

DEVELOPMENT OF AN INTEGRAL PROCESS MAPPING SYSTEM, APPLIED TO THE NOPAL POWDER PRODUCTION AREA.

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Summary

In this research a process mapping was developed and applied to the nopal production department with the objective of identifying, understanding and describing the nopal powder production processes. This tool allowed us to identify the changes of waste, even with this implementation we sought to meet the objectives, which is why this tool simplified and eliminated everything that does not add value to the process. With this tool we were able to improve the existing processes. Measuring the operation, transportation, storage and delay. By

Therefore, it also allowed to know the current definition of each process as well as to eliminate the errors of understanding, reducing waste and establishing performance metrics. Consequently, the activity that had the highest value was storage, with a time of 60 minutes, which is to be reduced with the standardization of the nopal weighing time. On the other hand, by implementing measurement systems, it will be possible to obtain information on the performance of the processes and the changes that are required to obtain better results and be able to become world class [1].

Keywords: process, mapping, quality and time standardization.

INTRODUCTION

However, process mapping is a powerful tool that measures the behavior of the process, which through four symbols such as: operation, transportation, storage and delay, analyzes and identifies the possible failures and deficiencies of the process, allows to optimize the processes present in the same or in case of not having defined any yet, helps the implementation in the organization of a structure based on processes.

General Objective

To show graphically by means of a process mapping the manufacture of nopal powder.

Specific objective.

- Define how the manufacturing process of nopal cactus through process mapping.
- Understand the process mapping and how the nopal manufacturing process is composed
- Apply process mapping.
- Analyze the results of the mapping applied to manufacture of prickly pear cactus.
- To evaluate the mapping applied to the manufacture of nopal cactus.

There are several types of processes: a) strategic, b) operational and c) support. Strategic processes support and deploy the organization's policies and strategies, providing guidelines and limits for the rest of the processes. Operational processes constitute the sequence of added value, from the understanding of market or customer needs to the use of the product or service by customers, going all the way to the end according to Mallar [3].

It should be noted that the implementation of process mapping will increase productivity, in addition to serving as an indicator for continuous improvement.

DEVELOPMENT

A process map is a set of charts, useful to give clarity to the operation of an organization, that improves communication at all three levels (managerial, tactical, operational) and establishes roles and responsibilities.

to execute activities in alignment strategic objectives [2].

Advantages

- Diagnose deficiencies
- Improve processes
- Optimizing resources
- Standardize times

Disadvantages

- You must be thorough when describing the activities of the process.
- Trying to get people to think and propose improvement actions as opposed to the Taylorian logic. It is not about working more, but about working in a different way.
- Participation and support versus hierarchization and control.

It is important to take into account that a process is any activity or group of activities that uses an input, adds value to it and provides a product to an internal or external customer.

While a process map is a technique or tool used to "map" the processes, in such a way that the flow of values that are in them (added or not) is discovered; by means of these maps it is possible to detect what does not add value and a map with the added value only is elaborated.

All procedures must rely on mapping to understand processes of any nature, perhaps ignoring the distinctive characteristics of systems such as hospital services.

Thus, these procedures could be enriched according to a set of criteria among which they include:

- Incorporate the classification and characterization of systems and processes by the relevance in the management and improvement tools to be used according to Hernandez, Medina & Nogueira [4].

For this purpose, the implementation of process mapping in an organization should be oriented by a business process life cycle model. This allows to maintain consistency in the actions to be executed, as well as a better understanding of the relationship between the business processes and the organization.

between the implementation outcome and the organizational objectives [5].

In order to understand the complexity of the processes, we start with a general overview and their basic characteristics.

Educational centers as organizations can be considered as a set of processes that have a beginning and an end. We then define processes as delimited actions that seek to satisfy the educational purpose of the center and that contribute to its development and search for improvement and quality) [6].

The processes have some basic characteristics:

- They are results-oriented.
- They respond to the mission of the educational center.
- Create added value for users.

It is important to highlight that the implementation of a process mapping is to align the objectives with the expectations and needs of the educational users.

While they show how flows of information, documents and materials are organized.

They reflect the relationships with recipients, suppliers and between different departmental units or with other educational centers, showing how the work is carried out.

They allow for continuous improvement, as they have a system of indicators that make it possible to monitor process performance.

Productivity.

Productivity can be summarized as the optimal use of resources. An efficient worker must use materials with the minimum of waste; use the minimum possible time in production, without deteriorating the quality of the product; use services (electricity, water, gas, etc.) in the necessary quantities, without waste, and use the technological means (machines, equipment, tools, etc.) in such a way that they do not deteriorate more than normal.

The operator's use and knowledge of production standards will allow him to know what is going on and how to make the best use of his resources. The

The operator must be involved in setting standards and measuring his own efficiency, but this can only be achieved when there is participation, commitment, achievement and recognition.

Quality and Productivity

For Deming [7] the relationship is very clear, because the strategies to improve quality lead to a minimization of costs, due to: the decrease in the number of procedures that must be repeated because they were poorly performed the first time, the decrease in process and procedure delays, the better utilization of resources, etc.

Hence, improving quality and thus avoiding the situations mentioned above tends to increase productivity [7].

Quality improvement and cost reduction are compatible. Quality applied to work processes leads to cost reduction.

Improved quality in the work processes involved in the manufacture, sale and distribution of products or services results in fewer errors, fewer defective products, less rework, shorter total cycle time and reduced or eliminated waste of resources, thereby reducing the total cost of operations.

Ullman [8], quoted by Ruelas (1993), points out the existence of an unjustified perception that quality and cost control are incompatible because, on the one hand, quality costs and, on the other hand, cost controls affect quality.

This author shows that the apparent incompatibility does not exist as an absolute statement [8].

We can conclude with the main objective of process which many authors converge on the same point: to improve the processes of the Quality Management System (QMS). With this, the ISO 9001:2008 standard mentions the eight principles of quality applied to the organization.

Therefore, the approach is process-based, establishing the likely achievable results managed by a central process.

As a result of the applicability, the concept of "continuous improvement" arises not only as part of the organizational processes, but also as the essence of the organization, part of the organizational culture, which defines its golden rule, four fundamental aspects:

- Write down what you do (process).
- Do what you wrote (operation).
- Prove it (audit).
- Improve it (continuous improvement).

It is important to note that the relationship between productivity and costs is focused on good production . Productivity improves when fewer inputs, which also means lower costs, generate the same output. Assuming a higher output with a lower number of inputs, which also means lower costs, productivity will be higher.

One way to illustrate the clear relationship between costs and productivity is to analyze the two possible alternatives when considering a cost containment policy [9].

One of these alternatives, which does not necessarily exclude the other, is to establish restrictions on the use of inputs, which obviously reduces costs.

The other is to reduce them; but not at the expense of establishing restrictions, but as a result of an increase in productivity or efficiency, since in this way more units of products are obtained for the same cost.

Table 1. Benefits of process mapping.

No.	Benefits
1	Allows mediate the performance of the organization
2	Reveals the processes related to the critical success
3	Defines the degree of satisfaction of internal and external customers
4	Identify the needs

5	It allows to understand the scope of continuous improvement
6	Analyzes and resolves limitations and sets each symbol a indicator
7	Keeps processes under

Table 2. benefits of process mapping (2019).

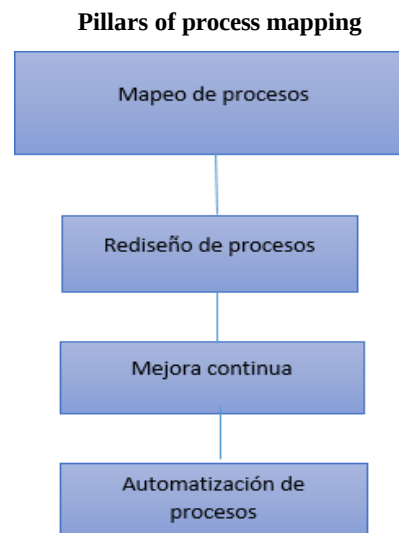


Figure 1. Pillars of process mapping (2019)

Other functions:

- Detect current needs.
- Involve the company's personnel.
- Management of resources and tasks as processes.
- Detect competitive advantages.
- Provide unity and direction.

All operations carried out by companies constitute processes in which people participate based on the activities they perform. The processes described are classified into strategic, operational and support processes. The first ones are related to the organization's strategy.

Operatives focus on the mission of the business and meet specific customer needs;

are those that generate added value and for which the client is willing to pay a certain amount. Finally, support services are those that provide the necessary means and support so that the operational processes can be executed [10].

Process quality

Quality can vary according to the perception of the person and is defined as the "set of properties inherent to something, which allow us to judge its value", it is also understood as a synonym of superiority or excellence. With this definition of quality in mind, we can make distinctions between:

- **Quality control:** through inspection or certain tests, the properties of the product are verified to ensure that the product is satisfactory.
- **Quality management:** defines the guidelines to be followed in terms of an organization's quality policy, with competencies in planning, resources or processes.

Quality has its strongest support in the processes. How the processes are defined, how they are developed in their various parts and their status, will determine the quality results obtained when the process is advanced, reviewed and evaluated. Therefore, we will go into some basic notions of the processes to achieve a correct management of them in the different moments of the programmed quality [11].

An organization, whatever its activity, if it wishes to maintain an adequate level of competitiveness in the medium and long term, must use formal analysis and decision-making procedures to systematize and coordinate all the efforts of the units that make up the organization to maximize overall efficiency.

There are several approaches to Total Quality management, tried and tested and implemented around the world. Almost all insist that the commitment to total quality applies to the efforts of all people in the organization and to all aspects operations, from the procurement of inputs and

resources to the manufacture of finished products and services rendered [12].

It is important to mention that the following process mapping is focused on the manufacture of nopal powder.

Taking into account the following steps:

1. Describe the activities.
2. Determine the times.
3. Identify to which type of symbol it belongs according to the action: operation, transport, storage and delay.
4. Plot the graph.
5. Determine the averages for each symbol.
6. Diagnose.
7. Decision making.

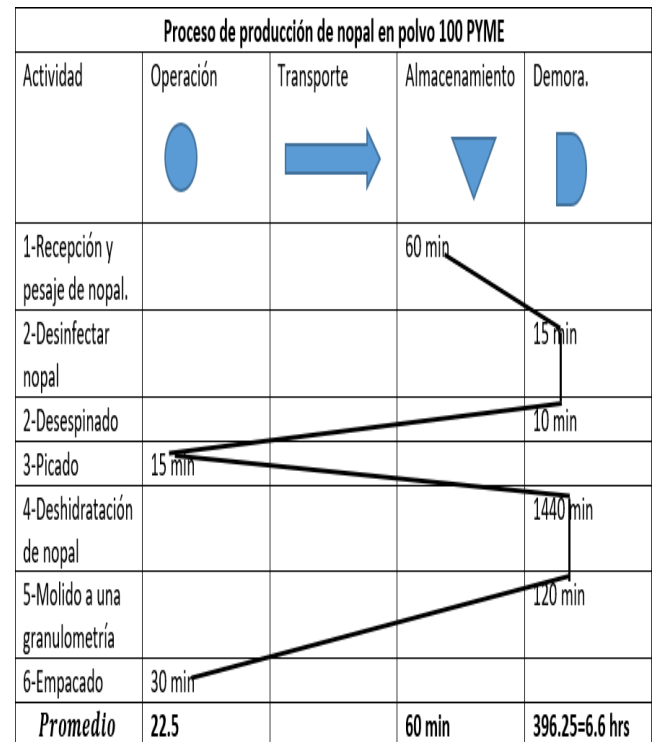


Figure 1 Process mapping (2019).

For every 100 pcs of cactus there is waste seedlings of 8 hrs with 23 min which means that the process should be automated given that on average in operation it takes 22.5 min, while there is no transport, storage 7 hrs.

Therefore, for every 100 pieces of nopal, the culmination process takes 8 hours and 23 minutes.

On the other hand, a high time delay is incurred, so it is recommended to automate with machinery.

With this tool you can graphically perceive the behavior of the process so it is easy to understand whether or not you are related to the process, for its degree of practicality makes it more interpretive and serves as a focus to measure the behavior of the processes.

In this way it is possible to reduce the deficiencies caused by delays, storage and prolonged transfers, better known as "waste changes", as well as to standardize all processes.

Nowadays, companies are facing more complex and competitive markets, therefore, they are in a constant search to be more efficient productively speaking, which is why these organizations have their strategies, goals and objectives well defined, and this information must be shared among their collaborators so that all members of the organization know their role in the organization.

In today's highly competitive business scenario, only those organizations that show a great capacity for adaptation, high agility and flexibility to develop effective actions and quickly generate ingenious and creative responses to the difficulties and challenges posed by the competitive scenario will survive.

In these circumstances it is necessary to develop the creative capacity and the ability to generate new and innovative solutions to problems and difficulties, as well as to customer demands.

One way to achieve good performance in this scenario is to use knowledge to creatively add value in products and services that ensure the sustainability and sustainability of organizations in time and space [13].

Quality-related activities were initially reactive and oriented towards inspection and statistical quality control, an approach that will later establish objective quality.

The basic objective of objective quality is efficiency and therefore it is used in activities that can be standardized (statistical quality control). Similarly, Vázquez et al. speak of subjective quality as an external view, to the extent that such quality obtains through the determination and fulfillment of the needs, desires and expectations of customers, given that service activities are highly related to contact with customers [14].

It is well known that quality perceptions and satisfaction judgments have been recognized as fundamental aspects in explaining desirable consumer behaviors.

The changes that have been taking place worldwide for some time now, such as the globalization of the economy, the trend towards increased competition on the part of companies and the search for organizational excellence, have not left training, and more specifically the education offered at universities, on sidelines.

The economy of a country depends to a great extent on the development of the productive sector in which companies play a relevant role; whether growth or stagnation depends on their performance. For this reason, productivity and competitiveness is the product of the ways of doing work, creativity and ingenuity to formulate strategies that allow organizations to optimize resources, improve costs and position themselves in the market.

DANE data show a favorable economic growth of this department in recent years, per capita income reached acceptable levels; regional competitiveness is supported by education, technological development, promotion of agriculture and strengthening of the productive sector, factors that have generated improvement in economic performance indicators and position the department in fourth place in the national economy, after Cundinamarca, Antioquia and Valle [15].

CONCLUSIONS

Thanks to the implementation of process mapping, it was possible to detect a huge amount of waste as time in delay, so the company intends to automate its processes to become more productive with the correct performance practices, and standardize the processes.

RECOMMENDATIONS

- Training of personnel.
- Maintain machinery.
- Standardize times for each activity.
- Detail management activities.

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