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Aplicación del ciclo PHVA para incrementar la productividad en el área de producción Frescor de la empresa ARY Servicios Generales S.A.C, 2020

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Abstract: This research called "Application of the PHVA cycle to increase productivity in the Frescor production area of the company ARY Servicios Generales S.A.C, 2020", aims to increase productivity by using the PHVA cycle. This research is classified as experimental, since the application of this technique will be applied to all operators in the area under study. Also, the ABC classification was used because with this tool we can determine the level of rotation of the products manufactured by this organization, once the results were obtained, the same tool was applied again, which determined that there are 11 products with a high level of rotation. Within this investigation an interview, 5'S methodology, and the standardization of work methods were used. Consequently, to evaluate productivity, a product was taken as a sample where we can observe that the productivity of both labor and raw material increased by 27% and 33% respectively. Under this context, we sought to ratify the results of a hypothesis test led us to conclude that the application of the PHVA cycle allows us to increase the productivity of organizations.

Keywords: Productivity, PHVA Cycle, incremental.

Resumen: La presente investigación denominada Aplicación del ciclo PHVA para incrementar la productividad en el área de producción Frescor de la empresa ARY Servicios Generales S.A.C, 2020", tiene como finalidad aumentar la productividad para ello se utilizó el ciclo PHVA. Esta investigación está clasificada como experimental, puesto que la aplicación de dicha técnica se realizará a todos los operarios del área en estudio. Asimismo, se utilizó la clasificación ABC pues con esta herramienta podremos

determinar el nivel de rotación de los productos que fabrica esta organización, una vez obtenida los resultados se volvió a aplicar la misma herramienta la cual determino que existen 11 productos con un alto nivel de rotación. Dentro de esta investigación se utilizó una entrevista, metodología de 5 'S, y la estandarización de métodos de trabajo. Por consiguiente, para evaluar productividad se tomó un producto como muestra en donde podemos observar que la productividad tanto de mano de obra como de materia prima aumentaron en un 27% y 33% respectivamente. Bajo este contexto, se buscó ratificar los resultados haciendo una prueba de hipótesis en la cual pudimos concluir que la aplicación del ciclo PHVA permite elevar la productividad de las organizaciones.

Palabras clave: Productividad, Ciclo PHVA, incremento.

INTRODUCTION

Since some time ago, smaller companies have acquired an important role in Latin America, that is why in the cleaning products segment there has been an excess of common products, however these may vary in terms of price and product quality and may also be oriented to a specific target audience.

In a research elaborated in 2017, by Intradevco S.A.C. company dedicated to the elaboration and promotion of cleaning products both domestic and personal hygiene products which in turn is dedicated to manage some brands in Peru as Dento, Patito among others , it was determined an increase in the productivity of resources thanks to the quality system and the standardization that is used; thus being able to overcome the fall that was generated in companies of the same sector in the same year.

Under this context in May 2019, in the department of La Libertad, the BCR published the results of the productivity indicators of the sector under study, which recorded an increase over previous years, this increase was generated due to the high demand for household cleaning products is why it is necessary to maintain product quality and service from product conception until it reaches the consumer.

Currently the company ARY SERVICIOS GENERALES is dedicated to the manufacture and marketing of cleaning products, however, this organization has some problems that are affecting in a relevant way in the production area. In order to determine and demonstrate the problems of this company, the fishbone tool was used, which resulted in a decrease in productivity in the production line and it was also found that the processes are not standardized in addition to the lack of commitment on the part of workers. All these problems found will lead to a bad quality system both in the product and in the service (Cosavalente et al., 2019, p. 14).

The application of the Plan-Do-Check-Act (PDCA) cycle to reduce defects in the manufacturing industry, in which the aim is to reduce as many defects as possible, the PHVA cycle was applied and two types of diagrams: Pareto and Flow, were used in order to diagnose the situation and therefore find as many defects as possible in the process. Likewise, the Pareto diagram was used to recognize the defects in some product models so that finally the standardization could be carried out with the appropriate improvements. This whole process led to a more optimal product quality (Vásquez-Vargas et al., 2018, p-23).

On the other hand, Grados and Obregón with their research in Lima, Peru, in which the 5'S methodology was applied in the warehouse in order to obtain a culture of standardization in the processes and thus avoid customer complaints. After applying the Deming cycle, it was possible to observe an improvement in the reduction of complaints by determining productivity, effectiveness and efficiency through a time study (2018, p. 24).

In the same way, it is of vital importance to be able to base this research in a theoretical way, for this we must begin to know the concept of quality where it is stated that quality is defined as certain characteristics of a good or service obtained in the production process that will satisfy the needs and/or requirements of the customer. Also, it must exceed customer expectations, this is achieved with quality management which is described as the relationship between quality improvement and user management in order to meet the demand, it is too much to say that this management encompasses the entire organization (Ladewski & Al-Bayati, 2019, p. 15).

The implementation of continuous improvement is done by quality control through some stages such as: Deming's circle, plan, check act among others; with this it will be possible to determine the improvement procedures starting with the evaluation which allowed to assume a process approach which will be analyzed with the different quality tools, (Schniepp, 2019) indicates that currently two types of quality tools prevail such as: quality improvement tools and quality control tools. Both are used to establish causes and/or drawbacks in order to find solutions. The quality control tools are made up of: Ishikawa diagrams, data collection sheet, control charts, Pareto diagram, stratification and finally the scatter diagrams however the quality improvement tools, which are used when there is no specific information of the problem. These tools are more complicated and therefore only trained personnel can make use of these tools. Within this group of tools we have affinity diagrams, relationship diagram and tree diagram (Novillo et al., 2017, p. 20).

This is why Gueorguiev & Sakakushev, (2016) states that today, says that many organizations seek accreditation in the ISO 9001:2015 standard as this standard aims to meet the requirements that every organization must have in order to meet customer expectations either in a particular process or in the totality of them. To synthesize the first variable, (Alcalde, 2019) refers that continuous improvement is a process of improvements used little by little in an uninterrupted way so that with it any type of waste can be eliminated and there is a better chance of success. The Deming cycle or PHVA cycle is used in any stage of the quality management system since it allows to improve the processes of the organization. This tool is divided into four phases: P (Plan), H (Do), V (Check), A (Act).

Conceptualizing the Deming cycle or PHVA cycle, the first stage of planning as the evaluation and fixing of the problems together with their possible solutions so that they can finally be selected and contrasted with the existing hypotheses. In the "Do" stage, what was planned is carried out with the sole purpose of being able

to solve the problems. In Verify, the results obtained are contrasted in order to then make a decision and act. In this last stage, all the inevitable changes are made in order to obtain the best results (Valgreen et al., 2019, p. 14).

To complement this research, it defines productivity as the result achieved from one or several processes in which resources are used. This result can be determined in units produced, goods sold or profits.

In order to measure productivity the following formula is used

$$\text{Productividad} = \frac{\text{Salidas}}{\text{Entradas}}$$

Therefore, in order to increase it, the relationship between the two must have a very high result.

Describes productivity as an indicator that studies the relationship between production and the factors that influence it, for which he defines it in the following formula $\text{Productividad} = \frac{\text{Producción}}{\text{Factores}}$. However, he also defines partial productivity in two formulas; firstly the productivity of labor at

$$\text{Productividad M.O.} = \frac{\text{Production total diaria}}{\text{Total Horas Hombre}} \quad \text{and raw material productivity in} \quad \text{Productividad M.P.} = \frac{\text{Production total diaria}}{\text{Total Materia Prima}}$$

MATERIALS AND METHODS

The type of research was applied, experimental design, quantitative approach. The application of a pre-test and post-test was used after the stimulus was applied. According to the evaluation of characteristics of continuous improvement in the PHVA cycle, we have 3 dimensions: Plan, Do and Check and Act. For the productivity variable, the evaluation of its characteristics through its dimensions: raw material productivity and labor productivity, techniques such as the ABC classification of products, field verification sheets, an interview and direct observation guides were used. In this research the validation of instruments is not used since they are constructs theoretically tested and supported by the academic community. A total of 4 workers from the production area of the company ARY SERVICIOS GENERALES S.A.C. were used. Likewise, the sample is determined by the same number of workers; therefore, this research is of a census type.

In this research, the author commits himself to honesty in the results and to respect the ownership of each one of the data provided by the company and only to manipulate the data obtained through its data collection instruments.

RESULTS

The results of this research are shown in five stages, as a first point the productivity in the production area was determined, for this a product of type A (high rotation) was taken as is the 4L Bleach of the Frescor line and it was found that the productivity of man hours to produce this product is 0.2421, on the other hand, taking the same product it was determined that the productivity of raw material is 0.244 units/soles.

As a second stage, the causes affecting productivity were investigated to find possible solutions. In this stage, the first step was to identify the

problem by interviewing the production manager, where it was identified that the low productivity of raw material is due to several factors, as shown in the following table:

Table N° 1
Diagnosis of low productivity of raw materials

CATEGORIES	ROOT CAUSES	SECONDARY CAUSES	CONSEQUENCES
METHODS	Activities that do not add value to the process.		IDLE TIME
	Lack of working methods.	No supervision	WASTE
LABOR	Lack of teamwork	Non-existent motivation	UNFULFILLED OBJECTIVES
ENVIRONMENT	AGGLOMERATION OF VARIOUS PRODUCTS	DISORGANIZATION	UNNECESSARY TRANSFERS

The third stage showed the results of the implementation of the proposals before the possible solutions. As a first proposal, the failures were identified and a standardization of the process was carried out. For this purpose, control cards were elaborated, which led to identify the causes of these errors and improvement solutions were proposed so that finally the processes could be re-inspected with the objective of identifying the changes made, which allowed a 69% reduction in the errors found.

The second proposal proposed in this research is the application of the 5'S for which an audit was conducted in order to know the status of the implementation of this tool in each S where it was found the operation in 41% however after the implementation could increase by 29%. Therefore, the third proposal is the application of a motivational workshop to the workers in the production area with the sole purpose of improving their performance in their work place and thus increase productivity.

The last proposal was to improve processes by identifying unproductive activities or, in other words, those that do not generate value.

Finally, in the last stage, the productivity after the implementation of the improvements was determined, which led to determine that the productivity of the previously selected product had decreased since the man hour is now 0.2023 and the productivity of raw material is 0.195 units/soles.

DISCUSSION

In this research the current productivity of the company ARY Servicios Generales S.A.C. was calculated through studies of times and records in the production area, which led to determine that it can improve its productivity both in labor and raw materials.

For this, 4L Bleach was taken as a sample, where its labor productivity was 0.2421 and in raw material was 0.244. Confronting these results as the research we can say that the productivity of the company is low but that it can be improved even having unfavorable conditions in its environment. Likewise, it also confirms the theory of Intradevco in its article in 2017 where it indicates that the cleaning products category has suffered a huge drop as this is due to the lack of standardization that companies have (Blanco & Sirlupú, 2015, p. 17).

To find productivity there are several methods such as Grados and Obregón suggests because for these authors, efficiency and effectiveness should be determined without considering the standard time; however, in this research this measure was taken into consideration since it allowed finding the activities that did not generate value for the processes and in turn caused downtime (2018, p. 21).

Under this context, productivity allows finding the failures that exist in the process, which will lead to making the right decisions for ratifies in his research that controlling the process will help to meet the objectives assigned by the company.

CONCLUSIONS

It is concluded that the productivity of the company Ary Servicios Generales is low with respect to the product Lejía 4L since initially the productivity of labor is 0.2421 and that of raw material is 0.244 soles units, this problem is due to the fact that there is no standardization in its processes. The standardization of its processes reduced the deficiencies found in the production area by 69%, which led to an increase in productivity. The implementation of the 5S in the production area was at 41%, but after applying the corresponding improvements, it increased by 29% to 70%.

The improvement of processes in the production area was able to contribute to finding activities that did not generate value, as well as finding idle time. Labor productivity increased by 16% and raw material productivity increased by 20% with respect to the 4L bleach product. Finally, it is concluded that the application of the PHVA Cycle increases labor productivity as well as raw material productivity.

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