


## Quality tools for improvements of the production process in microenterprise: The implementation of improvements in the production process through the quality tool: Case study in a regional flour packer in Manaus

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### ABSTRACT

This research aimed to optimize the packaging process, mapping the operational difficulties of a company that packs and markets regional flour in Manaus. It presented a better theoretical understanding of quality tools: Ishikawa Diagram

and 5W2H. As well as bringing a case study of its application. To achieve these objectives, the work was based on simple and low-cost changes. By analyzing the daily routine of the company's production sector, through action research with its employees. Classified as a qualitative method that seeks to understand the problems and contexts involved through data collection, such as interviews, participant observation and document analysis, Denise Filippo (2011 p.452). It was possible to identify some obstacles with regard to planning, control and process modes that, over the years, brought a lot of damage to the business. Specifically, the investigation seeks to identify and create action plans, with the purpose of solving the problems that generate delays in the elaboration of works in the production sector, improving the operational performance of the company's production. As a result, it was found that the tools, in general, helped the production sector to better organize its work routine, as well as bringing suggestions for improvements to problems found during this study, such as: the improvement of productivity rates, better redistribution of tasks and standardization of services.

**Keywords:** Ishikawa diagram, Action plan, 5W2H.

## 1 INTRODUCTION

In the business scenario, competition between companies is increasingly competitive. Each company seeks to improve its operational procedures, aligning the purpose of serving customers with quality and agility. The constant action for effective production alternatives to optimize the process is one of the ways in which these companies use themselves to win this dispute with the competition.

According to research, micro and small companies are the main generators of wealth in Commerce in Brazil, since they account for 53.4% of the GDP of this sector. In the GDP of Industry, the participation of micro and small (22.5%) is already approaching that of medium enterprises (24.5%).

The data demonstrate the importance of encouraging and qualifying smaller enterprises, including Individual Microentrepreneurs. In isolation, one company represents little. But together, they are decisive for the economy," says Barretto, noting that small businesses also employ 52% of the formal workforce in the country and account for 40% of the Brazilian wage bill. (SEBRAE, 2023).

Professor Martinho Isnard Ribeiro de Almeida also points out that:

In the small business, administration is usually done by the owners or their relatives, who often lack in-depth knowledge of administrative techniques. Few companies use administrative techniques to calculate production costs, budgeting, cash flow and business planning. In addition to this fact, other companies oversimplify the methods used to establish costs, a practice that can bring great distortions in prices, both the largest - which can make sales unfeasible and the smallest can lead to the decapitalization of the company. It is worth noting that in-depth knowledge of administrative techniques is not fundamental for small businesses, given the simplicity of the operation of this type of organization. The improvement of administrative quality, however, may be a strategy to be implemented, aiming to enable the company's staff to obtain greater efficiency and better effectiveness in business management.

About quality management in the small company according to Paladini (2019, p. 153) One of the biggest (of the many) myths that have always surrounded Quality Management refers to the size of the company. The idea was created, and persisted for a long time, that quality depends on the size of the company and, more specifically, that Quality Management is a process exclusive to large companies.

According to Toledo (2012, p.335) Even with the production process and the operating conditions previously determined, there are still some sources of variability in the day to day, such as: variability of the raw material, machine failure, tool wear, human error, etc. These sources of variability are accompanied by quality control during production.

According to Paladini (2009, p. 13), this need for change in organizations, demanding quality in products and services is always due to increased competition. The managerial decisions that previously chose to "produce" or "produce with quality" were being changed to strategic decisions to "produce with quality" or "endanger the survival of the organization".

This research aimed to optimize the packaging process by mapping the operational difficulties of a company that packages and sells regional flour in Manaus. The handling mode changes the system generating a loss of efficiency, so the quality tools chosen were: Ishikawa Diagram and 5W2H, which allow the opportunity to solve the problems that are impacting on its development, enabling corrections of improvements that may allow efficiency in its packaging process.

The object of study is a company that serves large, medium and small commercial establishments, with the problem of recurring delays in the delivery of sales orders, due to failures in its packaging process and does not know in depth its problems, due to the deficiency in the search for knowledge and application of scientific methods, as the quality control tools, being a differential to become more competitive in the market.

Thus, action research and exploratory methodology will be applied in pursuit of these specific objectives:

Identify the main problems that generate production delays using the Ishikawa diagram.

Create action plan for the purpose of solving your problems using the 5W2H tool.

Identify expectations of the company regarding the application of the tools.

The root cause of the problem in question will be identified, making it easier to find the factors that contribute to achieving the desired effect, as it allows to know the problems more deeply.

After finding the root cause will be used the action plan 5W2H, this is an extremely effective management tool, very simple to understand and easy to apply, working very well in all types of business, in a practical and organized way.

And with that, the monitoring of results are in accordance with the expectations of the company.

## **2 THEORETICAL FRAMEWORK**

### **2.1 QUALITY MANAGEMENT**

It is known that in a competitive scenario the most qualified are always ahead, with this, the search for excellence in quality has been one of the most studied subjects among companies that want to grow and have a differential. The concept of quality has evolved over time, and it becomes more understandable if we analyze the way it has been understood and applied over time. (LOBO, 2020 p.19)

According to OLIVEIRA (2020) the evolution of quality has gone through three major phases, namely:

It was the inspection, the product was inspected by the "artisans" themselves, where the main focus was on the detection of any defects, without there being a pre-established methodology to perform it.

It was statistical control, the inspection underwent changes and was improved through the use of statistical techniques. In the new system, which obeyed statistical calculations, the product was inspected randomly through a number so that it represented the whole group and, from them, the quality of the whole batch was verified. At the beginning of this era, the focus was on the product, but over time, it was shifted to the control of the production process.

It was of total quality, the emphasis becomes the customer becoming the center of attention of organizations that direct their efforts to meet their needs and expectations. In this era the company is fully responsible for quality assurance with emphasis on defect prevention.

However, LOBO (2020 p.21) says that although this evolution of the concept of quality has been sequential, companies should not think that the latter is the best of all. You need to be careful when applying this or that definition that you deem most appropriate to your business, not forgetting that the world is constantly changing and that the very concept of quality will continue to evolve and expand.

## 2.2 CONTINUOUS IMPROVEMENT

Continuous improvement emerged in Japan after World War II with the implementation of Toyota's production system, known as the Toyota Production System. According to MONDEN (2015, p.3) "the main objective of the system is to eliminate, through improvement activities, various types of waste that are hidden within a company. " The idea was that all employees contribute to the continuous improvement of processes, identifying and correcting problems in a systematic and continuous way. Since then, the philosophy of continuous improvement has spread around the world, being used in various sectors and organizations.

Continuous improvement is essential for companies to remain competitive in an increasingly globalized and demanding market. It is not limited only to the productive area, but must be applied in all sectors of the company, including marketing, sales, logistics, HR, finance, among others.

According to LIKER AND FRANZ (2013, p.32) continuous improvement "does not mean that the company values only small incremental changes and avoids fundamental innovations. It signifies a commitment to the ideal of continuously improving all parts of the organization."

To implement continuous improvement, it is necessary to change the culture of the company, encouraging collaboration, continuous learning, experimentation and the search for innovative solutions. CURVELLO (2012 p.13) says that "internal business communication plays a strategic role in the construction of a symbolic universe, which, allied to human resources management policies, aims to bring audiences closer to the principles and central objectives of the company."

It is important to set clear and measurable goals, regularly evaluate the results and involve all employees in the process. In this way, the company can ensure that it is always meeting customer expectations and maintaining its position in the market.

## 2.3 QUALITY TOOLS

Quality tools are important instruments to ensure the continuous improvement of a company's production process. LOBO (2020, p.47) states that "quality tools are a first step towards improving process profitability through the optimization of operations." Among the most commonly used tools

are the Ishikawa Diagram (known as a herringbone or cause and effect diagram), 5W2H, Histogram, Pareto Diagram, Check Sheet.

Such tools aim to increase efficiency, reduce costs and minimize errors in a process or product. Given this, it is essential to remember that some of the tools mentioned above do not have a difficult form of applicability as SOUZA (2018, p.109) says "to various quality tools, such as the 5S, CCQ, the 5W2H, cause and effect diagram, can have practical application, easy deployment and understanding, and lead organizations to a considerable improvement in quality. "

In summary, quality tools are important instruments for the identification and prevention of failures, optimization of the work environment and process management, ensuring the continuous improvement of the production process and ensuring customer satisfaction.

## 2.4 ISHIKAWA

The Ishikawa tool, also known as the Fishbone Diagram or Cause and Effect Diagram, is a cause and effect analysis technique used to identify the possible causes of a specific problem. LOBO (2020 p.54) confirms that "this diagram is designed to illustrate, in a clear way, several causes that affect a process by classification and relation of causes. For every effect there are innumerable categories of causes."

Thus, LANDIVA (2021, p.38) lists a sequence of steps for the construction of the tool: 1. Establish the definition by describing in detail the problem that was selected (where it occurs, when it occurs and its extension). 2. Use root cause research methods – brainstorming, for example – to gather data/causes to be studied. 3. Construct the cause and effect diagram: inserting the already defined problem, draw the traditional categories (6Ms). 4. Interpret the data obtained, in order to research the basic causes of the problem, observing the causes that appear repeatedly. 5. Assemble the cause and effect diagram, describe the problem and use the information collected through the methods of research and data collection.

This is a cause and effect diagram and its main purpose is to find the root causes of the problem. With the completion of the step, it is important to continue with the application of troubleshooting tools, and later use tools to structure the action plan, such as the 5W2H tool.

## 2.5 5W2H

5W2H is a very useful tool to ensure clarity and effectiveness of planning, as it helps to define the actions needed to achieve the goal and to identify the people responsible for those actions. LOBO (2020, p.56) highlights that the 5W2H tool is a checklist of activities, deadlines and responsibilities. 5W2H stands for "What, Why, Where, When, Who, How, How much."

LOBO (2020, p.56) describes how such questions can be used as a checklist of activities, deadlines and responsibilities:

5W:

- a) What? (what?):
  - What has been done?
  - What should we do?
  - What will happen if it is not done?
  - What else can be done?
  - What don't we need to do to keep it as is?
  - What can be done today, this month, and this year?
- b) Who? (Who?):
  - Who should do it?
  - Who shouldn't?
  - Who else should I do?
  - Who else should participate?
- c) When? (When?):
  - When is it expected?
  - When should it be expected?
  - When should it be evaluated?
  - How often to do it?
- d) Where? (Where?):
  - Where to do it?
  - Where not to do it?
  - Where is it ideal to be done?
  - Should it be done here or contracted?
- e) Why? (Why?)
  - Why is it our job to do?
  - Why isn't it our job?
  - Why do it here or there?
  - Why should it be this way?
  - Why do it now?

2H:

- a) How? (How?)
  - How?

- How can we improve? When?
- How can we do differently?
- b) How? (How much?)
  - When does it cost?

## 2.6 INVENTORY MANAGEMENT

Inventory management is the process of controlling and managing the quantity, location, movement, and replenishment of products or materials in a given inventory. The goal is to ensure that there is enough of each item to meet customer demand, without excesses that can generate unnecessary costs.

It is a vital function in a company as it is directly related to operational efficiency and customer satisfaction. (Slack, Chambers, Harland et al. 1997, p. 423 apud CHING, 2010 p.18) says that this concept originated in the purchasing function in companies that understood the importance of integrating the flow of materials into their support functions, both through the business and through the supply to immediate customers. This includes the function of purchasing, tracking, warehouse management, production planning and control, and physical distribution management.

To make inventory management even better, it is possible to integrate an information system. It works by collecting, organizing, and analyzing data. Helping to reduce the risk of product shortages or excess inventory, avoiding financial losses and improving business efficiency.

## 2.7 INFORMATION SYSTEM

An information system is a set of interrelated components that collect, process, and store information to assist in decision-making and the management of an organization. These components include hardware, software, data, people, and processes.

The primary purpose of an information system is to provide relevant and accurate information to enable the organization to achieve its business objectives effectively and efficiently. GONÇALVES (2017, p.15) states that IT provides companies with many possibilities, participating in virtually all processes. Assists in decision making, in the preparation of controls and in the execution of activities.

With the advancement of technology companies that do not adapt tend to lose competitiveness, so it is essential that there is an information system. GONÇALVES (2017, p.16) says that IT support, in this scenario, can provide an organizational environment capable of helping managers to work their information demands faster and with a better analysis of data. So that you understand the complexity of today's world.

In addition, the implementation of an information system with service standardization can be extremely useful to further ensure the quality and efficiency of the services provided by the company.

## 2.8 STANDARDIZATION OF SERVICES

Service standardization is a process of establishing standards and procedures to ensure the quality and efficiency of the services provided by a company, in order to meet customer expectations. This includes everything from setting standards of care and communication to standardizing processes and training employees. CAMPOS (2014) states that "In modern companies of the world standardization is considered the most fundamental of the management tools. "

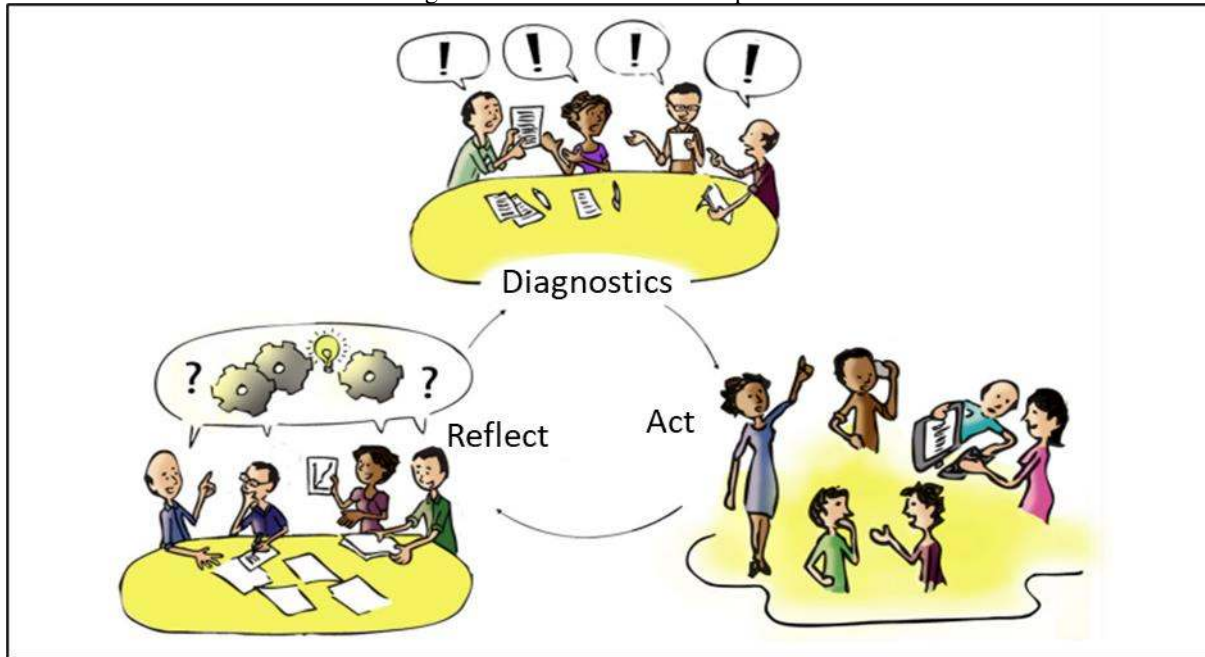
Standardization enables better control of performance and the possibility of evaluating and monitoring the company's progress against its objectives. In addition, it helps increase productivity, reduce costs, and improve customer satisfaction. SOUZA (2018, p.43) says that, "standardization of processes, products and services is an important factor to be aware of. To seek improvement, it is essential that there is a standard to build on. In this way, it is easier to identify elements to be improved.

## 3 METHODOLOGY

For the development of this study, action research was used. Action research is classified as a qualitative method that seeks to understand the problems and contexts involved through data collection, such as interview, participant observation and document analysis. According to Denise Filippo (2011 p.452):

The researcher, when using action research, investigates complex processes by introducing changes and observing the effects of changes in these processes. The researcher investigates and learns from the action taken within the context of the organization. The focus of the researcher involves understanding the problem and the actions taken to solve it within a particular real environment, as well as the generation of scientific knowledge associated with the theories that support the research.

Figure 01 - the action research process



Source: Collaborative Systems - Denise Filippo (2011)

### 3.1 METHODOLOGICAL PROCEDURES

Periodic visits were made to the company during a period of one month, in order to identify factors that contributed to data collection on the mechanism of operation of the production system. In addition to routine observations, meetings were held so that employees could respond freely and with their experiences and difficulties found in the company's production system that caused delays in production.

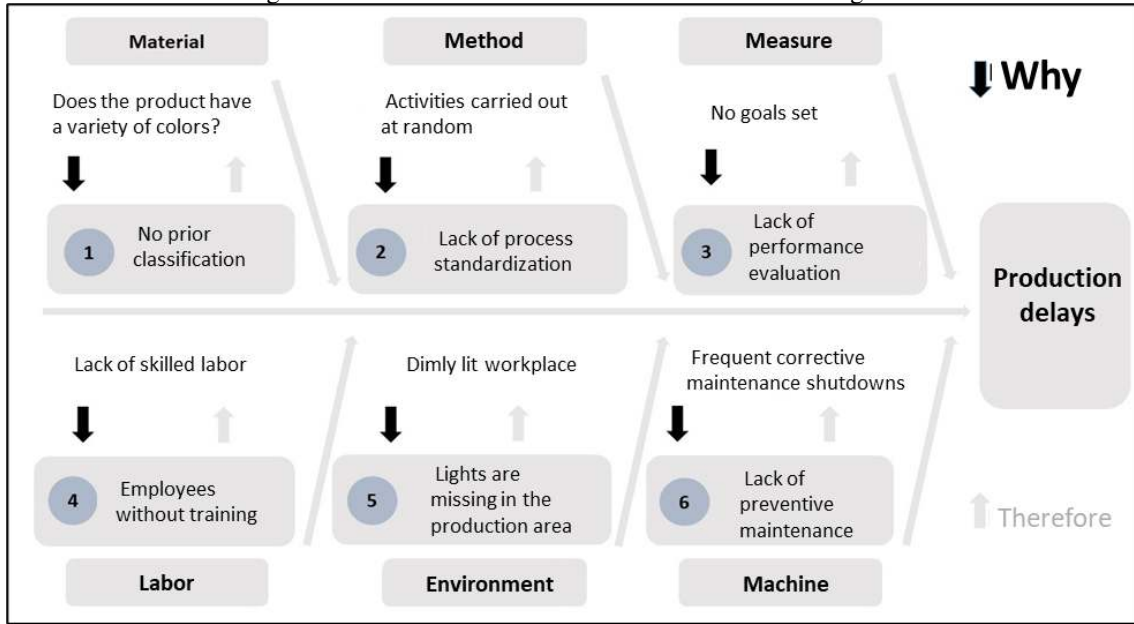
It was found that in the workplace the ceiling is very high and dimly lit. In the production stage, there is a delay in starting the activities due to a previous classification of raw material. The classification is carried out for the reason that there is a lot of variation in the coloration of the product and in the case if these classifications did not occur, there was a loss in the quality standard of the product.

Another problem found was the elaboration of the work without training done by four employees performing work randomly, where there were divergences and errors that generated rework due to lack of commitment to the work done.

Frequent shutdowns for corrective maintenance, of problems of easy resolution. But that, with these small stops made, are lost in quantity produced.

Productivity without being calculated through productivity indicators for the application of goals to be achieved. Through this action research the Ishikawa diagram was used to identify the root cause:

Figure 2 – Identification of the root cause – Ishikawa diagram



Source: Authors.

The creation of 5W2H action plan for the purpose of solving problems encountered by the Ishikawa method, solving them from their root cause:

Figure 3 – 5W2H Action Plan

5 W 2 H							
	WHAT WILL BE DONE? (WHAT)	WHY WILL IT BE DONE? (WHY)	WHERE WILL IT BE MADE? (WHERE)	WHEN WILL IT BE DONE? (WHEN)	BY WHOM WILL IT BE DONE? (WHY)	HOW WILL IT BE DONE? (HOW)	HOW MUCH WILL IT COST? (HOW MUCH)
1	Previous classification of the material	Product loses quality (mixed)	Deposit receiving area	15th May	Valdir	Classification of Raw Material	Zero cost
2	Process standardization	Randomly executed processes	Production line	17th May	Bruno	Analyzing and standardizing functions	Zero cost
3	Evaluate production performance	Need for performance evaluation	Production line	17th May	Jean	Apply productivity indicator	Calculating
4	Employees training	Deficiency of specialization	Company	15th May	Jean	Constant qualification	Zero cost
5	Auxiliary lighting installation	Production with low lighting	Production sector shed	16th May	Specialist electrician	Placement of three light fixtures	R\$ 300,00
6	Preventive maintenance performance	In-service maintenance shutdowns	In the machine	Last saturday of the month	Jorge Ibiapina (Authorized)	Monthly contract with mechanic	R\$ 300,00

Source: Authors.

#### 4 RESULTS

With the realization of the action plan it was possible to identify how these main causes would be resolved and what measures would be taken for the resolution. It can be observed that the presentation is easy to understand, in addition to keeping the information organized.

#### A look at development

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Detailing the process of how it will be, for a better understanding of the action to be performed:

Figure 4 – Detailed action plan

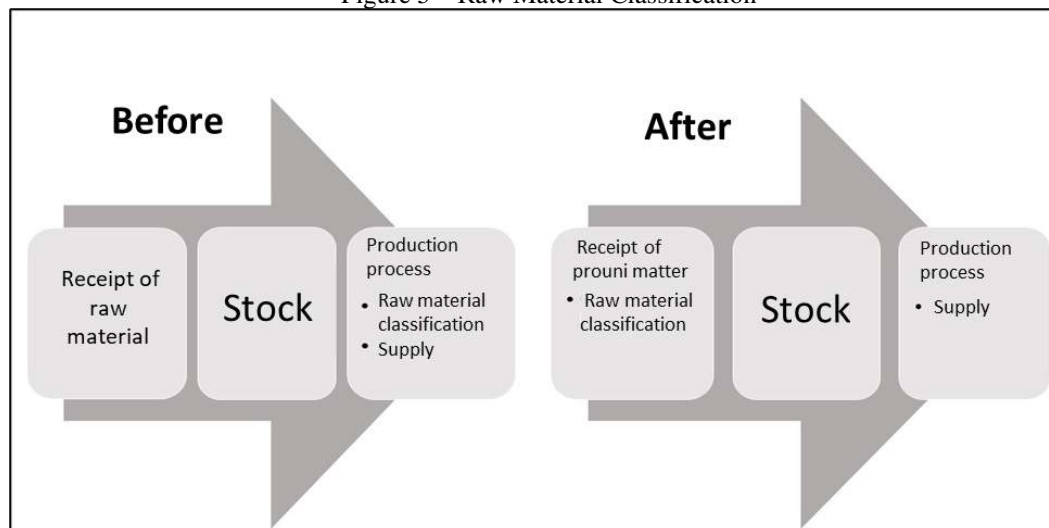
PROBLEM: PRODUCTION DELAYS	
ACTION PLAN	HOW WILL IT BE DONE?
1 Prior Classification of Raw Material	Upon receipt of the raw material, Valdir will pierce each bag of the product, classifying it by color, forming separate batches
2 Analyzing and standardized functions	Bruno is the machine operator, he will contribute as the leader of the process, standardizing them so that there are no execution variations
3 Apply productivity indicator	Apply reliable databases in order to provide relevant information and in quantity that allow analysis and decision making
4 Constant total qualification	Develop internal training focused on your competence, mobilizing people to achieve your organizational objectives
5 Placement of three lamps	As the lighting in the shed is very high, there is a need for good lighting to produce with motivation. Three auxiliary lights will be installed near the machine, increasing the luminosity
6 Monthly contract with mechanic	In a meeting, a monthly contract was established with an authorized mechanic who provides services to the company. This mechanic will attend to perform preventive services on the last Saturday of each month

Source: Authors.

#### 4.1 PRIOR CLASSIFICATION OF THE RAW MATERIAL

The classification of the raw material began to be carried out at the time of receipt when entering the stock, no longer being done at the time of production, making the start of activities more agile, because the feeding of the machine was made instantly to the production process.

Figure 5 – Raw Material Classification



Source: Authors.

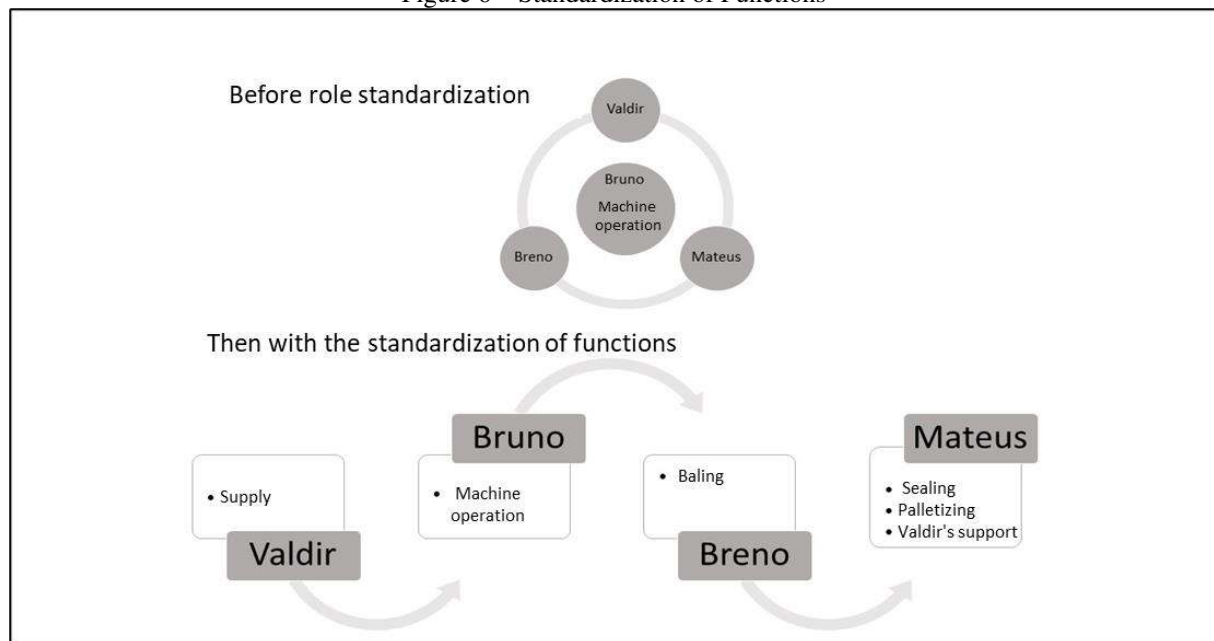
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## 4.2 STANDARDIZATION OF FUNCTIONS

With the contribution of the machine operator, sequencing the production process. We analyze the process seeking to understand the demand of each process, as well as the production bottlenecks, which are steps that will determine effective capacity and production efficiency with reduction of idle times. Thus forming an ideal standardization for the increase of quality and productivity. Therefore, the management of people involved in this process had a great differential represented as follows:

Figure 6 – Standardization of Functions



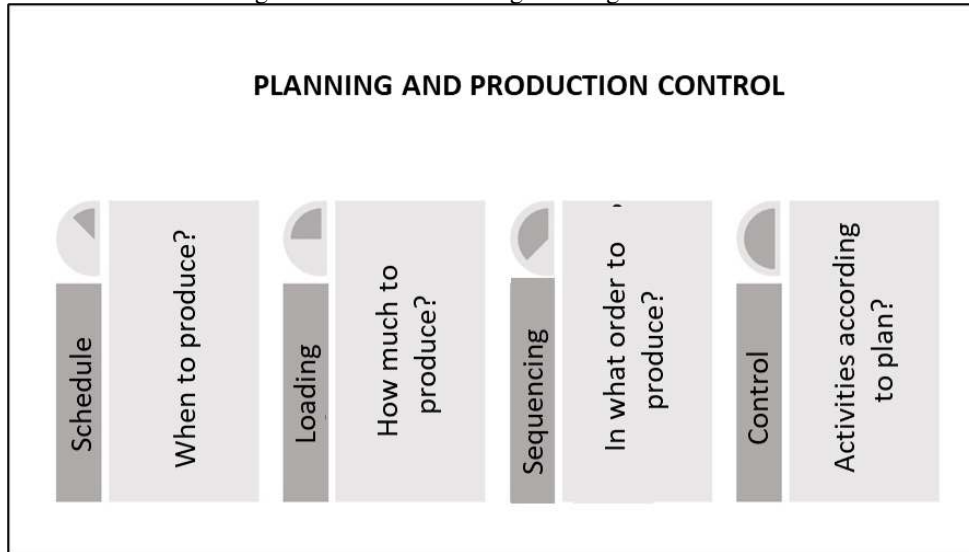
Source: Authors.

## 4.3 PRODUCTIVITY INDICATORS

Some actions of performance indicators had already been elaborated previously in documents, but in practice they were not applied to employees and there is little charge from superiors. Thus, it was necessary to monitor the activities developed and raise awareness of all. In order to support concrete results for the organization, optimizing the management of tasks and identifying points of improvement, both for the specific performance of operations and for the performance of the company as a whole.

Thus, proposals and suggestions were elaborated for remediation of the problem, offering the management a methodology of a strategic character can be observed in the following representation:

Figure 7 – Production Programming and Control



Source: Authors adapted internet.

#### 4.4 TOTAL AND CONSTANT QUALIFICATION

The company internally conducted training according to its needs, to improve performance in the activities performed, seeking excellence in the individual service performed by each employee. Low productivity was also a cause of workers' lack of professional competence. With the internal qualification, employees gave more agility to the execution of tasks, contributing to the multiplication of knowledge and proposals for solutions to problems arising from poorly designed processes.

Through observation, the results developed a better developed competence of the employees involved in several factors, including how to gain motivation.

#### 4.5 INSTALLATION OF AUXILIARY LAMPS

The installation of three luminaires in the workplace satisfies the needs of the workers, offering them a comfortable and productive workspace. These were placed on the side wall where the packaging services take place. In addition, good lighting contributes to the reduction of occupational accidents, from the simplest to the most serious.

#### 4.6 MONTHLY CONTRACT WITH MECHANIC

A monthly contract was made for the provision of continuous technical service of preventive maintenance, with a specialized mechanic of the machine. Where the services will be provided once a month, performing changes of pneumatic hoses and reviewing the useful life of parts, and should elaborate and keep updated a replacement plan of the same. Thus reducing shutdowns for corrective maintenance.

## 5 FINAL CONSIDERATIONS

In general, the research was successful in relation to its proposed objectives. With regard to the general objective, the study was able to suggest options for how to implement the tool in the daily life of the packer and, as observed, its application had a positive balance both in relation to the optimization of its processes and in the mapping of its operational difficulties.

As for the specific objectives, the result was no different. It was possible to identify the main problems that generate delays in the production sector. After investigation of its root causes, it can be observed that there were difficulties of in the 6M: Machine; Method; Manpower; Environment; Measure; Material.

In this way, six action plans were created so that the company's management could, in some way, monetize these corrections. Thus, a plan emerged for each root cause, with the purpose of assisting the company in the resolution of its problems, respectively, were able to guide the company in the solution of its operational difficulties. In addition, as well as presented viable proposals to facilitate the process of control of the department studied.

It was suggested the acquisition of a board, of the slate type, that could have the information related to the Ishikawa diagram and 5W2H, which the manager understands as very important. In this way, the manager would be able to crystal clear the information he finds pertinent to fulfill his actions in a safe way.

Finally, there is the expectation that in the future the packer, using the tools of the quality diagram of Ishikawa and 5W2H or even other tools (further studies would be necessary), so that it can grow and improve its work methodologies, seeking to find ways to achieve excellence in its products and services.

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