to 01/10/2022 were used.

The data was obtained from the database already used by the company. The information was organized using Microsoft Office Excel and is shown in Table 1.

Table 1- ABC Classification for the 13-month period.

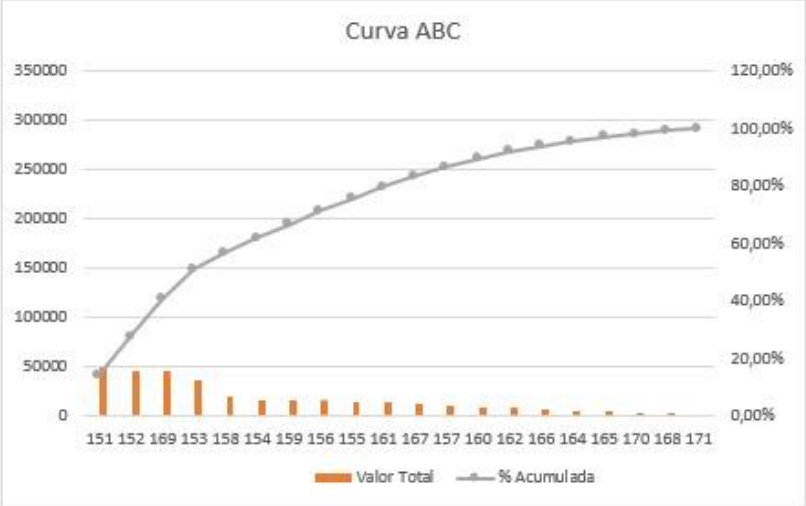
Item	Quantity	Unit Value	Total Value	% Individual	% Accumulated	Classification
151	2062	R$ 23,99	R$ 49.467,38	14,30%	14,30%	**A**
152	1905	R$ 23,99	R$ 45.700,95	13,21%	27,52%	**B**
169	1514	R$ 29,99	R$ 45.404,86	13,13%	40,64%	**B**
153	1515	R$ 23,99	R$ 36.344,85	10,51%	51,15%	**B**
158	1048	R$ 18,99	R$ 19.901,52	5,75%	56,91%	**C**
154	707	R$ 23,99	R$ 16.960,93	4,90%	61,81%	**C**
159	890	R$ 18,99	R$ 16.901,10	4,89%	66,70%	**C**
156	676	R$ 23,99	R$ 16.217,24	4,69%	71,39%	**C**
155	600	R$ 23,99	R$ 14.394,00	4,16%	75,55%	**C**
161	700	R$ 19,99	R$ 13.993,00	4,05%	79,60%	**C**
167	636	R$ 20,99	R$ 13.349,64	3,86%	83,46%	**C**
157	587	R$ 18,99	R$ 11.147,13	3,22%	86,68%	**C**
160	507	R$ 18,99	R$ 9.627,93	2,78%	89,46%	**C**
162	452	R$ 18,99	R$ 8.583,48	2,48%	91,94%	**C**
166	367	R$ 19,99	R$ 7.336,33	2,12%	94,06%	**C**
164	275	R$ 18,99	R$ 5.222,25	1,51%	95,57%	**C**
165	285	R$ 18,99	R$ 5.412,15	1,56%	97,14%	**C**
170	92	R$ 39,99	R$ 3.679,08	1,06%	98,20%	**C**
168	156	R$ 23,99	R$ 3.742,44	1,08%	99,29%	**C**
171	103	R$ 23,99	R$ 2.470,97	0,71%	100,00%	**C**
Total	**15077**		**R$ 345.857,23**			

Source: Prepared by the author.

Table 1 shows that the cumulative percentage of item 151 is 14.30%, which corresponds to a total of less than 20%, and is therefore classified as A in the ABC classification. On the other hand, the second item in Table 1, item 152, has an accumulated percentage equivalent to 27.52%, which makes it a product classified as B. In addition, Table 1 shows that item 151 is also responsible for the highest revenue, making it the main object of this study.

After creating the table, an ABC Curve chart was drawn up, as shown in Figure 1.

Figure 1 - ABC curve



Source: Prepared by the author.

Figure 1 shows the ABC Curve for the data obtained from the company analyzed. It can be seen from this image that the initial region, to the right of the x-axis, corresponds to product classification A, which is in line with the information presented in Table 1. After classification product A, on the x-axis, number 151, it is also possible to see classifications B (152,169, 153) and C, which are distributed from left to right, respectively, after A.

Chronoanalysis

The timing data for manufacturing was collected using the following instruments: a stopwatch, time sheets and a clipboard to record observations.

It was decided to carry out 10 timings in order to calculate them more assertively. In order to define the number of timings to be taken, some averages of the item's daily production were taken, production was observed over a few days and it was found that an average of 10

timings would be ideal to carry out the study with greater precision. The data was entered onto a note sheet and is shown in Table 2.

Table 2- Item Production Chronoanalysis

		1	2	3	4	5
Stages	**Period**	**Request is taken to the kitchen**	**Employee takes the order and moves to the glass bowl shelf**	**Travel to where the preparation begins**	**Assembly and finishing the cup**	**Travel to the other employee who takes you to the customer**
Collection 1	**Afternoon**	00:01:25	00:02:04	00:01:05	00:03:02	00:01:46
Collection 2	**Afternoon**	00:01:37	00:02:22	00:01:00	00:03:08	00:01:20
Collection 3	**Night**	00:01:43	00:02:09	00:00:57	00:03:33	00:01:59
Collection 4	**Night**	00:01:58	00:02:11	00:01:02	00:03:35	00:02:21
Collection 5	**Afternoon**	00:01:22	00:01:59	00:00:58	00:03:07	00:01:50
Collection 6	**Afternoon**	00:01:26	00:01:55	00:00:59	00:03:01	00:01:39
Collection 7	**Afternoon**	00:01:19	00:01:51	00:01:11	00:02:59	00:01:55
Collection 8	**Night**	00:02:01	00:02:07	00:00:49	00:03:29	00:02:20
Collection 9	**Night**	00:01:33	00:02:28	00:01:08	00:03:22	00:02:35
Collection 10	**Night**	00:02:03	00:02:11	00:01:05	00:03:16	00:02:44

Source: Prepared by the author.

During the timings, the employee was first told that he was being timed, but that he should not change the way he prepared the product so that there would be no change in the preparation time.

Once the doubts had been cleared up, the times were timed and there was a big divergence in the times collected in the afternoon. In relation to the times taken in the evening, it was noted that the times taken in the evening were higher, as this was a time when there were more orders, which led to confusion when preparing the item under study.

Time calculation

For this study, the operator's speed was taken as V = 1, i.e. at a normal working pace. As such, speed will not alter the result obtained when comparing the Average Timed Time (AT) and Normal Time (NT).

In other words:

$$TC = TN = 10 \text{ min } 6 \text{ sec or } 606 \text{ sec} \quad (1)$$

In this study, the tolerance conditions described in Martins and Laugeni's book were taken into account, so a Tolerance Factor of 10% was considered, where 5% is allocated for personal time and 5% for basic fatigue.

Applying the equation results in:

$$TP = TN \; X \; FT$$
$$TP = 606 \text{ sec} \times 1.10 \quad (2)$$
$$TP = 666.6 \text{ sec or } 11.11 \text{ min}$$

Therefore, when the Standard Time equation was performed, a time of 11 minutes and 11 seconds, or 666.6 seconds, was obtained.

Application of the Standard Operating Procedure

In order for the company to become competitive in today's market, it is necessary to standardize products, resulting in a lower error rate and thus reducing or ending customer complaints about these faults. The SOP for the item classified as A on the ABC curve is shown in Figure 2.

Figure 2 - Drawing up the SOP

Ice cream parlor		
SOP NO. 01	**ICE CREAM POP (151)**	
Objective: To standardize the production of the cup so that all employees, whether permanent or freelance, can reproduce it assertively and flawlessly.		
Description:		
1. Order taken to the kitchen		
2. Taking the order		
3. Go to kitchen 2 where the glass bowl shelf is located		
3.1 Kitchen 2 next to Preparation Kitchen 1		
4. Take the "Butterfly" model cup		
5. Take the bowl to kitchen 1 where the preparation begins.		
6. Check if there are any comments on the order		
6.1 Observations could be: With Açaí instead of Ice Cream, Without Strawberries, change the Petit Gateau for Chocolate.		
7. Separate all the items that will be used in the preparation		
7.1 The items are: Dark Chocolate, White Chocolate, Strawberry, Petit Gateau, Plate and Toppings. All the items are on the counter.		
7.2 Slice four strawberries		
7.3 Heat the Petit Gateau 15 seconds in the Microwave		
7.4 Take the plate and cover it with icing		
8. Spread white chocolate around the glass bowl and inside		
9. Spread dark chocolate inside the bowl.		
10. Pour vanilla ice cream into the bowl until it is full.		
11. Place White Chocolate on top to cover the ice cream		
12. Add a smaller amount of dark chocolate on top		
13. Place the chopped strawberries on top		
14. Place the Petit Gateau on top		
15. Finish with chocolate syrup		
16. Place the bowl on the plate with the icing on top.		
17. Take it to the employee who takes it to the customer		
Prepared by: **Author**	**Authorized by:** **Ice cream parlor manager**	**Date:** **20/11/2022**

Source: Prepared by the author.

The SOP was first drawn up and applied on Sunday 20/11/2022. The establishment had one permanent employee and five *freelancers* working in the *Back Office*. There was some apprehension on the part of the employees about following the steps that had to be taken.

They explained the SOP and how important it was to carry out this application. They were then shown the documents that had to be followed through the steps described therein, printed out and placed in easy-to-see areas so that they could follow the steps.

There was resistance from some employees, who didn't understand why the SOP was being applied, but even though they didn't fully understand the tool, they understood that this phase would improve the process of assembling *gourmet* bowls in their workplace.

The SOP was kept in the company for 2 days and it was analyzed how each employee behaved in relation to the steps to be followed according to the prescription given.

Chronoanalysis after POP application

After the SOP had been applied in the company, a chrono-analysis and time study was carried out so that a comparison could be made between the time taken to prepare the *gourmet* bowls before the SOP had been applied and after the SOP procedure had been applied. This second chronometry was carried out after the first week of the first application, as the employees had already become familiar with it.

The timings and data obtained are described and shown in Table 3.

Table 3 - Results of the Post POP Chronoanalysis.

		1	2	3	4	5
Stages	**Period**	**Order taken to the kitchen**	**Employee takes the order and moves to the glass bowl shelf**	**Travel to where start the preparation**	**Assembly and finishing the cup**	**Travel to the other employee who takes you to the customer**
Collection 1	**Afternoon**	00:01:01	00:01:21	00:00:59	00:02:01	00:01:02
Collection 2	**Afternoon**	00:00:58	00:01:16	00:01:02	00:01:59	00:01:10
Collection 3	**Night**	00:01:11	00:01:49	00:01:03	00:01:50	00:01:22
Collection 4	**Night**	00:01:17	00:01:59	00:00:49	00:01:48	00:01:13
Collection 5	**Afternoon**	00:01:07	00:01:48	00:00:45	00:01:51	00:02:01
Collection 6	**Afternoon**	00:01:01	00:01:37	00:00:39	00:01:59	00:01:01
Collection 7	**Afternoon**	00:01:05	00:01:49	00:00:50	00:02:01	00:01:05
Collection 8	**Night**	00:01:08	00:02:02	00:00:47	00:02:05	00:01:20
Collection 9	**Night**	00:01:22	00:02:01	00:00:44	00:02:02	00:01:11
Collection 10	**Night**	00:01:14	00:02:08	00:00:50	00:02:00	00:01:12

Source: Prepared by the author.

Table 4 shows the average time for each production stage.

Table 4 - Average Post POP Time Results

Et 1 - Order taken to the kitchen	Et 2 - Employee takes the order and moves to the shelf	Et 3 - Moving to where the preparation begins	Et 4 - Assembly and finalization	Et 5 - Going to the other employee who takes you to the customer	**Total**
0:01:08	0:01:47	0:00:51	0:01:58	0:01:16	**0:07:00**

Source: Prepared by the author.

As was done in section 4.4, the Average Time and Standard Time were calculated using the data obtained after the times had been timed. The operator's speed was maintained at V = 1, so the standard time is obtained as:

$$TC = TN = 7 \text{ min or } 420 \text{ sec} \quad (3)$$

To calculate the Standard Time, a Tolerance Factor equal to 10% was used, with 5% for basic fatigue and 5% for personal time. Therefore, when the equation was applied, the following result was obtained:

$$TP = TN \text{ X } FT$$
$$TP = 420 \text{ X } 1.1 \quad (4)$$
$$TP = 462 \text{ sec or } 7.7 \text{ min}$$

Analysis of results

After all the applications, timings and calculations, the data obtained was compared. When looking at the calculation of the chronoanalysis before the application of the SOP, the Standard Time was 11.11 minutes, and the Standard Time after the application of the SOP was 7.7 minutes, so when comparing the times, it is possible to see that there was a reduction of 3.41 minutes for the production of each of the bowls, this time represents a reduction of 30.69% of the total time spent on preparation.

As mentioned in topic 4.1, the company had no standardization before the study was carried out, and standardizing the process has brought significant results for the company, since by reducing production time it is possible to increase productivity and customer satisfaction.

With the results analyzed, they were taken to the owner of the company, who identified the improvement obtained with the application of the tools. All the documents with the analysis data were provided so that they could continue applying the SOP to other products.

CONCLUSION

The work presented the application of the SOP in an ice cream parlor in the interior of the state of São Paulo. Initially, the ABC classification was applied to analyze which item would be prioritized. Next, the activities inherent in the production process were mapped using a flowchart and the timing of activities.

After the first chronoanalysis, the SOP was applied, proposing standardization solutions with what should be followed in order to adjust and improve the process. With the improvement of the production process in place, there was a reduction in the production time of the bowls when compared to the times timed before the SOP was implemented. As a result, there was also a reduction in complaints about delays in delivering orders and errors in the orders themselves. Thus achieving the initial objective.

The main limitations of the research were the resistance of employees to change and the contribution of information regarding processes, directly impacting the organizational climate.

This work has helped to demonstrate that the tools that were applied to standardize processes are effective even for small companies, directly impacting areas such as Management, Costs, Engineering, among others, and can be implemented in various other sectors. For future projects, the standardization of other items, using the proposed tools, will raise the company's quality levels.

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