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# IMPLEMENTATION OF 5'S METHODOLOGY IN A HAZARDOUS WASTE RECYCLING COMPANY

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**Abstract:** This article is part of the results of a professional residency project that was carried out in a company dedicated to oil recycling, which did not have the appropriate methodology to effectively carry out the organization, cleaning and standardization activities of the company. Standard Operating Procedures (SOPs) and visual aids were developed, in addition to different training sessions for the company's personnel for the correct understanding and compliance with the 5's methodology. The implementation of the 5's methodology allows the company to offer quality products, in addition to providing the client with the assurance that the activities carried out are part of a system that is constantly improving, always seeking to meet the highest quality standards. The implementation of this methodology means that it must be practiced on a daily basis and considered a habit by all members of the company.
**Keywords:** visual ***aids***, trainings, recycling, 5's methodology

## INTRODUCTION

This project was carried out in order to perform the professional residency, aiming the implementation of the 5's methodology in an oil recycling company, this methodology is basic but effective and a basis for continuous improvement by developing a discipline in the activities of organization, cleaning and standardization in the work areas present in the company. This tool has great potential when implemented and has significant results, positively impacting the economic environment and improving production and operation times in the company.

The topic was selected based on the needs of the company Industria Química de Aceites y Combustibles S. de R.L. where the main activity is the recycling of oil, this process is carried out in the production area that due to the nature of operation is susceptible to be dirty so the lack of order and cleanliness, this causes that can go unnoticed by employees and at some point this carelessness can cause some kind of accident or problems may occur in the process.

The company is authorized by the Secretaría de Medio Ambiente y Recursos Naturales (Ministry of the Environment and Natural Resources) and therefore has certain conditions for its operation; with the implementation of this methodology it is complying with these conditions.

Some factors involved in implementing this methodology (Aldavert, 2016):

### QUALITY

Quality is conformity to requirements; they must be clearly stated so that there is no misunderstanding; measurements must be taken continuously to determine conformity to those requirements; non-conformity detected is an absence of quality.

### STRATEGIC PLANNING AND CONTINUOUS IMPROVEMENT

It is the elaboration, development and implementation of different operational plans by companies or organizations, with the intention of achieving objectives and goals. These plans can be short, medium or long term. It consists of 4 phases, which comprise the continuous improvement cycle, also called PHVA cycle:

- Plan
- Make
- Rate
- Act

## 5'S METHODOLOGY

The 5's refer to the initials of the Japanese words that make up this methodology, which is integrally focused on order, cleanliness and detection of anomalies, in order to develop work activities efficiently, prioritizing personnel safety and product quality.

The application of this methodology in the management and administration of work areas leads to a process of continuous improvement, which has a positive impact on improving productivity, competitiveness and quality in companies.

## PRINCIPLES OF THE 5'S METHODOLOGY

This methodology is composed of 5 fundamental principles (Hirano, 1997):

1. Classification (SEIRI)

This refers to identifying the items present in the work area and determining if they are of direct use to the worker or if they need to be reassigned to another area. This includes organizing what is needed and discarding items that are not directly related to the area's activities.

2. Organization (SEITON)

It means to put things in order, that is, to arrange in an orderly manner all the elements that have been considered useful and necessary in the previous step.

The next step is to classify according to use and sort in appropriate places to minimize search time and optimize effort. This is synonymous with standardizing the storage of objects, which will allow anyone to locate any item quickly, take it, use it and return it easily to its place.

It is necessary to define:

a. Which items are to be stored,

b. Where they will be located, and

c. How much is to be stored.

The benefits expected from the implementation of this item are as follows:

- To have a suitable place for each work element, facilitating its access and return to the place, avoiding waste of time and unnecessary movements due to searches.
- Improve productivity by minimizing or eliminating unproductive time. Eliminate losses due to errors and improve compliance with work orders.
- Grooming and cleaning can be performed more easily and safely.
- In the case of machinery, it facilitates the visual identification of the elements of the equipment systems, safety systems, alarms, controls, directions of rotation, etc.
- Allows identification and marking of all process auxiliary systems such as piping, compressed air, fuels; increases production operators' knowledge of the equipment.
- Improved information at the work site to avoid errors and potential risky actions, increasing safety.
- Improves the appearance of the workplace, communicates order, responsibility and commitment to work, thus improving the work environment.

3. Cleaning (SEISO)

This refers to constant cleaning, which means keeping the work equipment in good condition as well as keeping the work environment clean (Rey, 2005).

To achieve permanence at this point, you need:

a. Determine a cleaning program.

b. Define cleaning activities and methods.

c. Create discipline (training).

Advantages

- Reduces the potential risk of accidents.
- The useful life of the equipment is increased by avoiding deterioration due to contamination and dirt.
- Malfunctions can be identified more easily when the equipment is in an optimal state of cleanliness.
- Product quality is improved and losses due to dirt or contamination are avoided.

4. Standardization (SEIKETSU)

This methodology allows maintaining the achievements reached with the application of the first three "S's". If there is no process to maintain the achievements, it is possible that the workplace will again have unnecessary elements and the cleanliness achieved with the actions performed daily will be lost.

Benefits:

- The well-being of the personnel is improved by creating a habit of keeping the workplace spotless on a permanent basis.
- Cleaning errors that could lead to accidents or occupational hazards that could be avoided are avoided.
- Intervention times are improved and plant productivity is increased.

All the area's personnel, beginning with the main director, should be clear that the actions carried out by the groups should be born from the group itself, thus establishing a sense of ownership by being the intellectual and material authors. It is important that you want to carry out the activities of the first 3's actively participate in the development of standards and procedures, which helps and facilitates progress in this effort (Vargas, 2004).

5. Discipline (*SHITSUKE*)

It means making it a habit to employ and use established and standardized methods for cleaning in the workplace. Its application is a guarantee of permanent safety, it helps to improve productivity progressively and the quality of the products will be better.

Shitsuke is the bridge between the 5's and the Kaizen or continuous improvement concept. The habits developed with the practice of the PHVA cycle are a good model to make discipline a fundamental value in the way of doing a job (Villa, 2014).

Shitsuke implies:

- Perform personal control and respect for the rules that regulate the operation of an organization.
- Promote the habit of self-monitoring or reflecting on the level of compliance with the established rules.
- To understand the importance of respect for others and for the rules in which the worker has certainly participated directly or indirectly in their development.
- Benefits of applying shitsuke:
- A culture of sensitivity, respect and care for the company's resources is created.
- Established standards are followed and there is greater sensitivity and respect among people.
- The customer will feel more satisfied because the quality levels will be higher due to the fact that established procedures and standards have been fully respected, i.e., everything is progressively controlled.

## METHOD DESCRIPTION

This project was carried out in order to implement the 5's methodology in a company dedicated to the recycling of used oil, mainly in the production and laboratory areas, as shown in Figure 1.

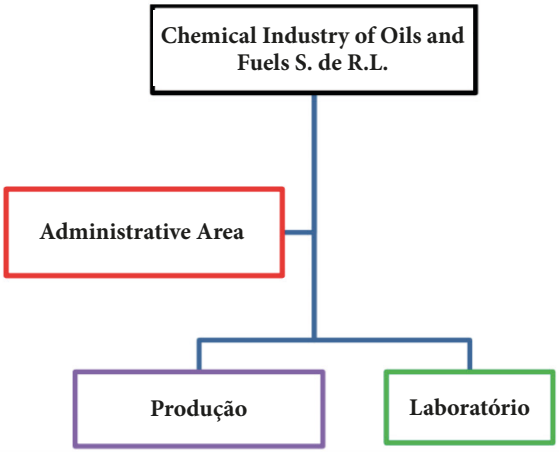


Figure 1. Organization chart of the Chemical Industry of Oils and Fuels

The following activities were carried out (Villaseñor, 2010):

- Initial Evaluation
- Prioritization of activities
- Implementation of the 5's methodology

## RESULTS

Based on the proposed activities, the following results were obtained

- Initial evaluation

An initial evaluation was carried out in order to obtain an indicator that would provide a basis for the project and at the same time serve as a first approach to the 5's methodology for the company's personnel.

- Questionnaire

This evaluation was carried out in the form of a questionnaire with questions related to the activities performed by the personnel in the different areas, as well as their perception of order and cleanliness through answers to simple statements. Figure 2 shows that 80% of the employees have the appropriate tools to carry out their activities, 20% of them answered that they do not. In Figure 3, 80% of them mentioned that in their work area they have accumulated material (that they do not need) which can hinder their work and create opportunities for accidents.

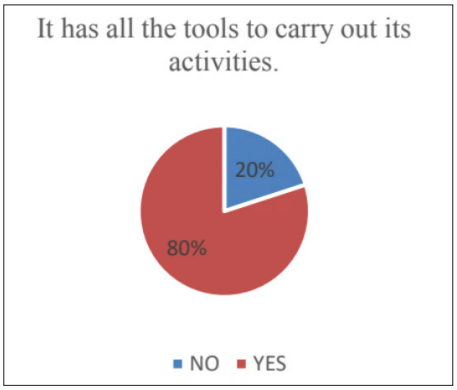


Figure 2. Sufficient tools

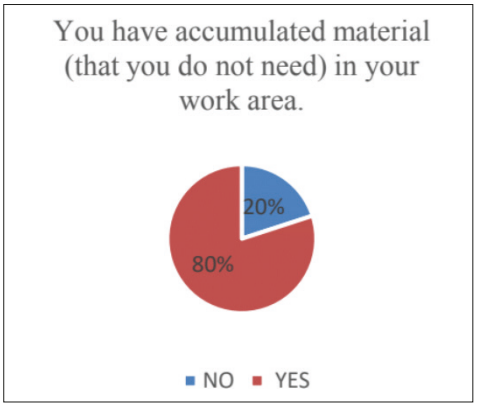


Figure 3. Accumulated material

Figure 4 shows that there are materials and objects that should not go in the work area and they do not know how they got there (40%) which confirms the response of figure 3 and reinforces the evidence of the implementation of the 5's methodology and figure 5 shows that 100% of the employees keep their work area clean of the garbage generated in their activities, which indicates their willingness to work in a clean and safe environment, but they do not have control over the material that accumulates near their work area.

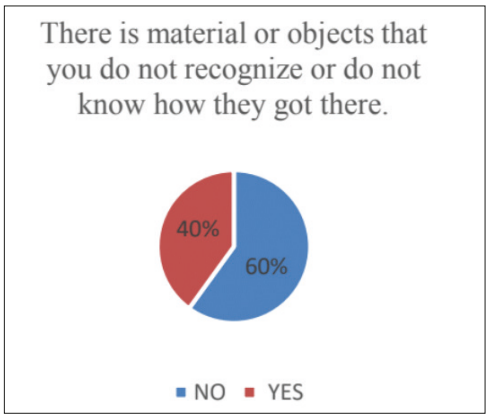


Figure 4. Material that should not be in the work area

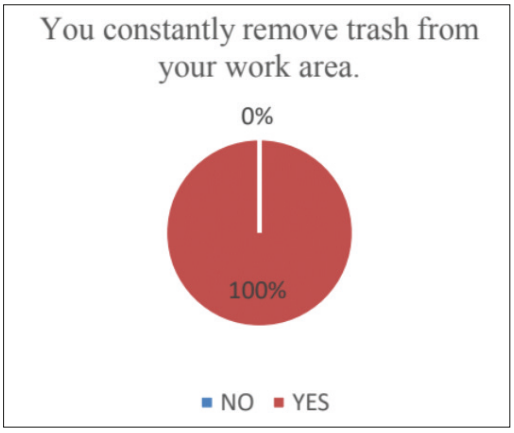


Figure 5. Cleanliness in the work area

In Figures 6 and 7, all the employees mentioned that they were made aware of the 5's methodology and agree that the safety and quality of their work can be improved if this methodology is applied.

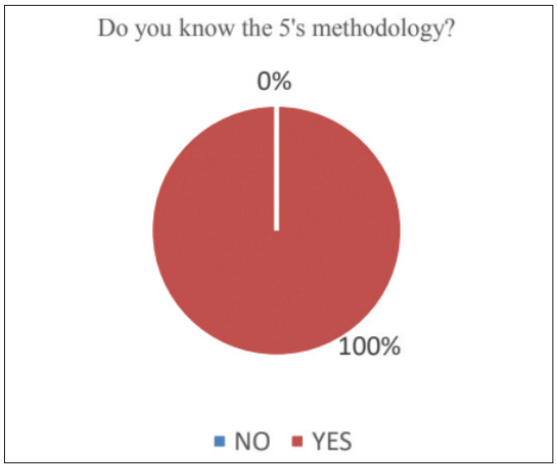


Figure 6. Knowledge of the 5's Methodology

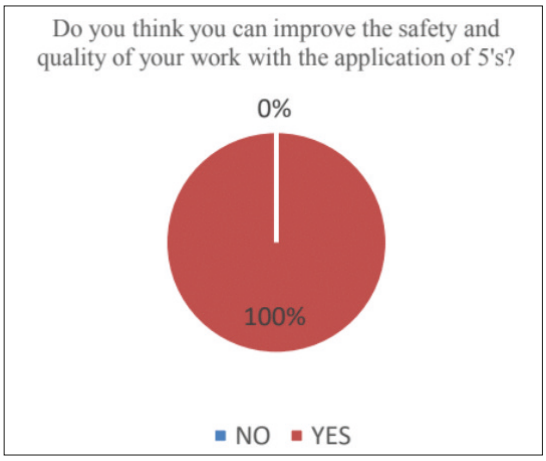


Figure 7. Safety and quality improvement

- Evidence gathering

A tour of the plant was conducted and a photographic memory was taken to obtain images of the initial state of the plant.

- Prioritization of activities

Based on the information obtained in the initial evaluation, it was decided to start in the process area, as this is the place where there is the largest number of storage areas, equipment and objects, which did not follow a pattern of order and cleanliness.

There are 3 warehouses in the process area:

- Hazardous Waste Warehouse.
- Personal Protective Equipment Warehouse.
- Tools Warehouse.

## IMPLEMENTATION OF THE 5'S METHODOLOGY

a. Classification (Seiri)

For the identification of objects and their usefulness, an identification and disposition diagram was made (Figure 2), through which a classification can be made into four groups: necessary objects, damaged objects, obsolete objects and surplus objects (Venegas, 2018).

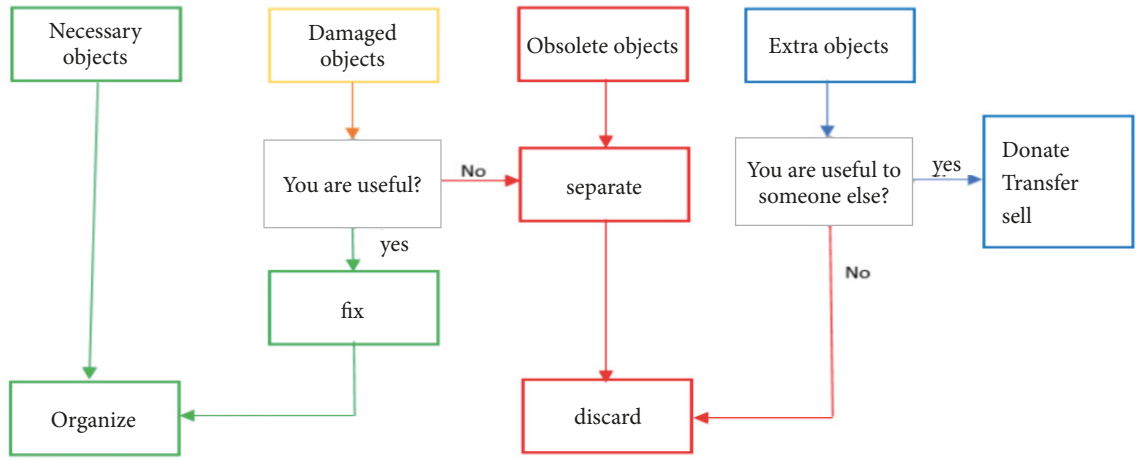


Figure 2. Identification and arrangement of objects

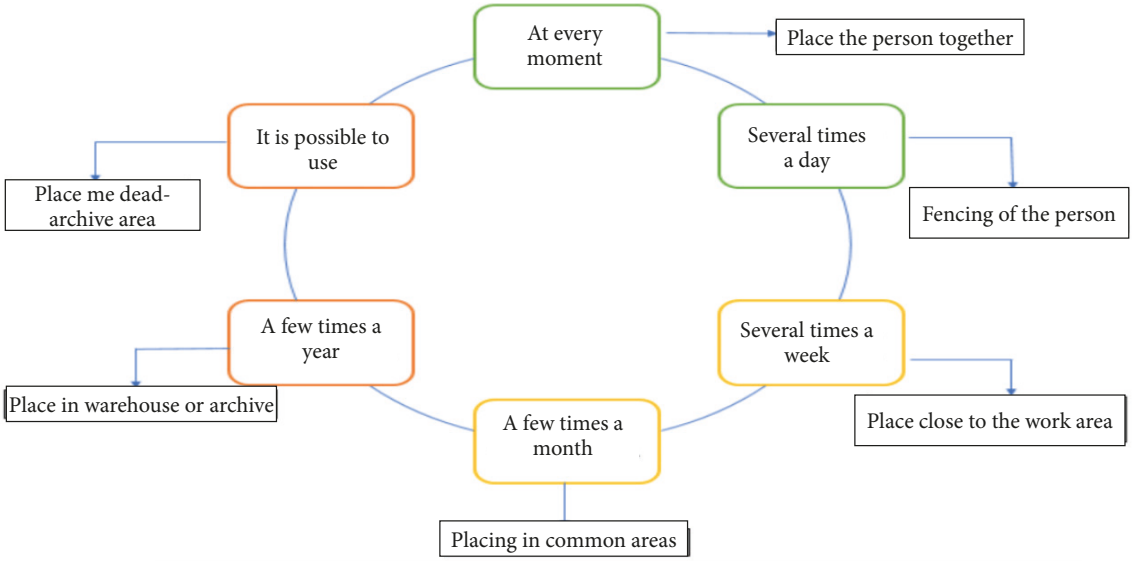


Figure 3. Determination of the organization of the objects in relation to the use of the objects.

a.1. Red Cards

A label or red card format was developed as an evaluation aid to answer the following questions:

- Is this element necessary?
- If necessary, is it in this amount?
- If necessary and in this quantity, does it need to be in this location?

b. Organization (Seiton)

A diagram was made to determine the place for each object according to its usefulness in order to organize them in relation to their use in daily activities (Figure 3).

c. Standardization (Seiketsu).

In order for the above 3's to remain as a standard to be maintained within the company, operating manuals were prepared, specifying the procedures carried out in the production and laboratory areas, as well as the elements that comprise them. A continuous review form was also created to periodically evaluate aspects of order and cleanliness, in which the performance of the implementation of the 5's methodology is evaluated. The aspects that are not complied with or are found to be contrary situations are corrected with the support of a report of findings in which a solution to these problems is proposed.

d. Discipline (Shitsuke).

To lay the foundations of this methodology and as part of the commitment of the personnel to comply with it, a training session was held in which topics related to the environmental laws and regulations to which the company is subject were addressed, as well as requirements or operating conditions requested by the corresponding authorities and how the implementation of the 5's methodology can be one of the ways to comply with part of them.

## CONCLUSIONS AND RECOMMENDATIONS

The implementation of the 5's methodology is just one more step in the establishment of objectives and results to grow as a company, offering quality products giving the customer the assurance that the activities performed are part of a system that is constantly improving, always seeking to meet the highest quality standards (Lefcovich, 2008).

As a recommendation, it only remains to say that the implementation of this methodology is something that has to be practiced daily, always seeking to be part of the activities as a way to improve and positively impact the environment and place where we work.

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