

Implementation of 5s methodology for performance improvement in a medium scale industry: A case study

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Abstract – Workplace is one of the prime important places which decide productivity of any industry whether it is micro, small, medium or large scale. To give best working conditions, the productivity of the company will be increased and also sustain in the global market. The 5S methodology is one of the best workplace organization techniques which make the workplace in such a way that the working conditions become best. The 5S methodology permits to analyze the processes will identify and remove the unnecessary product, tools, and general clutter; and also it will further encourage the development of new layouts, better storage systems, and new better methods for identifying the correct parts. This case study deals with the 5S implementation in an industry of OK plastics public limited company, which is located in Addis Ababa, Ethiopia. This paper explains the methods and techniques of 5 S use to increase the performance of all processes in the company. After implementation of 5s, it can be observed that introducing the 5S rules bring the great changes in the company, increasing the efficiency and effectiveness of the processes, improvement of the layout, productivity, improve the quality, and working conditions in the company

Keywords: Implementation, 5S, productivity, Effectiveness, improvement

I. INTRODUCTION

The most important an issue of any organization is to try to have employees work in a good working environment in order to make them feel good and get more energy to do their works. By doing so, the company can maximize the profits. But employees working in an uncomfortable, dirty, messy environment for this situation, it is difficult to find the appropriate tools which are needed. Difficulties are met when the organization is doing the work which has a scheduled due date. The organization then starts finding the solution to solve

the problems, which are caused by the messy environment, for enhancement of productivity and also to save money. To solve the above, problems in recent years, the implementation of 5S is being undertaken by almost all industries. 5S shows that 5 disciplines for maintaining a visual workplace. The 5s was introduced by Takashi Osada in the early 1980s, it is believed that implanting the 5s mythology could considerably increase the performance on all fronts of any organization especially health, housekeeping, safety etc. The 5S concept is applicable for many business or industry types, including companies claimed that the 5S benefit is not only for improving their service sectors also environment. Most of the company improving their processes in order to achieve a World Class, an organization has to go through a continuous and systematic process. The case study was conducted implantation of 5s in medium scale company located in Addis Ababa, Ethiopia.

II. LITERATURE REVIEW

The recommendation to implement 5S in a medium scale industry literature review are given in table 1

Table 1: Reviews of Paper

Ref	Discussions about 5s
[1]	This paper is simply representation of basic information with all process and concept about the 5S
[2]	The obtained results are evaluated and it has been observed that the company came to a point better than the initial status
[3]	In this paper, 5S implementation results in increasing of an efficiency, Safety, and reduction of the industry pollution.
[4]	This paper is aimed to determine performance factors and characteristics in industrial organizations and identifying the effectiveness of 5S implementation on Organizational performance as well.

[5]	By following the 5S methodology, this research effort shows significant improvements in safety, productivity, efficiency, morale, and housekeeping.
[6]	The 5S rules bring the great changes in The company, for example, process improvement by costs" reduction, increasing of effectiveness and efficiency in the processes, maintenance, and improvement of the machines" efficiency, safety increasing and reduction of the industry pollution and waste.
[7]	The results after the 5S implementations states that production system efficiency is improved from 67% to 88.8% in the successive week

III. METHODOLOGY OF 5S

In a manufacturing company to achieve an effective and organized work environment, so as to improve productivity, reduce cost, and improve quality standards. 5S include five Japanese word which is semi (Sort), section (Set in order), season (Shine), shiatsu (Standardize), and shut sure (Sustain). 5S programs have been implanted in organizations and to improve production values while also improving safety and employee morale. The 5S methodology has been applied to most workplace scenarios in a short period of time due to its simple nature. The before and after picture are taken for implementation of 5S methodology in a company. The figure1 show that methodology of 5 S and table 2 shows basic principle and benefits of 5S

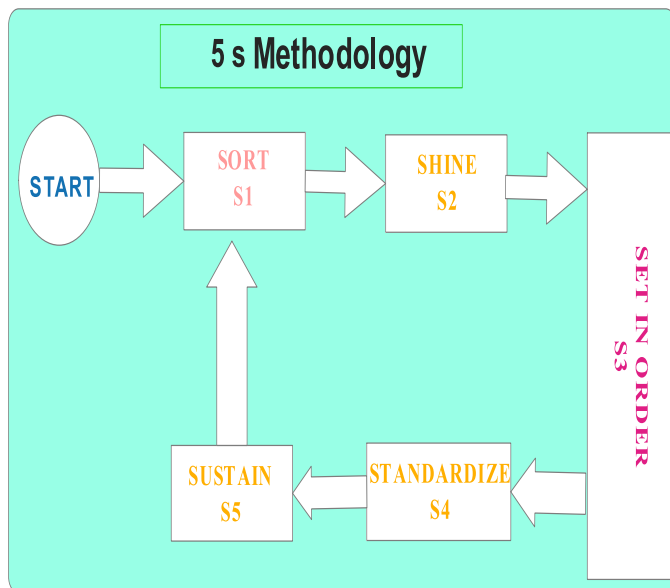


Figure1: Methodology of 5 S

Table2: Principles and Benefits of 5s

5S	PRINCIPLES	BENEFIT
S1 Sort (SEIRI (Say-Le))	To sort and systematically discard items those are not needed in the workplace.	(i)Process improvement by costs reduction (ii)Stock decreasing (iii)Better usage of the working area (iv)Prevention of losing tools
S2 Set in Order (SEITON (Say, Tun))	To arrange necessary items in a neat and systematic manner.	(i)Increasing of effectiveness and efficiency (ii)Safety improvement (iii)Shortening of the time of seeking necessary things
S3 Shine (SEIS (Say So))	To clean and inspect the workplace thoroughly.	(i)Increasing of machines" efficiency (ii)Maintenance the cleanness of devices, Efficiency (iii)keep the clean workplace, easy to check (iv)Quick informing about damages (potential sources of damages), (v)Improvement of the work environment, elimination of the accidents reasons
S4 Standardise (SEIKETSU (Say Ket Sue))	To maintain a high standard of workplace organization by keeping everything clean	(i)Safety increasing and reduction of the industry pollution (ii)Working out the procedures defining the course of

	and orderly at all times.	processes
S5 Sustain (SHITSUKE (Shish-Kay))	To train people to practice the 5S system continuously so that it becomes habitual and ingrained in the culture of the organization.	(i)Increasing the awareness and morale (ii) Decreasing of mistakes quantity resulting from the inattention, (iii)Proceedings according to decisions (iv)Improvement of the internal communication processes, (v)Improvement of the inter-human relations.

IV.INITIATION FOR 5S IMPLEMENTATION

The 5S approach is a systematic methodology practice which can be implemented in any size and type of company. In order to the implementation of 5s in any type organization, the following steps must be initiated.

STEP 1: FORMATION OF 5S COUNCIL

The 5S council is formed with an objective to enhance total participation at all levels of employees and to develop a continuous improvement culture and best performance spirit in the teams. Figure 3provides a typical organizational structure for the implementation process

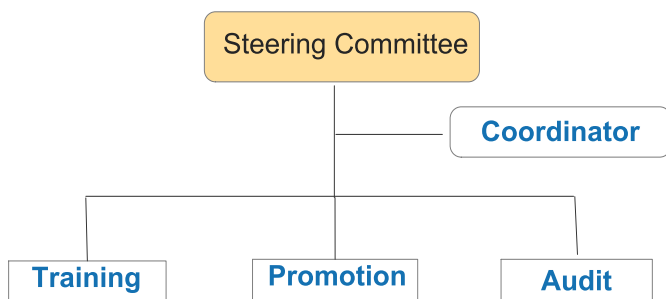


Figure3: The structure of Steering Committee for 5S implementation

STEP 2: SET-UP 5S ZONES

5S Coordinator will be responsible for assigning responsibilities. They would divide the activities into

manageable tasks. This can be done by obtaining the layout of the entire work area and dividing each section into small zones. Then assigning one team to each section and displaying the names of team members of each team and their areas. In doing this they must ensure that at least one person is assigned to each section and there is a leader for every team. Moreover, it must be taken care that the section size and team strength are uniforms to the extent possible. In the case of shared areas, the responsibility should be clearly defined avoiding any ambiguity.

STEP 3: 5S TRAINING

The training program, which is the starting point of 5S, encourages workers to become actively involved in the application exercises. Once the preliminary training is completed, everyone will have the required basic knowledge, and be responsible for action in progress. Training should include 5S Awareness (for Top Management), 5S Awareness (for Operators), 5S Implementation (for Facilitators), Internal 5S Audit (For all).

STEP 4: 5S DECLARATION / LAUNCH

The main objective of this step is to announce the 5S declaration of 5S Policy, Objectives, and Goals, the announcement of 5S Zones, the announcement of the 5S Slogan.

V.COMPANY BACKGROUND

OK Plastics PLC was established on March 23, 2004, which is located in Addis Ababa, Ethiopia. It was started its operations in 2008 by manufacturing household utensils and paint containers. The factory has 18 plastic injection molding machines also known as an injection press which used for manufacturing plastic products by the injection molding process. Each machine is consists of two main parts, an injection unit, and clamping unit. There are different types of injection molding machines. The machines are classified primarily by the type of driving systems they use. The types are hydraulic, mechanic, electric, or hybrid. The figure4 shows the flow chart of production. Now the company produces the best quality of modern houses hold utensils and paint containers for all paint factory in Ethiopia by using modern technology machinery and well-experienced professionals in the field of plastic technology

VI. PROBLEM STATEMENT

The following problems occurred before implementation of '5S' in the company.

1. Improper sitting of instruments and materials
2. Improper utilization of space for the molds
3. Improper utilization of storage space for raw material and finished products
4. Absence of proper loading and unloading equipment
5. Time wastage in searching for tools, materials due to improper workplace management.
6. Not utilization for storing the unwanted or rejected material

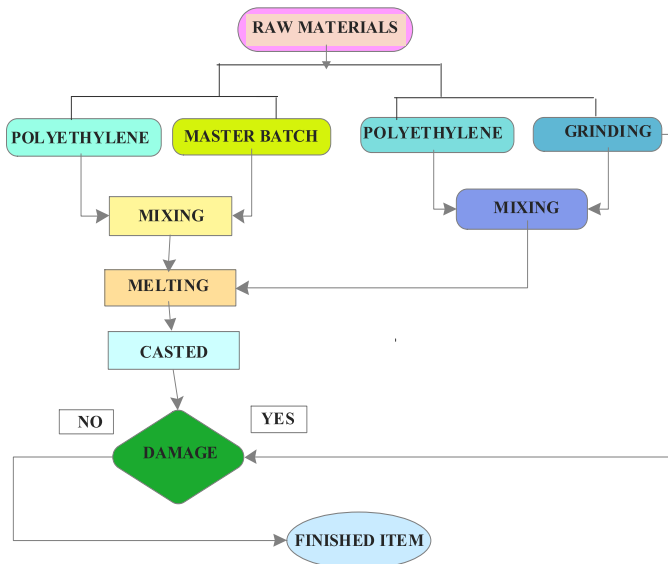


Figure 4. Production flow chart

VII. ACTUAL IMPLEMENTATION OF '5S' STRATEGY

Implementation of first 'S' SIRI (Sort)

It is a waste reduction step; first stage prepare list for tools, equipment and all materials separated as necessary and unnecessary this helps to distinguish current resources in the company. Select material based on their users wanted and unwanted materials.

- Select materials based on their used, necessary and unnecessary. During this time unnecessary materials go out from working place and we can salvage materials
- All necessary things, classified, described and process the own place. All measuring tools properly classified and kept During the time unwanted materials go out from working place. It helps to maintain the workplace clean and improves the effectiveness of receiving and searching materials is shorten the time of running operation. Then waste items were

kept at one place and named place as scrap yard which is just located back side of the entrance of storeroom

Implementation of Second 'S' SEITON (Set in order)

Once the first S has been implemented successfully. The second S reflects a very popular saying: It emphasizes effective, efficiency, safety, storage and consequently improves the appearance of the workplace.

- Drawing out the shapes of tools makes possible the quick putting aside them on the constant places
- Leveling floor this help to for free move of transporting material
- Painting the floor helpful to identify the storage place of each material or transport ways
- Colored labels permit to identify the materials, spare parts or documents

Implementation of the second S it should execute the segregation of things and mark the places of their storing. Their distance and location from the place of work should depend on the frequency of using these materials or tools. Place of storage should be marked in the manner making possible their quick identification. It can be used colored lines, signs or tool board.

Implementation of third 'S' stands for SEISO (shine)

It is related to the shine, sweeping and cleaning of workplace and machinery. During cleaning, it is checked the cleanness of machine, the source of light and workplace area. Implementation of this S, regularly cleaning permits to identify and to eliminate sources of disorder and to maintain the clean workpiece. During cleaning it is checked such as cleanness of machine, workplace, and floor, tightness of equipment, bolt, air and water tube, cleanness of lines, pipes, sources of light, oil filter. As the implementation of third S, the time spent on physical cleaning will reduce. Graphing the cleaning times is a good measure of the overall improvement of the area. The purpose of 5S is not to have to clean but to stop the area from getting dirty in the first place by eliminating the reasons and sources of the dirt. There are several benefits of the routine cleaning cycle. The figure5 shows that the existing layout and figure 6 shows that after implementation of 5S plant layout

- To improve safety by reducing the possibility of accidents
- To clean an environment that will give new and existing customer a positive
- To clean production tools, with a view to preventing damage to components that could be caused by rust, abrasion or chemical contamination and effects the lifetime of the product.
- To create an environment that the employees will be proud to work.

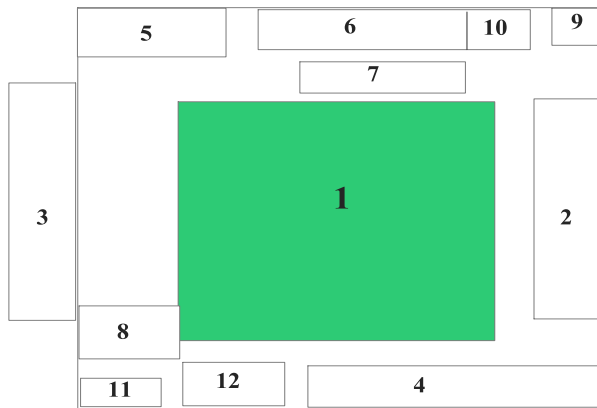


Figure 5: Existing layout

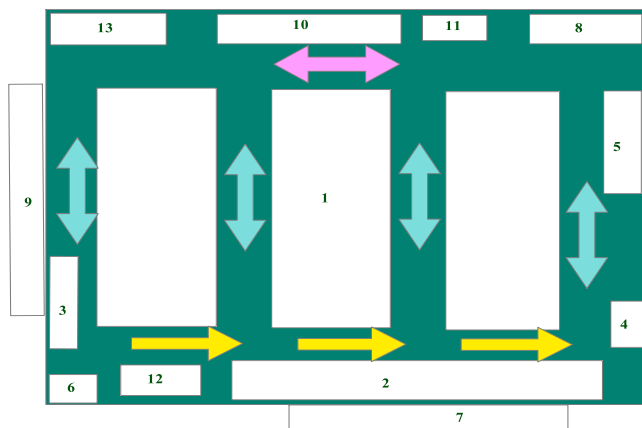


Figure 6: Proposed layout

- | | |
|---------------------|--------------------------|
| 1. Working Area | 7. Mold Area |
| 2. Mixer | 8. Mold Area 2 |
| 3. Store | 9. Oil and Generator |
| 4. Office | 10. Main air supply room |
| 5. Water supply | 11. Main electric power |
| 6. Crashing machine | 12. Material counting |

The fourth ‘S’ stands for SEIKETSU (standardize)

In this standard procedure, work instructions, and audit sheet are prepared to maintain. The continued employment of the 5S will ensure a high standard of workplace the next step is to concentrate on standardizing best practices. Before starting of work to check and correct the noted items, placing equipment

at its place and cleaning etc. and give a proper reading on audit and create important in employee to maintain this thing on the production line. The plant must include the creation of procedures and simple daily checklists which are to be visibly displayed at every workplace.

The fifth ‘S’ stands for SHITSUKE (sustain)

Implementing the idea of the 5S will demand everybody in the company. Established a cleaning schedule is better than unscheduled. Use downtime to clean area and diagnosis machine. The 5S projects must be regularly audited to ensure that the same standard is maintained. This includes the standard and regularly updating of the activity boards. The discipline extends to safety. Teams should always observe safety rules, wear any protective clothing and check on risk assessment. Sustain is about the physical and mental disciplines required to maintain the other Seiketsu items. It is done with help of support between store keeper, employees, manager and, engineer.

VIII.RESULTS AND DISCUSSION

Implementation of 5S in OK Plastics PLC Leading company, what is effectiveness after implementation of 5S we have compared and recorded it with old records of the effectiveness of 5S before and after implementation is given below Table.3, Since reading of effectiveness, is given out of 1, for example working environment is taken 0.5 out of 1 before implementation of 5S now after it is 0.9 out of 1, similarly, the other process reading is given before and after implementation of 5S. From that comparison, we conclude that overall change is 85% which means increased it up to 30% after implementation of 5S

Table.3, Processes Effectiveness After and Before Implementation Of 5s

Sr. No.	Processes	Before	After
1	Material Searching Time	0.6	0.9
2	Tool Arrangement	0.5	0.8
3	Material Arrangement	0.4	0.6
4	Working Environment	0.5	0.9
5	Safety	0.6	0.8
6	Working Efficiency	0.6	0.8
7	Overall Change In Percentage	55%	85%

IX. CONCLUSIONS

The studyof these papers demonstrate the implementation of 5S methodology practice leads to improvement in productivity

and working efficiency of the OK Plastics PLC Leading Company. The 5S improves environmental performance and reduction of wastes in materials. It shows that neatness in the storage of raw material and finished products. The 5S implementation leads to the improvement of the quality of the products and organization become self-disciplined. The implementation of the 5S system gives the following effects regarding the improvement in quality such as workers get used to ordering and discipline, reduction of physical effort, eliminates unused, unwanted material from the storage room, fewer accidents during the production process. The final conclusion is that overall change is 85% which means increased up to 30% after implementation of 5S.

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