# 5S  IN QUALITY MANAGEMENT

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**Abstract:** *The fundamental principles of organization are customer satisfaction, eliminating waste, achieving a continuous flow in production and continuous improvement. The 5S method is a structured program for implementation the standardization and organization, simplifies the environment of the workplace (Gemba), reduce losses and unnecessary activities, and improve quality efficiency and safety.* ***Keeping the workplace clean, providing a good working environment and promote productivity, reducing costs, ensure security and removes all types of losses. The case study present the 5S method as a tool which can be used efficiently to keep those things necessary for the proper conduct of the organization and the elimination of unless things.***

**Keywords:** 5S, Kaizen, quality, waste, Gemba, management change

**JEL classification:** M11, M12, M14

## 1. Introduction
**The 5S is an advance management technique, which is applied to reduce waste, pointless activities environment of workplace and under the international standards also assurance of safety work place.**
**The purpose of implementation of 5S is to identify and remove dirt and disorder into the area of employee's workplace.**
The organization management principles are: customer satisfaction, to eliminate wastes, to achieve a continuous flow in production and a continuous improvement.
New ways of achieving the organization objectives in the easiest manner with the lowest costs are a provocation for any organization.
The 5S's method   increase production, maintenance costs, also contribute to labor motivation and improve organizations image in the eyes of economical agents and and the customers.
It is known that at the moment the organization decide to implement the Kaizen  concept for quality improvement. The 5S's practice is a technique used to establish and maintain quality environment in an organisation.
The name 5S's stands from Jananese words (Osada, 1991):
1.SEIRI -setting, elimination of unnecessary things, sorting;
2.SEITON-order, arrangement  methodical appoach;
3.SEISO - inspection control, cleaning , disturbance detection the working areas, equipment  will be clean;
4.SEIKETSU-standardizing the extension of the cleaning concept;
5.SHITHSUKE-discipline, moral education, respect for others and sustain the entire activity of organization.
5S is one of the most widely adopted techniques from the Lean Manufacturing toolbox (Titu, Oprean and Grecu, 2010).
The Kaizen umbrella protect the continouse improvement of quality including here the manufacturing management process where: K- represent knowledge, A-achivement, I-innovation, Z-zero defects, E-employeers, N-nonconformity (Figure.1).
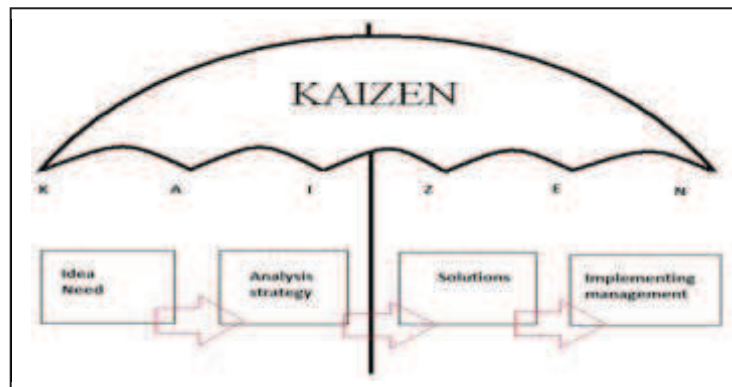
**Figure 1:** Step by step method to improve quality in organization
Source: By the author

Bungău, Blaga and Gherghea (2011) used 5S's Audit method to implement 5S in operational management and observed that organization is receiving multiple subscriptions of the same problems:

- no program to consolidate and to make information available;
- untrained in using central document filling system;
- unaware of duplicate subscription;
- no method to centralize subscription of information's;
- no space for common storage.

The management has been translate to organization departments and become a tactic activity of the organization.

The implementation concept of continuouse improvement using 5S's method involves the following objective:

1. Increase the storing place;
2. Create a nonconformity report procedure;
3. Create and preserved the membership;
4. Reduce the unproductive times;
5. Redefine the access, working and storing place;
6. Readjust the location.

## 2. Case study

In January 2015, a survey was conducted to find out the suitability importance, difficulties and benefits of 5S implementation.

In order to be able to comment the 5S practice, a 5S Audit Worksheet developed by Ho (1999) was used in the study.

According to obtained a positive response to each S, the propose target for each S was 5, so each S must obtain a minimum of 5 and a total score of 25, for all 5S's.

A Likert scale for 5S's rating was used to obtain the results, in function of respondent perception the score was 0= poor-unacceptable, 1= marginal, 2= satisfactory, 3= good, 4= excellent and 5=for strongly agree.

According to the survey for each S it was possible to identify the baseline of 5S's Audit from the first and from the second implementation of 5S's method.

It is important to define the structure of 5S's terms in order to ensure the good working of organization and prevent the wastes.

Also the entire staff was involved in organization activity according to possibilities.

Using computerized management system 5S Audit was presented in association with each S.

## 3. Results

According to the values score obtain for each S, the organization has reached or not the proposed target.

The 5S's method was applied to present the results of the 5S Audit after the second implementation of the method.

The 5S interface used the following steps: preparation, initial audit, education quality culture and the 5S's principles. If analyze each S, based on specific questions, qualification of 5S is achieved by specific score for question:

For- **S1-SEIRI- SORT**- making the difference between necessary and unless things, giving up the unless ones (Table 1).

**Table 1:** S1-SEIRI-Sort before 5S Audit

<table>
<tr><td rowspan="2"></td><td colspan="2">Check Item</td><td>Description</td><td colspan="6">Score</td></tr>
<tr><td></td><td></td><td></td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr>
<tr><td rowspan="5">1 S<br><br>SORT</td><td>1</td><td>Materials or part</td><td>Does the inventory or in-process inventory include any unneeded materials or parts?</td><td></td><td></td><td>x</td><td></td><td></td><td></td></tr>
<tr><td>2</td><td>Machines or equipment</td><td>Are there any unused machines or other equipment around?</td><td></td><td></td><td></td><td>x</td><td></td><td></td></tr>
<tr><td>3</td><td>Jigs, tools, or dies</td><td>Are there any unused jobs, tools, dies or similar items around?</td><td></td><td></td><td></td><td>x</td><td></td><td></td></tr>
<tr><td>4</td><td>Visual control</td><td>Is it obvious which items have been marked as unnecessary?</td><td></td><td></td><td></td><td></td><td>x</td><td></td></tr>
<tr><td>5</td><td>Written standards</td><td>Has establishing the 5S's left behind any useless standard?</td><td></td><td></td><td></td><td>x</td><td></td><td></td></tr>
<tr><td colspan="3" align="right">Sub Total</td><td></td><td></td><td>2</td><td>9</td><td>4</td><td></td></tr>
<tr><td colspan="3" align="right">Sort Average</td><td></td><td></td><td></td><td></td><td></td><td>3</td></tr>
</table>

Source: By the author

Total score achieved is:
- red labels have been applied to all marks, which were not necessary during the activity;
- all the useless things have been stored and eliminated;
- rules specific to this activity have been stated and are to be implemented.

For- **S2-SEITON-ORDER**-ordering and arrangement. The ordering of all items the results are presented in Table 2.

**Table 2:** S2-SEITON- Order before 5S Audit

| | | Check item | Description | Score | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 0 | 1 | 2 | 3 | 4 | 5 |
| **STRAIGHTEN** **2 S** | 1 | Location Indicators | Are shelves and other storage areas marked with location indicators and addresses? | | | x | | | |
| | 2 | Location indicators. Item Indicators | Do the shelves have signboards showing which items go where? | | | x | | | |
| | 3 | Quantity Indicators | Are the maximum and minimum allowable quantities indicated? | | | x | | | |
| | 4 | Demarcation of walk ways and in-process inventory areas | Are white lines or other markers used to clearly indicate walkways and storage areas? | | | | x | | |
| | 5 | Jigs and tools | Are jigs and tools arranged more rationally to facilitate picking them up and returning them? | | | x | | | |
| | | | Sub Total | | | 8 | 3 | | |
| | | | Straighten Average | | | | | | 2,5 |

Source: By the author

Total score is:
- All objects which were placed inappropriately have been taken inventory of;
- The locations of al objects necessary in the workplace have been define;
- The access, storing areas have been established.

For- **S3-SEISO-CLEANING.** Directley the staff its encourage to suggest and make improvements in organization management in different departments ( Table 3).

**Table 3**. S3-SEISO-Cleaning before 5S audit

| | | Check item | Description | Score | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 0 | 1 | 2 | 3 | 4 | 5 |
| **SHINE** **3 S** | 1 | Floors | Are floors kept shiny clean and free of waste, water and oil? | | | x | | | |
| | 2 | Machines | Are the machine wiped clean often and kept free of shavings, chips and oil? | | | | x | | |
| | 3 | Cleaning and checking | Is equipment inspection combined with equipment maintenance? | | | x | | | |
| | 4 | Cleaning responsibilities | Is there a person responsible for overseeing cleaning operations? | | | x | | | |
| | 5 | Habitual cleanliness | Do operators habitually sweep floors, and wipe equipment without being told? | | | | x | | |
| | | | Sub Total | | | 6 | 6 | | |
| | | | Shine Average | | | | | | 2,4 |

Source : By the author

For–**S4-SEIKETSU –STANDARDIZATION.** After the interpretation of the results, 5S will confirme that the implementation, application of the method and method concepts, don't need any investment only more attention to details and practical work inteligently (Table 4).

**Table 4**: S4-SEIKETSU –Standardization –before 5S audit

| | | Check item | Description | Score | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 0 | 1 | 2 | 3 | 4 | 5 |
| **STANDARDIZE** **4 S** | 1 | Improvement memos | Are improvement memos regularly being generated? | | | | x | | |
| | 2 | Improvement ideas | Are improvement ideas being acted on? | | | x | | | |
| | 3 | Key procedures | Are standard procedures clear, documented and actively used? | | | | x | | |
| | 4 | Improvement plan | Are the future standards being considered with a clear improvement plan for the area? | | | | x | | |
| | 5 | The first 3 S's | Are the first 3 S's (sort, set locations and shine) being maintained? | | | x | | | |
| | | | Sub Total | | | 4 | 9 | | |
| | | | Standardize Average | | | | | 2.6 | |

Source: By the author

For-**S5-SHITSUKE-SUSTAIN.** A good organization, a well know role in team and the responsabilities, are the objectives of the organization which should be clearley define and accepted by all its members.
**The 5S's was implemented, but the results** are low **for S5, the score encourage and confirm that** some changes in organization are necessary (Table 5).

**Table 5:** S5-SHITSUKE –Sustain before 5S audit

| | | Check | Description | Score | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 0 | 1 | 2 | 3 | 4 | 5 |
| **SUSTAIN** **5 S** | 1 | Item Training | Is everyone adequately trained in standard procedure? | | | | | x | |
| | 2 | Tools and parts | Are tools and parts being stored correctly? | | | | | x | |
| | 3 | Stock controls | Are stock controls being adhered to? | | | | | x | |
| | 4 | Procedures | Are procedures up-to-date and regularly reviewed? | | | | x | | |
| | 5 | Activity boards | Are activity boards up-to-date and regularly reviewed? | | | | x | | |
| | | | Sub Total | | | | 6 | 12 | |
| | | | Sustain Average | | | | | | 3,8 |

Source : By the author

**The next application in organization is recycling cars specific components, using a computerized micro-program for implementation of 5S with positive effects in manufacturing and remanufacturing production (Daraba,** 2007).
After a detailed analysis, we can observed that even in the area where initially we consider they don't need changes, improvements are needed, with a lot of possibilities which don't need investments (Figure 2).

**Figure 2:** 5S's in organization before 5S's method and after 5S's Audit
Source: By the author

If 5S is not taken up seriously then it leads to 5D's: delays, defects, dissatisfied customers, declining profits and demoralized employee.

A new management concept of total productive maintenance has formulated, which together with other pillars of the company, preventive maintenance, maintenance-productive, 5S, auto-maintenance and continuous-improvement, give the answer to the link between quality and organization maintenance (Boca. G.D., 2012).

## 4. In conclusion

The 5S method is a structured program for implementation the standardization into organization, simplifies the environment of the workplace (Gemba), reduce losses and unnecessary activities, improve quality, efficiency and workplace safety a new S6.

The foundation of the Gemba house, is focus on wastes activities. 3M's –muda, mura and muri is understandable because pulling out wasteful activities is one of the foundation of continuouse improvement (Figure 3).

Another important component for the house foundation 5S is keeping the discipline in house quality of organization.
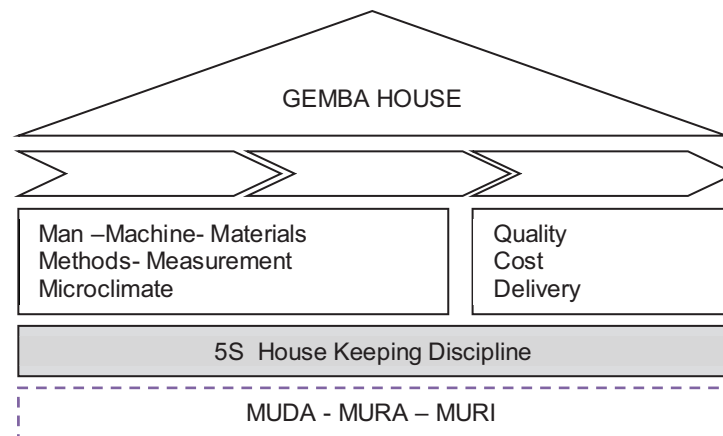


**Figure 3:** Gemba House in organization
Source: By the author

The six major sources of losses in that study which can lead and support the implementation of 5S's system are: stop-time accidental, time to change, adjustment and adaptation of equipment, micro-machine stops, slow-functioning equipment, defect quality and start-faults.

The 5S Audit was conducted using monthly schedule, but whenever is requiered by auditors from quality department, it is possible to establish specific objectives with different priorities like in Table 6.

**Table 6:** Specific objective

| Priority | Frequency of use | How to use |
|---|---|---|
| Low | Once per year<br>Less than once per year | Throw away<br>Store away from the work place |
| Average | Once per month<br>Once per week | Store together but offline |
| High | Once per day | Locate at the workplace |

Source : By the author

The pillars of Gemba house are represented by the 5M's –man, machine, material, method of controls, quality measure and microclimate (work environment).

Manager as a leader can improve his qualities and capabilities through training and practice, and organization can move pushing for continuous training of employees.

Using the 5S's method was possible to identify also for leadership the 5S's keys.

The leadership keys can be structured in four categories primary understanding of S, secondary supervisory understanding of S, waiting progress review of S and auxiliary key with the specific elements of S impact in organization (see Table 7).

**Table 7**: The 5S for leadership

| 5S Understanding of Executives | Primary understanding | 1 |
|---|---|---|
| * General Awareness | | |
| * Executive Involvement | | |
| 5S Understanding of Supervisory & Front line | Secondary supervisory | 2 |
| * General Awareness | | |
| * Executive Involvement | | |
| 5S is included as part of monthly progress review | Waiting progress review | 3 |
| * Evidence of discussions (Agenda, minutes) | | |
| * Evidence to follow up | | |
| Orderliness and cleanliness of gate/entrance/ lobby areas & first impressions to a visitor | Auxiliary | 4 |
| * Entrance area | | |
| * Lobby area | | |

Source : By the author

In conclusion applying the 5S's Audit, the score before the implementation of 5S's was equal with 70 points and after the Audit the organization obtained a significant improvement to 88 score.

Each S who obtain low score, needs a new action, a plan aimed to increase the score and improve the organization conditions (Table 8).

**Table 8:** 5S Auditresults

| Category | Score before 5S | Score avarage | Score after 5S | Score avarage |
|---|---|---|---|---|
| Sort | 15 | 3 | 20 | 4 |
| Straighten | 11 | 2.5 | 15 | 3 |
| Shine | 12 | 2.4 | 15 | 3 |
| Standardize | 13 | 2.6 | 15 | 3 |
| Sustain | 19 | 3.8 | 23 | 4.7 |
| Total Points | 70 | 14.3 | 88 | 17.7 |

Source: By the author

Using the 5S's data was possible to influence S2, S3, S4 from low values to maximum values of 15 points after audit and improve the micro-environment organization conditions.

For S5=sustain, even the values before and after the 5S's implementation, are high, the organization has some problems between manager-subordinates relationship, regarding the staff training and communication.

Analyzing the results, according to the spider diagram for the first implementation of 5S's method (Figure 4), we can identify a good score for S3=shine from 12 to 15 maximum score, and for S4= standardization from 13 to 15 maximum score.
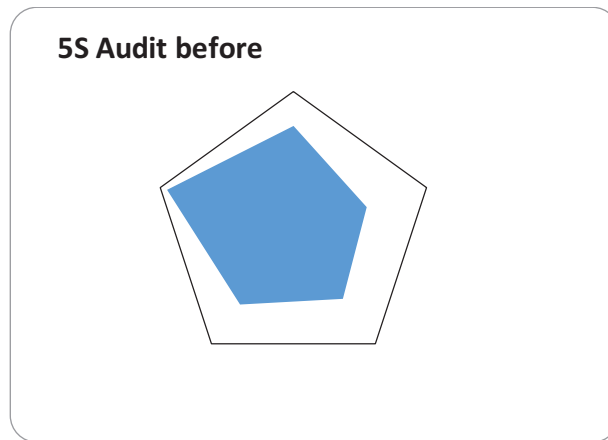
**5S Audit before**

Figure 4:The Spider diagram after first implementation of 5S's
Source: By the  author

We may establish  also for each S, the values before and after the 5S's Audit method and encourage the organization to apply the method (Figure 5).
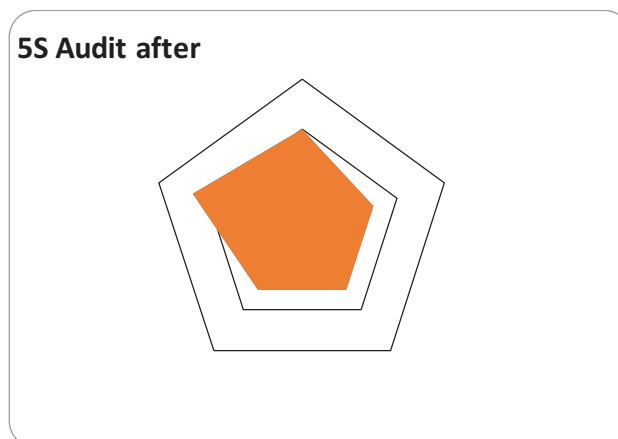


**5S Audit after**

Figure 5:The Spider diagram after second  5S's Audit
Source: By the author

A new development direction has been defined and it is definitely one based on quality (Abrudan, 2012).

Quality standards have been promoted and production has experienced all necessary modification in order to suite them.

As a conclusion, when we are added the 5S element, the quality management, environmental management and safety management systems can be steered towards Total Quality Management (TQM), as shown in the flow diagram below:

**5-S » ISO 9000 / ISO14000 / OHSAS 1800 » TQM**

Quality management doesn't need to prove its importance anymore. In the new modern age quality has become a heraldic element inside every organization that participates to production and distribution of goods and services under the quality passport (Table 9).

**Table 9:** Quality management heraldic elements

| 5S | ISO 9000 | ISO 14000 | OHSAS 1800 |
|---|---|---|---|
| **improve efficiency** | Quality Management Standards | Environment Protection Standards | Security Safety Standards |
| **basis for improvement** | | | |
| **support positive motivation for operators** | | | |
| **built the company image** | = | = | = |
| **identify quality problems** | Quality Management | Protection Management | Human Resources Management |
| **TOTAL QUALITY MANAGEMENT** | | | |

Source: By the author

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