Implementation of 5S Methodology in Stock Area in an Electronics Factory in Manaus Industrial Polo

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Abstract

In companies in the Manaus industrial district, a vision for continuous improvement is obtained, because large companies seek to follow a quality standard in their products and also in terms of organization in their work environment. This article seeks to describe the benefits of deploying the 5S program in a stock sector, where it is one of the shortcomings of large backlogs of manufacturing products in the manufacturing sector, acting with corrections in material allocation positions, as well as the use of appropriate tools and tools. expanding their spaces, having a low cost and also adapting storage of other different models without problems in identification.

Keywords: Improvement, Organization, Low cost, Storage.

1. Introduction

With the tragedies left by the war, Japan created a methodology in which it could acquire a quality of life with an initial focus on industries. In order to achieve their recovery and development, they created the 5S program as the basis for this improvement, in which the country felt the need for everyone to be involved in order to achieve long term results. This method has sought to make progress since the 1950s, when World War II terrorized the whole of Japan. This was designed to combat postwar disasters.

In Brazil it was created for a reeducation base, seeking to maintain an organized and more productive environment, generating the disposal of those that are no longer used, storage for space generation,

cleanliness, standardized areas generating the ease of finding products for work development, the discipline of keeping clean, identified, organized. The 5S that are in Brazil the Sensos, translated from Japanese to Portuguese are they SEIRI - Sense of Use; SEITON - Sense of Storage and Ordering; SEISO - Sense of Cleanliness; SEIKETSU - Sense of Standardization; SHITSUKE - Sense of Discipline.

The use of 5S in a company does not mean that you should follow the program as it is implemented in Japanese companies, as it is understood that it needs to be a culture embedded in all sectors that involve the organization, being clear to employees, managers and high importance for the quality of life at work, so that it is not lost after some time, being only a reference.

Highlighting each Senso and its importance of implementation in the industrial process, since there is a delay to find certain material, unused raw material, lack of space, disorganization, generating a delay in their release to the productive sector.

2. Theoretical Foundation

To carry out the research, we sought to base the use of the 5S Program in a company of the Manaus industrial hub in the segment of motherboard and card machine electronics.

2.1 5S Philosophy

The 5S program is a methodology created and devised in Japan in the 1960s, aimed at improving the environment of companies that were very dirty and disorganized, as well as ending waste, reducing the number of personal and impersonal accidents and improving the environment. business productivity. [1]

The program aims to: improve the work environment, reduce waste, prevent workplace accidents, streamline processes, improve employee morale and encourage creativity. [2]

Adopting:

- Seiri: Sense of Organization or Use;
- Seiton: Sense of Storage or Order;
- Seiso: Sense of Cleanliness;
- Seiketsu: Sense of Standardization or Health;
- Shitsuke: Sense of Discipline. [3]

2.1.1 Seiri: Sense of Organization or Use

“O senso de organização ou utilização consiste em analisar os locais de trabalho e classificar os objetos segundo sua utilidade ou frequência de uso e retirar do ambiente tudo o que não necessita estar neste local”. [4]

2.1.2 Seiton: Sense of Tidiness or Order

According to [5] "all materials must have their previously established place, and the most used should be located in a place of easier access". However, this Senso contributes to the ordering and tidiness of the department, enabling the location, as well as the gain of new space for storage of raw materials.

Second [6] "is arranging the place where you go to work or perform activities, so as to minimize the search

times for something, which makes the task to be performed more efficient and without risks of accident and less tiring."

The sense of ordering has benefits such as: ease and speed in finding documents and materials; reduces workplace accidents that may occur due to clutter; facilitates communication between employees; avoids the purchase of materials and components unnecessarily; ease of control of purchase orders for stock replenishment and good presentation of the work environment. [1]

2.1.3 Seiso: Sense of Cleanliness

Cleaning is the most basic activity of the 5S, there is no work that does not involve cleaning. It can also be viewed as an inspection, because with clean equipment and machines it is possible to detect any problem while it is still small, making it possible to repair it immediately. The degree of cleanliness is very important for the safety and quality of the products offered. [3]

The sense of cleanliness has the following benefits: prevention of accidents, reflecting in the reduction of employee absences; cleaner and safer work environments; fight against waste; reduction of pollution and aggressions to the environment and greater control in the conservation of materials. [7]

2.1.4 Seiketsu: Sense of Standardization or Health

This requirement recommends keeping employees at work in perfect conditions of hygiene, cleanliness and well-being, with health and safety protection measures, including noise, odor, lighting, temperature, ergonomics and protective equipment. For this, safety and workplace protection rules should be established. [2]

The sense of standardization benefits mental and physical balance; the improvement of the work environment and social coexistence within the company; improving the business image to the external public and improving the level of satisfaction and motivation of the people involved. [1]

This sense refers to the union of the 3 previous senses, in a systemic manner, maintaining the disposal, organization and cleanliness, both continuously.

It results in the standardization of the senses, with the goal that all be fulfilled.

2.1.5 Shitsuke: Sense of Discipline

As expressed [6], “it is that you strictly and continuously comply with the other 4 senses (Seiri, Seiton, Seiso and Seiketsu) without requiring the request of another person (boss or co-worker)”.

According to [4] the sense of self-discipline is something personal, because it indicates the moment when people become aware of the need to seek self-development and consolidate the improvements already achieved with the practice of other senses, not neglecting the constant improvement.

It is the most complex sense to achieve because it requires actions and time for everyone to develop it, mainly because this sense interferes with people's culture and behavior. [7]

It is the sense of self-analysis seeking improvement, establishing proper discipline behavior, aiming at personal and organizational growth.

2.2 Auditoria Interna dos 5S

De acordo com [9], Auditoria interna é uma atividade independente e objetiva que presta serviços de avaliação (assurance) e de consultoria e tem como objetivo adicionar valor e melhorar as operações de uma organização.

Ainda conforme [9], a auditoria auxilia a organização a alcançar seus objetivos adotando uma abordagem sistemática e disciplinada para a avaliação e melhoria da eficácia dos processos de gestão de riscos, de controle e de governança corporativa".

2.3 Stock Management

Companies need a broader view of inventory and management to be able to manage and handle making their business more competitive, as there are gains in management by knowing the importance of limiting their inventory, so there will be no financial waste. It's a waste of time.

As reported [10] Management is a set of activities that aims, through the respective inventory policies, to fully meet the company's needs, with maximum efficiency and the lowest cost, through the largest possible turnover to capital invested in materials.

According to [11], "a company's inventory area is generally responsible for controlling the flow of materials internally, and should therefore balance the needs and availability of the organization's resources, whether human, material, physical and financial space, among others ".

Companies have the importance of having a well-managed inventory, as lack of products as well as excess materials is detrimental to the overall management of the end product and capital.

2.4 Continuous Improvement Process

In the nineteenth century, on the Ford Motor Company assembly line with its concept, improvement gained relevance. In 1948, in Japan, came the continuous improvement in the processes that would influence the change of productions. Nowadays the thinking of (Lean Thinking) meaning of continuous improvement in Japanese is seen in many companies.

According to [12], improvement is characterized as a process of continuous product and process improvement towards major performance improvements. Continuous improvement is characterized as an iterative, cyclical process. That is, from the evaluation of the obtained results, the research and knowledge acquired with an improvement action on a given object of study, new improvement actions can be proposed, which would lead a virtuous cycle of improvement.

For [13], continuous improvement is the search for better results and performance levels of the company's processes, products and activities. It puts it as an objective to be developed culturally in the company and can be generated by a management action or a suggestion of one or several employees.

As stated [14], the continuous improvement process is influenced by external factors and pressures. He says that if his goal is to create an internal structure that can meet external expectations and nullify forces contrary to business development.

Solutions for a Model That Can Be Used

- The PDCA Cycle
- Kaizen Method

- Lean Thinking
- Six Sigma

Of these four tools, only the PDCA Cycle was used for 5S deployment in the Inventory sector, below is an explanation.

2.5 PDCA Concept

In the 1930s it was developed by Engineer Shewhart, the American origin methodology, the PDCA, but it was Deming who publicized the method and made the PDCA known initially in Japan and later worldwide. Based on four words there is a continuous cycle using Plan, Execute, Check, Action.

FIGURE 1 - PDCA Cycle
Source: adapted from [14]

Plan: Identify the problem, analyze and develop the action plan to achieve the goals.
Do: Execution of Action Plans, compliance with standards.
Check: Control the effectiveness of action plans, always following the work, in order to verify the results obtained.
Action: Action Correctly If Needed, Acts with Standardization, Review Activities and Planning

3. Tools and Methods

As ferramentas utilizadas para contribuir na melhoria contínua foram planilhas no Excel, Apresentações no Power Point nas reuniões periódicas durante o processo de implantação do 5S. O Gráfico de Pareto, foi a ferramenta para levantamento dos pontos de melhoria. E, uma equipe foi treinada para acompanhamento do desenvolvimento do método.
Na Análise dos Resultados, nos itens de verificação considerados problemáticos foi utilizada a ferramenta 5W2H, na qual consistiu em analisar a causa raiz do problema, através das sete perguntas: What, Why, Where, When, Who, How, How Much.

4. Application of Study

The application started through a meeting with the sector manager, responsible for the team. The research

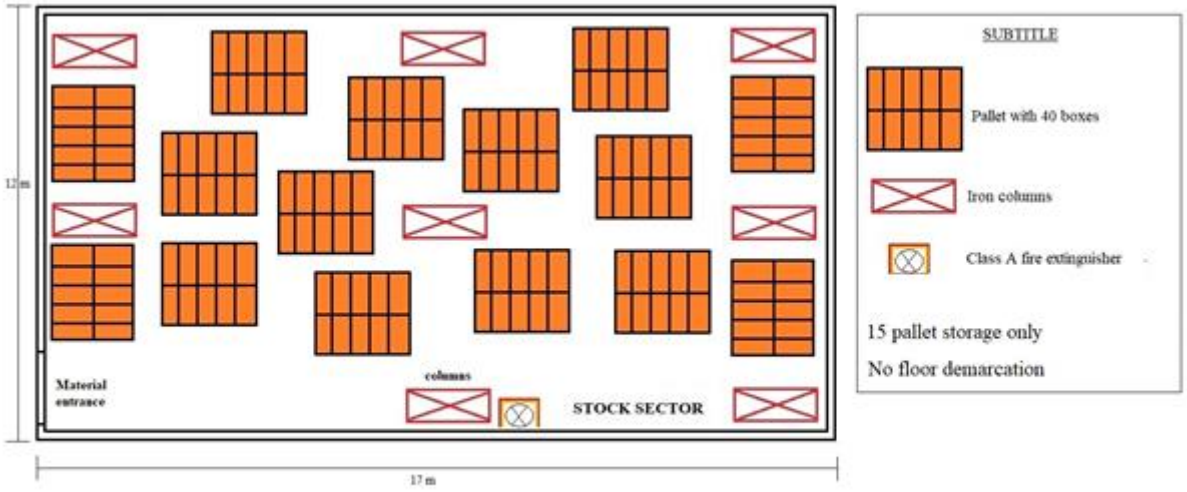
project was implemented through the case study that began with the planning, which defined the execution schedule, the action, the responsible and the execution time.

The Cycle will be approached by explaining each task performed in the deployment.

4.1 PLAN

In the first stage, the definition of the 5S Team was carried out, the team was responsible for planning the deployment, various problems in the sector were evaluated, such as equipment disorganization, obsolete material close to the materials in use, lack of standardization, extremely working table. Messy, working tools out of place, wasting time. After taking several photos of the Sector, a presentation was made to show employees the current status, and the weekly Action plan was set at a meeting with the entire 5S team.

In Figure 1, it demonstrates how the inventory sector was organized prior to the implementation of the 5S Program, with disorganized stored boxes generating a waste of time in delivering materials to the production line.



STOCK SECTOR BEFORE 5S IMPLEMENTATION

FIGURE 2: Previously the stock was organized in a disorganized and wasted space.
Source: Own authorship (2019)

Subsequently to the implementation of the program, it is clear that the space was used, leaving an organized environment, optimizing time both in the search for materials and their exit.

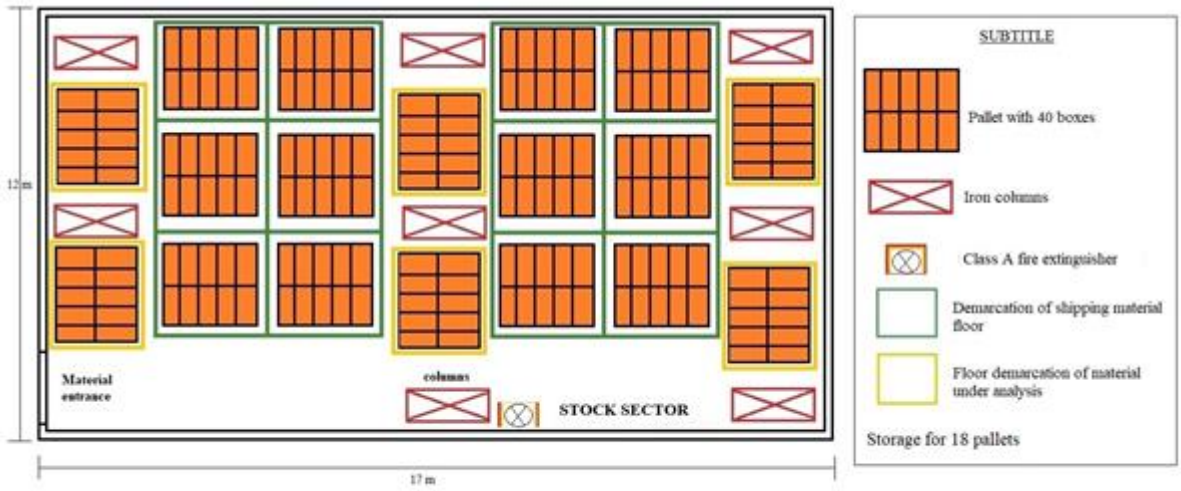


FIGURE 3: After the stock was neatly organized and optimizing the space
Source: Own authorship (2019)

4.2 Implementation (DO)

After the Weekly Action Plan was prepared by the 5S Team, the document was submitted for approval by the Supervisor. a data da apresentação para os sector employees, which would address the 5S Program, demonstrating the current reality of the sector through photographic archives and the Weekly Action Plan, demonstrating to employees the need for change. After this awareness the deployment with the Sense of Use began.

The photographic record of the sector was made, prior to the Program and according to Figure 3 it can be noticed the lack of harmonization in the sector, the dispensing of boxes, which caused a disorganization to the sector, mixed parts, and a heavy environment.

FIGURE 4: Before the stock was always full of boxes with equipment almost always mixed, then there was an improvement, which was garbage went to garbage.
Source: Own authorship (2019)

After the implementation of the Program, the photographic record occurred again, demonstrating the result in the Inventory, leading to the organization of the material, according to what is constantly used and what was not so used, was separated, generating a positive point in the optimization of the material. time, efficiency in finding the right material.

FIGURE 5: Then inventory was organized, with more storage space
Source: Own authorship (2019)

4.2.1 Sense of Use Week

In the first week of project execution, the command was to separate what is useful from what is not, to improve the use of what is useful, to keep only what is needed in the workplace, to combat waste. Before week of use, it was possible to find several empty boxes in the industry taking up shelf space, many unused equipment for productive area. In figure 5, an analysis of the equipment was made, and many of them were sent to the sector responsible for obsolete equipment.

4.2.2 Ordinance Sense Week

In the second week the Ordinance Sense was performed, the organization of parts, tools and equipment in an order that allowed the best work flow. The equipment was arranged so that it was easily found for later use. The process was performed to eliminate unnecessary movements.

4.2.3 Cleaning Sense Week

In the third week, the Sense of Cleaning was applied, and even in the third step, it was already possible to notice the difference. At this stage it is important to perform the cleaning of the environment as well as to keep it clean. It was time to educate not to get dirty, and to look after everything.

4.2.4 Health Sense Week

In the fourth week, the next to be implemented was the Health Sense, it brought the challenge of keeping

clean and organized, favoring physical, mental and emotional health, with hygiene practices.

4.2.5 Self-Discipline Sense Week

In the fifth week, the Sense of Self-discipline triggered, as the other senses generated this stimulus. One factor was that every week a team was assigned to monitor and organize. There was a meeting to align the actions, improve and modify if necessary, as well as to show the results of the week.

4.3 CHECK

For the maintenance of the 5S Program, a group was defined to perform the training, and thus, to follow up the implementation. Once a month a meeting will be held to align actions and program improvements.

4.4 ACTION

After the implementation, there was a meeting with the 5S Team, Auditors and SGI where it was decided that the follow-up visit would be held once a month so that the program could continue and the employees would adapt to the new reality.

Items identified as problematic would be treated with 5W2H to be closer to the solutions.

The 5W2h is a tool used because of its understanding and ease of use. It consists in answering the seven questions so that all the basic and essential aspects of a planning are analyzed.

According to [15], the 5W2H tool is understood as an action plan, that is, the result of a planning as a way of guiding actions that should be executed and implemented, being a way of monitoring the development of what is established in the planning stage. planning.

With the increasing demand for managing processes and information through simple and objective responses, it enables critical information for planning to be identified. It is due to the use of seven English words: What, Where, Where, Who, Why, When, When, How, and How Much how many).

According to a meeting held with Mr. Rodrigo Frota, Inventory Manager, the tool will be used from the monthly follow-up meetings of the program, if problems are identified. Through the tool, it will be done simply, clearly and efficiently.

Table 1: Then inventory was organized, with more storage space

Step	Answer content	Sample Questions
What	Necessary actions to have analyzed	What should be done? What are the problem inputs? What predicts extract from the process? What methods are used?
Why	Justification of actions	Why does the problem occur? Why do you do it this way? Why act on this problem?
Where	locations influenced by the actions	Where does the problem occur? Where to act to correct the problem?

Who	Responsibilities for actions	Who are the stakeholders? Who knows the process? Which people should perform the action?
When	Set deadlines	When to start or to finish? When to perform each step?
How	Methods to be used	How will the plan be implemented? How to record the information? How to define process steps?
How Much	Set budget	How much will the cost involved? How much will the resources cost? How much does it cost to fix the problem?

Source: Own authorship (2019)

5. Final Considerations

Implementation of the 5S program took place in the Inventory sector, where employees received parts and had the mission to ship production in an organized manner and in a short time. The application of the 5S Program added to the development of the sector through the improvement of the work environment, generating employees a time gain in the flow of their activities.

During the implementation there were several resistances, especially with the older employees of the company, the thought "I am like this and I will die like this" hit us in many moments. But cultural changes take time and effort, and with the help of everyone on the 5S team, we can change the landscape.

Some difficulties were encountered when the team needed to urgently send material to production and there was a delay in finding all the requested materials. It was possible to see this, because employees from other shifts complained a lot about this failure, also when there were product changes in production lines.

The environment after the implementation of the 5S was really pleasant, the sector began to have a lightness in the environment, due to the space it generated, breathing a more clean air. Some difficulties have been overcome, others really only over time. The Program required self-discipline employees from time to time, compliance with standards and procedures was a great victory for the 5S Team, and certainly increased productivity and elimination of various wastes that were occurring in the industry.

6. Acknowledgments

I thank God first, my parents who always advised me to move on with choosing the course, my wife who always supported me, my children, friends and teachers for their dedication and affection.

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