

Continuous Improvement in The Small and Medium Industries of Colombian Regional Footwear. Review and Some Techniques

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Abstract- A review article is presented with the different continuous improvement methodologies applied to the footwear industry in Norte de Santander. The qualities and rates of competitive advantage experienced by industries in an increasingly dynamic market are studied as of the closing of the border between Colombia and Venezuela, the latter being the main commercial partner in an industry that is reinventing itself and adapting to new one's political conditions.

Keywords – footwear industry, 5S, Lean Manufacturing, SME's, implantation.

I. INTRODUCTION

The speed of the continuous changes in which the market is currently developing is a premise for many companies and business ideas, one of the objectives of part of the offer is to be at the forefront of the needs of customers and / or consumers, in face a one competition that increasingly gains a greater possibility compared to products of local origin. [1]. Zambrano, in his postgraduate study, refers to the number of products consumed with foreign origin, greater than his local counterparts. Taxes translate into higher costs for the entrepreneur and a higher price for the consumer. [2].

Footwear industry is not alien to this phenomenon, a first-rate manufacturing whose indexes have been adapting to new realities based on the need to innovate new marketing chains and continuous improvement techniques in its production.

The Colombian Association of Footwear, Leather, and Manufacturing Industries (ACICAM), documented in 2018 that, between January and November, footwear sales to the international market were rounded at 39 million dollars, 43.02% more than the result obtained in the same period of 2016. Norte de Santander qualifies as the 5th exporter. [3]. Researchers Rico, Cuesta, Barrientos and Coronel doing research the different physical formats currently used by the farm manager to collect data of interest. [4].

While the indicators show comparative advantages, high demand, a trade balance with a surplus, and global competitiveness, researchers Páez, Jiménez and Danna-Buitrago, sustain the contradiction of the previous statements, referring to the footwear sector as weak in the domestic market and incompetent to stay in the market for uncompetitive prices, quality and designs. [5].

We are faced with a dilemma that, well exploited, can evolve into strength: on the one hand, the footwear sector faces the lack of cutting-edge technology, an old production structure, competition from Chinese products and smuggling, while the current low rates of interest, free trade agreements, good political-economic relations, the creation of clusters, geographical location of the country, and tax and legal reforms, favor the footwear sector. [6].

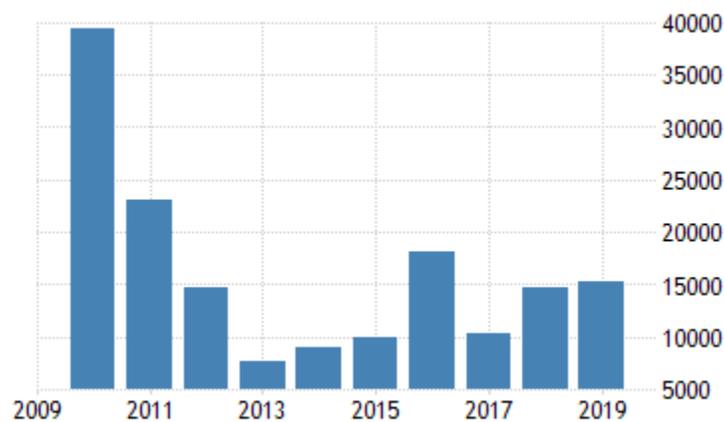


Figure 1. Colombian footwear exports

II. PROPOSAL

Three factors determine the competitiveness of footwear in Norte de Santander: business organization, infrastructure and modernization. One of the main problems is having an SME'S (Small and Medium Business) style structure in almost all of the manufacturing, which creates a serious competitive disadvantage compared to Asian footwear imports. SMEs, unlike large industries, base their production processes on a craft work, with small scales of production. [7].

Giovanni Mendoza, in his research, supports the entry into the international scene of a giant in production and competitiveness like China and the growing impact on an industry that has not prepared for the global market, enduring for decades the lack of public policies and associative projects. [8]. From production with little or no automation to obsolete marketing models, footwear production is going through a bad time.

SME's miss out on the basic tools of traditional marketing, much less those of digital, perhaps because they do not identify the benefits that these can have, such as their low cost, the ability to measure what happens to consumers and how to apply the results to the strategy general organization. [9]. Furthermore, the vast majority of manufacturers project their productions on "hacking other brands." Fake Adidas, Reebok, Lacoste, and Nike flood the market with below-average prices and acceptable quality. [10].



Figure 2. Lack of technology in the footwear industry

Business competitiveness is at a very high level, say the Peruvian researchers Sandro and Oracio, since they have generalized the use of technologies; But it must be understood that this use should not be improvised, much less random, on the contrary, it must be properly planned and organized in order to avoid unnecessary and unproductive investments. [eleven]. Norte de Santander presents empirical organizational processes, reasons to investigate industrial engineering tools that allow organizations to plan in search of continuous improvement of their products to obtain quality standards and contribute to the development of the region, as stated by the engineer industrial by expressing that one of the fundamental areas of the company is production and the need to improve production processes. [12].

2.1 Techniques–

Carrying out a feasible research for a sector as competitive as footwear, brings together "a dynamic combination of knowledge, understanding, capabilities and skills." [13]. It is not for less, if we also add to a sector lack of automation in the processes and with little or no experience of digital marketing. This quality control is carried out in order to identify and eliminate any type of unnecessary process or change a process that requires more resources than strictly necessary, summarized and known as Lean Manufacturing, a concept focused on people and developed to maximize utilization. resources through minimizing waste, then lean manufacturing was formulated in response to the fluctuating and competitive business environment. [14].

Lean Manufacturing Techniques abbreviates the concept of price into a simple equation.

$$\text{COST} = \text{MARKET PRICE} - \text{PROFIT (1)}$$

One of the techniques applied in industrial engineering to achieve high standards of organizational quality is based on a Lean Manufacturing tool called Kaizen philosophy. A simple management method to execute Kaizen in a production or service company is called: the 5S.

Hailing from Japan, it is widely applied by leading companies such as Toyota and Sony. The Kaizen objective highlights the importance of eliminating all types of unnecessary activity, as well as work that the operator does more without adding value to the final product. In short, a customer pays a price for a pair of shoes and is not willing to do so for operations that make it more expensive. "This philosophy, (Kaizen) adapts very well to SMEs since its focus is not to waste efforts on activities that, although they could be important, it would be inappropriate to address them when there are problems that can put the survival of the company at risk, that is, it helps us in the implementation of small but progressive improvements that impact the operation of the companies". [15].

Kaizen is a simple and effective tool for continuous improvement, based on statistical process control and whose objective is to eliminate inefficiencies in each phase of the production process [16]. With the 5S method of

management for SME'S, we can know and act on any type of loss or waste, both in the production process and in the distribution of products that increase costs and decrease productivity [17].

In this sense, Global Consulting distinguishes some essential aspects in its application such as the existence of inefficient or unnecessary processes, defects, delays and possible excess production, but also everything related to the treatment of inventories and the transport of goods or raw materials [18]. Toyota defines waste as: anything other than the minimum of equipment, materials, components and labor time absolutely essential for production ... [19], establishing a change of employees in order to reward the development of processes in an optimal and efficient way.

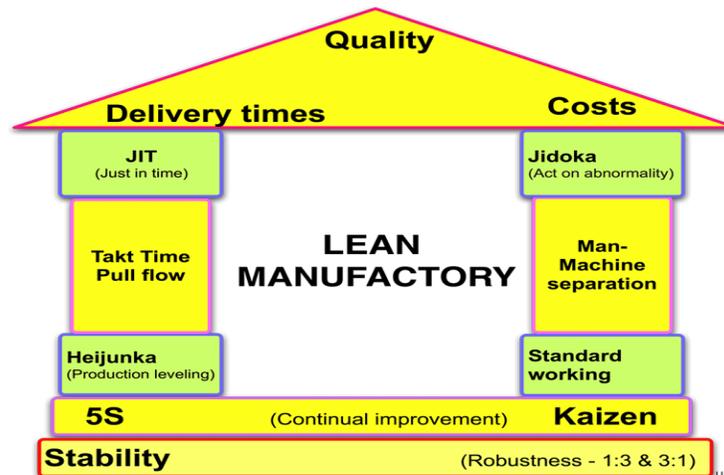


Figure 3. Lean Manufacturing house

2.2 Lean Manufacturing and 5S Methodology-

Although our research is not directed towards large companies, nor are SME's owners of high technology, the market they face is competitive and global. Therefore, work organization techniques that favor proper management and quality control aimed at identifying and subsequently eliminating unnecessary business processes must be taken into account.

Within the Lean system there are a variety of compositional principles, techniques and methods, sometimes not homogeneous, but which can be grouped into three groups:

1. Applicable to the entirety of any company or business sector. (5S, SMED, TPM).
2. They require greater demand from business personnel. (Jidoka, SPP).
3. They program and control both the means of production and the logistics chain. (Kanban) [20]

We will focus on the 5S (First group) and its advantages for a manufacture such as footwear.

The organization of the 5S tool for an SME's, pursues two objectives: eliminate waste and ensure a clean and orderly work environment. For this, it is essential to continue in an orderly manner the 5 steps with the support of adequate resources and adaptation to the internal business culture.

Once applied, the 5S will bring a pleasant sensory impact, thereby reducing or eliminating customer complaints, avoiding customer complaints, improving the worker's interrelation with their work environment, the sense of ownership, and improving efficiency in the processes.

The 5S tool establishes basic routines to eliminate waste generated by the company, which does not add value to the final product. They are broken down into:

Merchandise transports.
Inventory.
Movements.
You wait.
Overproduction.
About processes.
Quality defects.
Excess of meetings.
Waste of knowledge. [21].

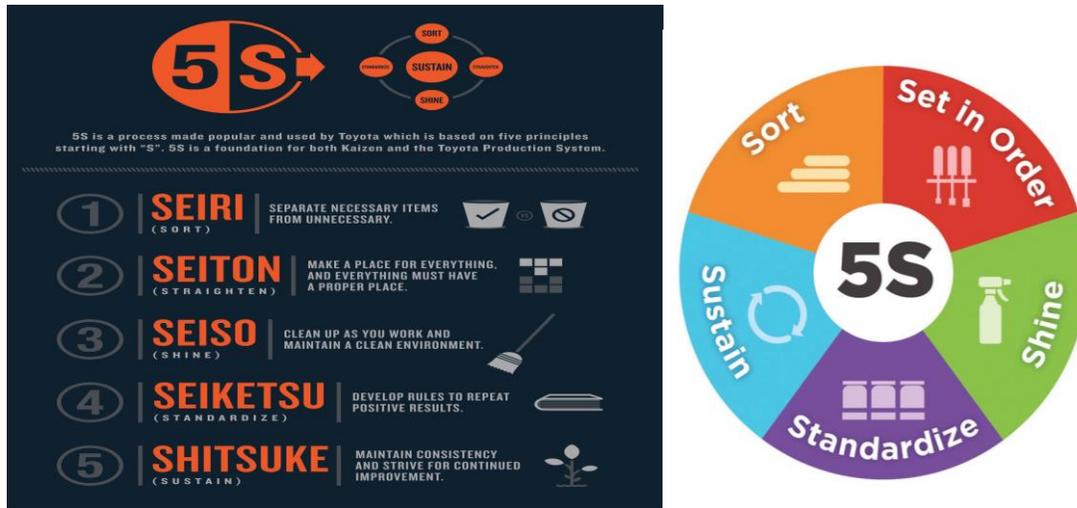


Figure 4. The 5S of Kaizen.

III. EXPERIMENT AND RESULT

a. Separate necessary items from unnecessary.

We will use a technique by means of cards to indicate the degree of importance in case we conclude that the object product of the investigation is supposed to be a waste.

Table -1 Experiment Result. Prototype 5S. Short.

PROTOTYPE 5S FOR SMES IN THE FOOTWEAR SECTOR.			
Factory: _____			
Alleged Waste: _____			
Degree of Incidence: UNNECESSARY <input type="checkbox"/>		NECESSARY <input type="checkbox"/>	
Category: MACHINERY <input type="checkbox"/>		TOOLS <input type="checkbox"/>	PRODUCT <input type="checkbox"/>
MATERIALS <input type="checkbox"/>		WHICH ONE: _____	
Action: REMOVE <input type="checkbox"/>		NOT REMOVE <input type="checkbox"/>	
Date	/ /	COD: _____	Firm: _____

b. Straighten. Make a place for everything.

Organize the necessary elements for the execution of the tasks. Define the locations and establish the necessary identifications for each object. Use the delimitation of work areas, passage areas and storage of tools, raw materials or others, arranging them in an organized manner according to their frequency of use.

Table -2 Experiment Result. Prototype 5S. Straighten.

PROTOTYPE 5S FOR SMES IN THE FOOTWEAR SECTOR. FREQUENCY OF USE.			
Factory: _____		Area _____	
FREQUENCY OF USE	Hourly	Place next to the worker	<input type="checkbox"/>
	Several times a day	Place close to the worker	<input type="checkbox"/>
	Many times per week	In an area	<input type="checkbox"/>
	Some frequencies per month	Place in another area	<input type="checkbox"/>
	A few times a year	Archive	<input type="checkbox"/>
	Once a year	Store	<input type="checkbox"/>
	It may be used		
	Not used	Delete	<input type="checkbox"/>
Date	/ /	COD: _____	Firm: _____

c. Shine. Clean up as you work and maintain a clean environment.

It is inescapable to establish fixed hours for cleaning and inspecting the workplace in the event of possible defects, after having eliminated the unnecessary and cataloged what is necessary for operations. Consider it as an act of maintenance of the equipment and workspaces and not as an extra work.

Table -3 Experiment Result. Prototype 5S. Shine.

PROTOTYPE 5S FOR SMES IN THE FOOTWEAR SECTOR. SHINE.		
Factory: _____		Area _____
CLEAN UP AS YOU WORK AND MAINTAIN A CLEAN ENVIRONMENT	Day	Date
	Week	Date
	Month	Date
	Defect 1	
	Defect 2	
	Defect 3	
Date / /	COD: _____	Firm: _____

d. Standardize.

Fit and implement previous prototype models as final models. Prototype standards are defined and orders are guaranteed to be fulfilled in the best possible way. Photographs can be attached to models for modeling and creating world-class visual management. In the absence of the resource of photographs, summaries of the work carried out would be established.

e. Sustain.

Make a habit of all those set standards. Incorporate self-discipline and self-control as a business culture at work. Visual control systems and mechanisms will be placed to make the accommodation of the 5S to the SME's as pleasant as possible. Through these tools it will be controlled that the entire S are carried out. Basic routines can be visually programmed, introducing order and cleanliness first through signals.

f. Propose a Manual of Functions based on the results obtained.

With the data obtained, the Manual of Functions will be made. It is necessary to reaffirm that for a good investigative course, the companies that undergo the investigation must contribute both the physical space of the factory and the workers.

Table - 4 Experiment Result. Function manual.

FUNCTION MANUAL. SME FOOTWEAR.		
Factory: _____		
Identifier	Variable	Function
	Positions.	<i>A job title is named based on the responsibilities and activities of a job.</i>
	Name of the position.	<i>Number of positions.</i>
	Functions or similar positions.	<i>Different positions that perform the same function</i>
	Job activity.	<i>activity to be carried out by the operator</i>
Date / /	COD: _____	Firm: _____

IV. CONCLUSIONS

Continuous improvement in SMEs begins with a serious commitment to cleanliness and organization, from the small job to the last operator. It starts with a solid organization and cleanliness in the jobs, moving towards the departments and processes.

The zero-defects culture, cost reduction and other improvement activities should move from resistance to initial change towards the norm. Once the tool is applied, other improvement objectives can be set.

Through the measures adopted, reforms will be obtained in terms of faster service, lower costs and guaranteed quality of the products. SMEs will benefit from a decrease in accidents, increasing the useful life of the machinery available and eliminating waste. With this, the SMEs of Norte de Santander will have better opportunities for competitiveness.

IV.RECOMMENDATIONS

Perform periodic verifications to verify the state of compliance with the applied methodology, maintaining strict control and monitoring in each intervention.

Evidence and compare the conditions of the position in order to establish improvements by identifying the new factors that will emerge at the end of each inspection.

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