

Common Methodology For Implementing 5S Practices In An Industry

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Abstract: *One of the major challenges in this competitive business world is to manage the quality of work environment. In an approach to enhance the quality of work environment the lean management is adopted. 5S is a simple tool of lean management which proves to be an extremely effective technique to manage the work environment quality. In this paper, the implementation of 5S and its influence over the quality of workplace is discussed along with the methodology of implementation.*

Keyword: *5S; Seiri; Seiton; Seiso; Seiketsu; Shitsuke; Modal Rating.*

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I. INTRODUCTION AND LITERATURE REVIEW

Every organization aims for profit, and in today's global market scenario the profit made from waste and as well through the proper workplace management is necessary. This can only be done when there's a stringent implementation of some technique which governs the management of workplace in a desired way. 5S is a simple tool of lean management which ensures the enhancement of the quality of the workplace once it gets implemented in an organization. To put in simple terms 5S governs what should be kept, where it should be kept, how it should be started, and in turn ensuring efficient, repeatable and safe ways of working. The main concept of 5S is to enhance the work efficiency, environmental safety, standard process flow and visual management. Assertion of 5S is to assign location for everything and time is not to be wasted by looking for things. Mr. Larry Simmons quoted "It's a way to help people get more work done by working half as hard so that the company can make more money". The most important factor of 5S is it makes the problem immediately obvious. It is a team run process and should be conducted by the people who work within the area in which the principles of 5S is being applied. The practitioners often mistake the words workplace organization as a synonym for housekeeping. This is quite myopic and misleading as it leads one to believe that 5S is a tool for driving workplace cleanliness. Workplace organization refers to the way, the various components of a workplace system are managed and organized, for example the workplace procedure, rules, inventory management, policies, and so on. Thus 5S is structured program which is implemented in an organization to systematically achieve the organizational cleanliness and standardization in workplace. 1. Chauhan et al. (2010) shows the problem to sustain in a global market for an organization. Lean manufacturing is the rhythm followed by every organization for its survival and success. The main idea of lean manufacturing is to reduce the types of waste so that the price of the product can be reduced. 2. Huldi and Inamdar (2010) described the development of key areas in lean management to enhance the production efficiency. 3. Dalgobind and Anjani (2009) presented the methodology for determining the real problem associated with the industries in implementing the lean management and also stated the required lean tools to make sure it helps the company to achieve its long term vision. 4. Gheorghe (2008) presented a continuous improvement strategy to improve the manufacturing and the sequential effects on the on the industry's performance was analyzed. 5. ShahryarSooroshian, Meysamsalini, ShanthiBavani, HastiAminattaheri (2012) described the implementation of 5S philosophy which involves a real case study, the top level management's interest, the benchmarking factor and involvement of employee was given attention and emphasized. 6. Prashant koli (2012) calculation of 5S and implementing it in the real life scenario was discussed in this paper.

1.2 Research Objective

The objective of this research is to identify the optimum way of understanding and implementing 5S practices in an industry with statistical and holistic approach which tends to increase the productivity and effectiveness of the production of an industry.

1.3 Implementation and rating of 5S practices in an industry

Here we are going to assign score to the 5 different types of S that is present in the 5S system. And these scores will let us know the current status of the industrial housekeeping and what can be the precautionary actions for enhancing the performance of the industry.

1.3.1 SEIRI (Sort)

This is the primary step that need to be done after the implementation of 5S in an organization. Sorting through things that is present in the workplace and removing the unnecessary items from the work place. The action plan for implementing SEIRI in an industry:

Table 1: Questionnaire for implementing SEIRI

Questionnaire
1. Have you totally looked around your workplace and listed all the items?
2. Is this item needed?
3. If it is needed then is it needed in this quantity?
4. If it is needed, should it be located here?
5. If it is needed, then how frequently it is being used.
6. Who is ultimately responsible for the item?
7. Are there any non-needed items cluttering the workplace?
8. Are there any tools or materials that is left on the floor?
9. Is there an availability of holding area in every department?

Now the answers to the above given questionnaire gives us an idea about how the items that is present in an industry is being handled. After analyzing the answers the precautionary methods are taken into consideration for correcting it.

Precautionary methods:

1. Classify the necessary items according to the frequency of use.
2. Items or equipment used once in a week or once in a month should be kept within the reach.
3. Items or equipment's used less frequently should be stored in a more distant location.
4. Unnecessary items should be stored in the holding area.
5. Responsibility of the holding area should be assigned to someone at the beginning of the sorting activity.
6. The materials in the holding area should be kept for 3 to 4 months and before disposing any item it should be authorized by the person assigned for it.

After completing the above given methods successfully, rate the SEIRI as given below.

1. Material availability: The quantity of the material is given importance 0 is given for the material unavailability and 1 is given for the material availability.
2. Defective goods: The fraction of the non-defective goods is checked. If there are N items which contain M items as defective then $[1 - \{M/N\}] =$ fraction of fine goods. If the value is equal to 1 then it is taken as 1 point and if not award 0 point.
3. Operating condition: If the operating condition is under control then it is taken as 1 point, if not then assign 0 point to the system.
4. Relative information: If full information like working condition, material information and process guidelines is given then give 1 point, if not then give 0 point.
5. Elimination of waste: Let P be the total number of waste and Q be the waste that is eliminated. If the fraction $[Q/P]$ is 1 then award with 1 point, if not award 0 point.

Now add all the points and rate it out of 5. If it's less than 3 even after upholding the precautionary methods then rework need to be done.

Modal Rating tabulation for (SEIRI):

The W_1 denotes week 1, and correspondingly W_2, W_3 and W_4 denotes week 2, 3 and 4 respectively.

Table 2: Modal rating of implementation of SEIRI

Criteria	W_1	W_2	W_3	W_4
1. Material availability (0 or 1)				
2. Defective goods (0 or 1)				
3. Operating condition(0 or1)				
4. Relative condition(0 or1)				

5. Elimination of waste(0 or1)				
TOTAL (out of 5)				

The above tabulation will now be used to evaluate the effectiveness of implementation of SEIRI in an industry.

1.3.2. SEITON (Set in order)

To put in simple words SEITON means ‘systemize’. Putting the necessary items in their place and providing easy access. This is done to keep the necessary item in good order and focusses on efficient and effective storage methods.

The action plan for implementing SEITON in an industry:

Table 3: Questionnaire for implementing SEITON

Questionnaire
1. Does all unnecessary items are eliminated?
2. What do I need to do my job?
3. Where should I locate this item?
4. How many of this item do I really need?
5. Why and where each item belong?
6. Is the process correctly sequenced to deliver what the customer wants?
7. While the customer is searching for a product is he able to get it right at the first time?

Now the answers to the above given questionnaire gives us an idea about how the items are being systematically arranged as per the requirement. After analyzing the answers the precautionary methods are taken into consideration for correcting it.

Precautionary methods:

1. Taking into account the workflow, decide where you need the things.
2. Considering the efficient operations discuss with colleagues, where to place the items.
3. Frequency of use should be considered while you place the items.
4. Make sure to inform everybody in the industry about positioning of the items.
5. Make a clear list of items with their locations and display it.

After completing the above given methods successfully, rate the SEITON as given below.

1. Sequence rating: Let there are M number of tools in proper sequence, let N be the number of tools which are not in proper sequence. Fraction of proper sequence = $[1 - \{N/M\}]$. If the value is 1 then award 1 point, if not 0 point.
2. Material arrangement: Let D be the lack of material and C be the total material required, then Fraction of material available = $[1 - \{D/C\}]$. If the value is 1 then award 1 point, if not 0 point.
3. Tool arrangement rating: Let P be the no. of irregular process and Q be the total no. of process. Fraction of consistency to tool arrangement: $[1 - \{P/Q\}]$. If the value is 1 then award 1 point, if not 0 point.
4. Material arrangement consistency: Let U be the fail arrangement and V be the total no. of arrangement. Fraction of consistency: $[1 - \{U/V\}]$. If the value is 1 then award 1 point, if not 0 point.
5. Working efficiency of SEITON system: Working efficiency = working time for process / Total time allotted for process. If the fraction value is one award 1 point, if not award 0 point.

Now add all the points and rate it out of 5. If it’s less than 3 even after upholding the precautionary methods then rework need to be done.

Modal Rating tabulation for (SEITON):

The W_1 denotes week 1, and correspondingly W_2, W_3 and W_4 denotes week 2, 3 and 4 respectively.

Table 4: Modal rating of implementation of SEITON

Criteria	W_1	W_2	W_3	W_4
1. Sequence (0 or 1)				
2. Material arrangement (0 Or 1)				
3. Tool arrangement(0 or1)				
4. Material arrangement consistency(0 or1)				
5. Working efficiency(0 or1)				
TOTAL (out of 5)				

The above tabulation will now be used to evaluate the effectiveness of implementation of SEITON in an industry.

1.3.3 SEISO (Shine)

SEISO involves cleaning everything, keeping it clean daily. Frequent inspection of the workplace and equipment for defects is done. Thus SEISO process indicates the ‘Renovation of the workplace’. The action plan for implementing SEISO in an industry:

Table 5: Questionnaire for implementing SEISO

Questionnaire
1. Where is the problem located?
2. What exactly is the problem?
3. Who is responsible to take action?
4. When will the solution be implemented?
5. How solution is going to be implemented?
6. Does log book is maintained for every department to note down the defects identified and time to rectify it.
7. How frequently the inspection is being done?

Now the answers to the above given questionnaire gives us an idea about how frequent the system is being inspected and how efficiently the defect is identified and rectified. After analyzing the answers the precautionary methods are taken into consideration for correcting it.

Precautionary methods:

1. Adopt cleaning as a daily activity and as a part of inspection.
2. Find the ways to prevent dirt and contamination.
3. Clean both inside and outside on daily basis.
4. Always find the root cause of contamination and defects to take the appropriate and corrective actions.
5. Keep a log book of all places to be cleaned and improved.

After completing the above given methods successfully, rate the SEITON as given below.

1. Is the machine clean or not: If the machine is clean then give 1 point and if not then give 0 point.
 2. Process path clean: If the path of process is clean then allot 1 point and if not give 0 point.
 3. Proper environment for working condition: Let J will be total aspect for favourable condition and I be the no. of fail arrangement. Fraction of environment: $[1-\{I/J\}]$. If the value is 1 then award 1 point, if not 0 point.
 4. Cleaning consistency: Let G be the total no. of cleaning required and H be the cleaning not done say inconsistency. So consistency rate will be Fraction of consistency = $[1-\{H/G\}]$. If the value is 1 then award 1 point, if not 0 point.
 5. Safety from accident: Let K be the total no. of accident chances and L be the total no for accidents occurs. Then safety rate will be Fraction of safety: $[1-\{L/K\}]$. If the value is 1 then award 1 point, if not 0 point.
- Now add all the points and rate it out of 5. If it's less than 3 even after upholding the precautionary methods then rework need to be done.

Modal Rating tabulation for (SEISO):

The W_1 denotes week 1, and correspondingly W_2 , W_3 and W_4 denotes week 2, 3 and 4 respectively.

Table 6: Modal rating of implementation of SEISO

Criteria	W_1	W_2	W_3	W_4
1. Is the machine clean or not (0 or 1)				
2. cleanliness of the process path (0 Or 1)				
3. Proper environment for working condition (0 or1)				
4. Cleaning consistency(0 or1)				
5. Safety from accident (0 or1)				
TOTAL (out of 5)				

The above tabulation will now be used to evaluate the effectiveness of implementation of SEISO in an industry.

1.3.4. SEIKETSU (Standardize)

It involves creating the visual controls and guidelines for keeping the workplace organized, orderly and clean. High standard of high housekeeping is maintained. The standard is dependent on the SEIRE, SEITON and SEISO.

The action for implementing SEIKETSU:

Table 7: Questionnaire for implementing SEIKETSU

Questionnaire
1. Whether the first 3S is implemented properly?
2. Does the routines and standard practices for regularly and systematically repeating the first 3S is established?
3. Does the inter departmental competition is promoted?
4. Does regular inspection/audit and evaluation by a special team takes place?
5. Is housekeeping department having a maintenance system?
6. Is any process repeated unnecessarily?

Now the answers to the above given questionnaire gives us an idea about how the first 3S is implemented and how organized a workplace is maintained. After analyzing the answers the precautionary methods are taken into consideration for correcting it.

1. All team activity documents should be publically displayed on the board.
2. Create procedures and forms for regularly evaluating the status of first 3S.
3. Standardize ‘single point lessons’ for documenting and communicating 5S procedures.
4. Create a maintenance system for housekeeping and make a schedule for cleaning the workplace.
5. Regular inspection/audit and evaluation by a special team should take place involving the senior management person.
6. Have a meeting on the status of implementation of 5S once in a week to create the awareness among the employee’s.

After completing the above given methods successfully, rate the SEIKETSU as given below.

SEIKETSU rating:

$$(\text{SEIRE rating} + \text{SEITON rating} + \text{SEISO rating}) / 3$$

If it’s less than 3 even after upholding the precautionary methods then rework need to be done.

Modal Rating tabulation for (SEIKETSU):

The W_1 denotes week 1, and correspondingly W_2 , W_3 and W_4 denotes week 2, 3 and 4 respectively.

Table 8: Modal rating of implementation of SEIKETSU

Criteria	W_1	W_2	W_3	W_4
SEIRI				
SEITON				
SEISO				
Average				

The above tabulation will now be used to evaluate the effectiveness of implementation of SEIKETSU in an industry.

1.3.5 SHITSUKE (Sustain)

It involves the training and discipline to ensure that everyone follows the 5S standards. This a condition where all the members practice the first 4S spontaneously and willingly as a way of life. This develops the culture of the organization.

Action plan for implementing SHITSUKE:

Table 9: Questionnaire for implementing SHITSUKE

Questionnaire
1. Does every employee consider the workplace as his home?
2. Does regular inspection is done to check the implementation of first 4S properly?
3. Does the 5S practices is forced on an employee?
4. What kind of role the senior management is playing in setting up the 5S practices?
5. What kind of tools and elements are in workplace so that the new employees can learn to sustain the standard practices?

Now the answers to the above given questionnaire gives us an idea about how employee takes up the 5S practices and the organizational culture is well defined. After analyzing the answers the precautionary methods are taken into consideration for correcting it.

1. Everyone in the workplace should treat it as their own home.
2. Tools and elements should be derived for teaching the employees about the 5S practices.

3. Periodic facility management involvement is required to check that the first 4S is implemented properly.
4. Employee should take 5S as part of their work and it should not be forced upon them.
5. Senior management should do a periodic review of the status of 5S.
6. Monthly feedback of 5S from each employee is considered for better implementation.

After completing the above given methods successfully, rate the SHITSUKE as given below.

SHITSUKE rating:

$(\text{SEIRI rating} + \text{SEITON rating} + \text{SEISO rating} + \text{SEIKETSU rating})/4$

If it's less than 3 even after upholding the precautionary methods then rework need to be done.

Modal Rating tabulation for (SHITSUKE):

Table 10: Modal rating of implementation of SHITSUKE

Criteria	W ₁	W ₂	W ₃	W ₄
SEIRI				
SEITON				
SEISO				
SEIKETSU				
Average				

The above tabulation will now be used to evaluate the effectiveness of implementation of SHITSUKE in an industry

II. CONCLUSION

When fully implemented, the 5S process increases morale, creates positive impressions on customers and increase the efficiency of the organization. Employee will feel better about where they work, the effect on continuous improvement can lead to less waste and better quality. 5S is an integrated approach for productivity improvement. 5S is an integrated concept of actions, condition and culture. To get the greatest success, the nature and implication of each S need to be understood by each employee and should be regularly practiced. In this paper the 5S is defined, questioned, analyzed and finally rated. This approach of implementing 5S can fetch great results if it is applied to any organization.

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