

APPLICATION OF KPI APPLIED TO POINTS OF SALE, USING THE "OVERALL EFFICIENCY OF A PROCESS" (OEE) TOOL STUDY: FORMATO MERCADO SELF-SERVICE STORE.

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Summary -- Commerce in Mexico is one of the main income sources, however it is well known that customer service is not the best, because in many cases the productivity of customer service is very slow and for this it is very important to measure 3 main pillars, time, performance and quality, using the Overall Equipment Effectiveness (OEE) tool which is a simple and easy to understand indicator for all involved. In addition, it will facilitate the selection of specific improvements needed and above all it shows the priorities in a very clear way. However, practice shows how improvements in companies are only successful when everyone in the company can contribute to the improvement of results. The OEE is a tool that was used to measure the productivity of a self-service store, therefore, it makes it easier for the whole human team to clearly perceive the effects of the actions taken for improvement and to justify such actions in a clear way. Therefore, the scope of productivity generated by this application will have an impact on the company's operation process; consequently, labor productivity has become the basic indicator to measure the impact of human capital on organizational performance. Productivity is related to the increase in revenues and profits, as well as the performance of its personnel. This approach not only serves to know the current state of the staff and their role in the results of organizations, but also to formulate strategies that lead them to adopt best practices aimed at impacting the level of engagement, a factor that ultimately influences productivity [1].

Keywords: Customer service, quality, productivity.

INTRODUCTION

Currently, self-service stores are classified according to their format by size as mega markets, hypermarkets, supermarkets, membership clubs, bodegas, convenience stores and mini supers.

However, this research will focus on a "market" format since the majority of the population in Mexico has a low to medium purchasing power, it is important to highlight that continuous improvement is one of the fundamental pillars in all areas, therefore they are forced offer a better quality service which is demanded by globalization, so we seek to improve the customer service process at the points of sale and also to increase the productivity of customer service, remembering that efficiency among effectiveness equals productivity.

Meanwhile, in the self-service market format store, activities that do not add value to the process were detected, one of them being dissatisfied customers, since customers claim that the service at the points of sale is very slow, and they also claim that they are not trained. To this end, we are seeking to enhance the productive scope.

DEVELOPMENT

Overall Efficiency of a process (OEE)

Before starting it is important to mention that an indicator is the "performance measurement" which can be of the internal or external areas that make up a production process, it allows to know in real time the status, evolution and associated problems, so it is possible to

to forecast failures in order to generate timely actions [2].

On the other hand, KPIs are metrics that help us identify the performance of a given action or strategy. These units of measurement indicate our level of performance based on the objectives we have previously set [3].

OEE is the acronym for Overall Equipment Effectiveness and shows the percentage of effectiveness of a machine with respect to its equivalent ideal machine. The difference is made up of time losses, speed and quality losses [4].

Continuous improvement

OEE, precisely, measures the efficiency of industrial processes, making it an ideal tool for developing the culture of Continuous Improvement in companies and obtaining higher productivity using the same available resources [5].

Retail in Mexico, basically modern retail, accounts for more than 70% of sales revenues, with the U.S. firm Walmart Stores Inc. and its subsidiary Walmart de México standing out, followed by local firms Soriana and Comercial Mexicana.

Against this backdrop of multinational superiority, the purpose of this study is to compare the productivity and its expression in market competitiveness of the three leading chains.

*Professor-researchers, Department of Economics, Universidad de Sonora, Mexico. E-mail:cboca@pitic.uson.mx and mvazquez@pitic.uson.mx, respectively. 94 Paradigma económico Year 4, No. 1 retail trade in Mexico, through the analysis of productivity per employed personnel, per establishment and per square meter in sales area; in addition to the variables, sales revenue, number of establishments, employed personnel, amount of annual investment and percentage share of each of the firms in the total revenue of supermarkets in Mexico from 2002 to 2010 [6].

While competition is increasing and the products offered on the market are becoming more and more varied, consumers are becoming more and more demanding. They no longer just

They are looking for quality and good prices, but also good customer service.

Customer service is the service or attention that a company or business provides to its customers when dealing with their queries, orders or complaints, selling them a product or delivering it [7].

While the general objective of the present research is:

- To detect the productive indicator of the points of sale of self-service stores in market format.

Specific objectives.

- Use the Overall Efficiency of a process tool as a productive (OEE) KPI
- Analyze the Overall Efficiency of a Process (OEE) tool.
- Improve y enhance the productive indicator.

To measure the productivity of customer the following research will focus on tool "overall process efficiency or better known as (OEE)", according to [8] which measures availability, performance and quality as shown below:

Example table:

$$\text{Disponibilidad} = \frac{(TR)}{(TT)} = \frac{\text{Tiempo real}}{\text{Tiempo teorico}}$$

$$\text{Rendimiento} = \frac{(PP)}{(PR)} = \frac{\text{producción prevista}}{\text{producción real}}$$

$$\text{Calidad} = \frac{(CPB)}{(B)} = \frac{\text{Piezas buenas}}{\text{producción real}}$$

Figure 1. Formula: overall efficiency of a process

$$DXXRC = OEE$$

$$DXXRC = OEE$$

(Tajonar (Navarra). 2019).

It is important to mention that each of the factors is represented as follows:

Availability: How much time the machine or equipment has been running with respect to the time you wanted it to be running (taking out the unplanned time).

Performance: During the time it has been running, how much it has produced (good and bad) compared to what it should have produced at ideal cycle time.

Quality: This is the indicator best known to all. How much of the total production (good and bad) I have produced good at the first time.

OEE indicates how effectively the machines are being used compared to the Ideal Machine (OEE = 100%).

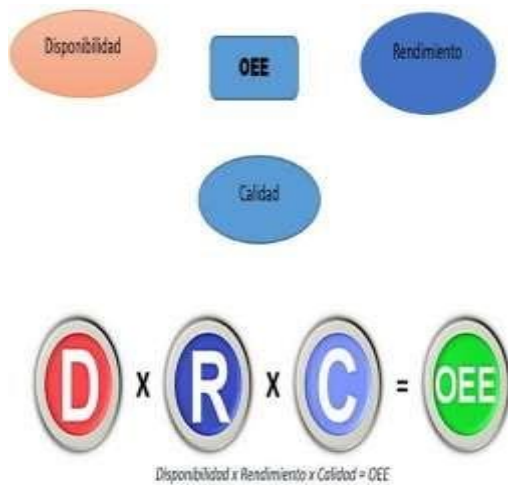


Figure: 2 overall process efficiency (OEE) schemes González, Martín*† and Cuauhtémoc, Lehi (2015).

The OEE value is used to rank one or more production units, or an entire plant, in relation to the best in class (those that have already reached the level of excellence, a World Class Manufacturing, according to the following scale:

- < 65%: "Unacceptable". Significant economic losses occur and competitiveness is very low.
- 65% and < 75%: "Fair". Acceptable only if in the process of improvement. Economic losses occur. The level of competitiveness is low.
- 75% and < 85%: "Acceptable". Improvement must continue to exceed 85%.

% and move towards World Class Manufacturing. Slight economic losses occur and competitiveness is slightly low.

- 85% and < 95%: "Good". Enter World Class values. Good competitiveness.
- 95%: "Excellent". True World Class values. Excellent competitiveness.

According to [9] Practice shows how improvements in companies are only successful when everyone in the company is able to contribute to improved results.

The OEE, therefore, makes it easier for the whole team to clearly perceive the effects of the actions taken for improvement and to justify these actions in a clear way [9].

According to [10], the benefits can be diverse as shown below:

- Increased productivity
- Economic losses are reduced
- Increase the degree equipment reliability
- There is an improvement in maintenance
- Reduction in the number of failures
- Potentiates all installed capacity

On the other hand, from an R&D point of view, the food and beverage industry is one of the leading sectors. However, when it comes to maintenance, most companies still keep their records on paper.

Although in the past regulations and compliance requirements forced these companies to work with paper, nowadays the advances in digital tools make the use of paper unnecessary [11].

In the current ecosystem of machines and industrial processes, data is becoming more and more important every day. Information is power, a good management of the data provided by the machine can improve the efficiency of the machine.

One of the most demanded parameters from machinery manufacturers is to be able to show the OEE (Overall Equipment Effectiveness), which serves to measure the efficiency of the machine. It is the ratio between what

theoretically could produce a machine and what it actually did [12].

Improving productivity, if the product/service meets customer expectations, means improving the bottom line in both industrial and service companies.

For many years and despite being an essential function for all companies, regardless of the sector in which they operate, Production has not had the strategic consideration in our country that reasonably corresponds to it, basically because companies sought differentiation in other fields and not in the efficiency in the manufacture of their products and services.

With margins getting tighter every day and more and better competitors, companies are having to look again at manufacturing areas to try to find advantages that will allow them to compete successfully.

Processes, therefore, are once again becoming increasingly important as they are largely responsible for the productivity of people and machines.

Business management is becoming more complex every day, basically because margins are being adjusted at great speed, especially taking into account that these adjustments are often caused by external circumstances that we do not control and that result in productivity losses due to increased costs attributable to all the elements involved in manufacturing, both fixed and variable.

In a very simplified way, we could associate Profit as sales revenue minus the direct and indirect costs we incur to make the product available to the customer, i.e. manufacturing costs, overhead and depreciation.

Its main limitation is that it is necessary to capture the information at the machine and process it in real time (manual captures, sometimes essential, may contain errors, forgetfulness, time lags, etc.).

And although the development of the indicator and its application is more frequent (and more objective due to the automatic collection and processing of the information, without manipulation) in companies

industrial, it is also very useful in the efficient management of processes in service companies.

While it is easy to use, with a language and definitions accessible to all operators and technologists that provides information on the level of effectiveness of a specific machine or production line and by referencing the effectiveness of the machine with the absolute maximum of availability, speed and quality we can focus entirely on the losses and thus on the potential for improvement and by multiplying the three components it becomes an indicator that reflects the ratio between what we are producing and what in theory we should be producing during a particular period of time.

Shifts can influence OEE because the information referred to losses allows plant shifts to initiate specific and focused improvements to the detected problems and thus guide OEE to the decrease of production cost based on the decrease or eradication of losses and thus, the results of all these improvements are reflected in the evolution of OEE [13].

Reengineering together with total quality can lead the company to link electronically with its customers and thus become an extended enterprise. One of the most interesting structures being introduced today is networking, which is a way of organizing a company that is proving its potential.

Total quality is a quality management system that encompasses all the activities and all the achievements of the company, with special emphasis on the internal customer and on continuous improvement.

Total quality is a concept, a philosophy, a strategy, a business model and it is customer-focused.

Total quality does not only refer to the product or service itself, but it is the permanent improvement of the organizational and managerial aspect; taking a company as gigantic machine, where every worker, from the manager to the lowest hierarchical level, is committed to the company's objectives.

For total quality to be fully achieved, it is necessary to rescue moral values.

It is here, where the entrepreneur plays a fundamental role, starting with the previous education of his workers to achieve a more predisposed working population, with a better capacity to assimilate quality problems, with better criteria to suggest changes for the benefit of quality, with better capacity of analysis and observation of the manufacturing process in case of products and to be able to correct errors.

The use of total quality has advantages, such as the following:

- Potentially achievable if there is a decision at the highest level.
- Improves the relationship between human resources and management.
- Reduce the costs by increasing productivity.

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Total quality is a quality management system that encompasses all the activities and all the achievements of the company, with special emphasis on the internal customer and on continuous improvement.

In recent years, there has been a growing interest in organizations in paying attention to the human factor, i.e. the people who work in them. There has been a growing awareness that, in addition to remuneration, it is necessary to attend to the need to participate in decision-making and to generate opportunities for personal fulfillment. This is why organizational climate and satisfaction studies are so interesting.

They allow employees to express their opinion on how the organization functions and how they feel about it; thus, they constitute an instrument of inquiry, which works under the premise that benefits are generated when corrective actions are implemented in the aspects that require it.

They are also an excellent mechanism to learn, indirectly, about the quality of the quality of

In fact, its results point to how the structural and static aspects (status variables) of the organization are functioning, and what happens on a day-to-day basis in the relationships between people (dynamic variables).

Importance of Measuring Productivity

Measuring productivity makes it possible to identify the development of industries.

Productivity is important because it means more income for the worker and more profits for the company.

In key industries, this means lower costs and a high international market share.

Many companies, especially those trying to compete internationally, are very conscious about their slow productivity and are highly interested in improving it. Companies use a variety of approaches to improve productivity. The three main ways are:

Technological, which focuses on the acquisition of equipment and specialized software; administrative, which focuses on defining the strategic mission more clearly, changing the basic structure, and applying operations management techniques; and behavioral, which focuses on employees, increasing their motivation and participation.

In the face of global competition, productivity is a determining factor in the success or failure of companies. Bill Gates, the world's richest businessman, in a recent interview said: "it is a wonderful time in the world of software" and therefore he thinks that all its competitive advantages must be used. He also explained that software gives companies the possibility to reduce their costs and improve their productivity.

There are several ways in which productivity can be increased: Be more practical, invest in knowledge and tools to make the work easier, with less effort or to produce more.

Modifying the work technique to make it more efficient

Research, models that represent in a logical way the reality of a problem, goals and their constraints to achieve them, variables, etc.

The main objective is to determine the optimal combination of resources to reach a desired goal. To do so, it is necessary to rely on specialized software that allows you to visualize the behavior of your business in the future.

Total Quality Management can be defined as the strategic behavior to improve quality, combining statistical methods of quality control with a cultural commitment to seek tools for improvements that increase quality and decrease costs, thus improving competitive advantages and increasing performance.

The so-called guru of Total Quality, Dr. Edward Deming defines it as follows: "meeting the requirements and expectations of our customers, both internal and external, in terms of products and services, the first time and on time every time".

It is added that "total quality is the human condition that recognizes the presence of another who needs a service and is given exactly what he/she needs" [14].

For this reason, the following was detected in self-service stores in the market format:

$$\text{Disponibilidad} = \frac{(TR)}{(TX)} = \frac{1.5 \text{ hrs}}{4 \text{ hrs}} = 0.37$$

$$\text{Rendimiento} = \frac{(PR)}{(PP)} = \frac{1500 \text{ PZ}}{3000 \text{ PZ}} = 0.5$$

$$\text{Calidad} = \frac{(PR)}{(B)} = \frac{1850 \text{ PZ}}{2500 \text{ PZ}} = 0.74$$

$$\text{OXRXC} = \text{OEE} \quad 0.37 \times 0.5 \times 0.74 = .136 \approx 13.6\% \text{ OEE}$$

Figure: 3 Overall process efficiency (OEE) applied to a self-service store (2019).



Figure: 4 Points of sale (2019)



Figure: 4 line Points of sale (2019)



Figure: 5 product scan (2019)

DISCUSSION AND ANALYSIS OF RESULTS

According to the aforementioned scopes, the productive scope is 65% is "Unacceptable". Significant economic losses occur and competitiveness and productivity are very low.

Having detected the aforementioned, an analysis is carried out, which shows that there are possibly several changes of waste in the availability item, as shown below:

- Discussion among workers.

- There is no technique for point-of-sale product scanning.
- The staff is not trained.

The following changes are available in the performance category:

- The points of sale are poorly calibrated
- There is no ongoing maintenance.
- Little knowledge of the use of points of sale.

The quality item shows the following changes in waste:

- The way the items are handled is not adequate.
- The product is diminished and that alters the quality of the product and of course the service.

CONCLUSIONS

In this research the OEE tool has been used, so it is concluded that based on the results obtained 59% is unacceptable, thanks to this tool it was possible to detect deficiencies in time, production and quality, which seeks continuous improvement to streamline its operations, in addition to increasing its installed capacity.

RECOMMENDATIONS:

- Train personnel to manage the points of sale.
- Training in the handling of the articles.
- Calibrate the points of sale.
- Standardize item scanning times

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