IMPLEMENTATION OF 6S PRACTICES IN THE SILK MULTI-END REELING INDUSTRIES IN ANDHRA PRADESH

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ABSTRACT

Small scale industries plays an important role in Indian economy. It has emerged as powerful tool in providing relatively larger employment next to agriculture. It contributes more than 50% of the industrial production in value addition term and generate one third of the export revenue. Global markets are continuously changing and demanding product of high quality and low cost. Such products can be produced using lean manufacturing tools and techniques, a management philosophy that aimed to reduce all types of wastes at all levels of product manufacturing so as to reduce product cost. 6S is a basic lean manufacturing tool for cleaning, sorting, organizing and providing necessary ground work for workplace improvement. This paper deals with the implementation of 6S methodology in the multi-end silk reeling unit, Dharmavaram, Anantapuram, Andhra Pradesh. Out of the available various lean manufacturing techniques, 6S offers good potential for required improvement. Ten week study is carried out in the case company. The results after the 6S implementations states that production system efficiency is improved from 67% to 88.8% in the successive week.

Keywords: Lean Manufacturing, Safety Management systems, 5S, 6S, PDCA, Workplace organization, Silk reeling.

1. INTRODUCTION

One of the most important issues of any organization is to try to have employees work in a better working environment in order to make them feel good and get more energy to do their projects. By doing so, the company can maximize the profits at the same time. But in practice the employees work in an uncomfortable, dirty, messy environments which are usually full of unused materials. Because of this situation, it is hard to find the appropriate
tools which are needed. Difficulties are met when the organization is doing the project which has a scheduled due date. The organization then starts looking for a solution to solve the problems, which are caused by the messy environment, for enhancement of human capability and productivity and also to save more money.

6s is an approach to organize, order, clean, standardize and continuously improve a work area. 6s is not just about housekeeping. It is one of the efficiently working tools of lean manufacturing. The program gets its name from six activities beginning with letter S, which were derived from five Japanese words. The words are Seri, Seiton, Seiso, Seiketsu, and Shitsuke, & safety which when translated mean sort, set in order, shining, standardize, and sustain, respectively. Sort helps to remove all unneeded items; only what is needed stays. Set establishes locations and quantities needed for efficient operation. Shine represents cleaning through inspection. Standardize implements visual displays and controls. Sustain helps to keep the organization effort in place the rough training and total employee involvement. [NikAbdRahaman]

This paper reviews the current literature on Lean and 6s practice. It explores the concept of 6s and its implications in a workplace. The basic information and its philosophy highlight the significance of 6s. This paper will attempt to answer some of the questions of a 6s implementation with a literature review. It is hoped that it can serve as a reference for the silk reeling industries Management program in the continuous improvement of its facilities. At the close of the chapter discusses the six terms that form the basic principle of 6s and practices involved.

A Key to worker safety in Lean Manufacturing operations is the development of informed, empowered and active workers with the knowledge, skills and opportunity to act in the workplace (6s) to eliminate or reduce hazards [1]. In addition, Ansari and Modarress [4] point out those safety strategies are crucial to world-class competitiveness; companies that fail to utilize a strategic approach to company safety will less successful over the long term.

Recently, 5s was expanded to 6s by the addition of “Safety”. This paper discussed the 5s expansion to 6s as one of the most important tools and techniques of Lean Manufacturing that focuses on effective workplace organization and standardized work procedures. The 6s process simplifies the work environment, reduces waste and non-value activities while improving quality efficiency and safety. The aim of this study is to evaluate safety in Lean Manufacturing approaches and safety management systems (SMSs) and clarify the relationship between them.

**Importance of silk production process**

The silk Industry, one of the productive cottage sectors in India is developing rapidly and lucratively over the past years. Clothing is the second important need and the factors like comfort, material, cost, quality, design, and fashion appeal play a significant role during cloth selection. Among the natural fibers - silk, cotton and wool, silk is known as the queen of fibers.

Irrespective of age, sex, income status and the geographical location, everybody seems to adore silk fabrics and silk-related products, including sarees, bridal wear, hand bags, rugs, sox etc.

In addition, silk products come in different price ranges and are considered as exclusive and luxurious as gems and jewels. Therefore, silk products enjoy the support from the upper economic strata as well as from the middle class Indian society. Further, being a natural fiber, silk is acceptable in both domestic and export markets.
Despite India being the second largest producer of silk in the world behind China, the annual silk consumption exceeds the production in India. For example, while the production is about 18,000 MT, the consumption is 26,000 MT. India has a share of approximately 13.4% in the global raw silk production and hence the western countries believe that the Indian silk industry is a viable alternative to that of Chinese silk. Accordingly, the foreign exchange earnings from silk exports have been over Rs.3000 crores [1].

2. LITERATURE REVIEW

This paper discusses about the Lean Manufacturing which implemented in various industries especially in manufacturing sector. Besides, it discusses about the lean tools and techniques which used in industries in terms of the benefits and implementation steps.

2.1 Lean Manufacturing

Lean manufacturing is the practice of eliminating waste in every area of production including customer relation (sales, delivery, billing, service and product satisfaction), product design, supplier networks, production flow, maintenance, engineering, quality assurance and factory management. It goals is to utilize less human effort, less inventory, less time to respond to customer demand, less time to develop products and less space to produce top quality products in the most efficient and economical manner possible (Smith and Hawkins, 2004).

Lean manufacturing is a manufacturing strategy aimed at achieving the shortest possible cycle time by eliminating waste (Lee and Allwood, 2003). Lean manufacturing is a Comprehensive term referring to manufacturing methodologies based on maximizing value and minimizing waste in the manufacturing process (Anon, 2007e).

The main part of lean is the determination of value. Value is defined as an item or feature for which has customer is willing to pay. All the other aspects of the manufacturing process are deemed waste. Lean manufacturing is used as a tool to focus resources and energies on producing the value-added features while identifying and eliminating non value added activities.

In order to understand lean it is necessary to understand that lean focuses more on how we think about the manufacturing process than anything else. Lean manufacturing is the codification of a set of ideas that work in harmony. By identifying both who the customer is and how they define value, lean manufacturing allows companies and individuals to focus resources on adding value. By manufacturing to customer demand, driving out waste and continuously improving, companies can satisfy customers, employees and shareholders alike (Anon, 2007e).

3. WHAT ARE THE 6S?

6S is a lean methodology focused on waste removal. The methodology is recursive, never-ending and continuous. It is one of many principles in the philosophy of lean manufacturing and by no means does adopting one principle make a company lean, 6S is just a principle to make problems visible (5) (11). Lean is much bigger than 6S but the 6S is a sound foundation to begin full adoption. In adopting 6S make sure everyone is on the same page with what the 6S are defined as.
The 6S are derived from 6s Japanese words that translate to sort, straighten, shine, standardize, sustain, and safety. They are described as follows(5)(17):

1. **Sort** – identify what is needed to do daily work, what is not needed, and what can be improved.
2. **Straighten/Set in Order** – physically organize the work area with the best locations for the needed items.
3. **Shine** – clean and/or remove reasons for unorganized, unproductive and unsafe work. Create measures and preventative maintenance to ensure the Shine step.
4. **Standardize** – provide procedures to ensure understanding of the process. This S supports the first 3S’. Keep using best practices.
5. **Sustain** – set up the system to ensure the integrity of the process and build it so it that improvement is continuous.
6. **Safety** – Eliminate hazards. (We added this sixth “S” so we could maintain the focus on safety within our lean events and embed safe conditions into all our improvements.

“A place for everything, and everything in its place” it the mantra of the 6s method, and storage and workspace systems such as those provided by list international allow improved organization and maximum use of cubic space for the highest density storage. The result is an improved manufacturing process and the lowest overall cost for goods produced.

There are a number of great reasons for using 6s. It is a natural for building teams who share a common work area. For one thing, every team member benefits from it and for
another, it fits common sense. Everyone has had the experience of losing work, misplacing documents and spending frustrating and wasteful time looking for them, tripping on objects left in the working place, etc. as a consequence, 6s is tool whose value is readily grasped. Everyone can get their arms around the concept of “a place for everything and everything is in it” place. Another great quality 6s is that it is doubly enabling. It enables people to be free of aggravations that hinder their work and it is a wonderful way to involve people in improving their own work settings. That enables greater employee empowerment. Finally, the visual impact of 6s event makes the improvement it produces impossible to miss and this creates a real sense of achievement and pride that can form the beginning of more significant cultural transition

6S can ultimately be applied to any work area, in and outside manufacturing. The same techniques apply to any process including those in the office. Before beginning a further in-depth discussion of the 6S we will discuss some rules that the facilitate or and those involved must be aware of before implementing the 6S.

Involvement is key in implementing 6S, therefore there are some ground rules that are highly suggested to be followed during the process for all people involved. They have been compiled as follows.

1. “Blame the process, not the person”(22). If there is an issue that is causing problems look into the scenario that allowed the problem to happen.
2. Allow people to offer suggestions; don’t shoot them down for it. Small ideas sometimes lead to bigger solutions.
3. 5S and ultimately lean should travel in all areas of a company. Allow 5S to happen on the production floor and office area. “Respect, challenge and help your people and teams”.
4. Involvement is key in the 5S, involve everyone who touches the process in every step of the 5S methodology.
5. “Grow leaders who live the philosophy”(6).

Benefits of 6S

- Pride is created in the workplace. If those who work in an area have input in decisions made, they are more likely to experience pride for their work. Employees become empowered.
- Stake holders will see the difference. A clean, organized and safe workplace is noticeable.
- A clean and organized workplace is safer. It decreases the possibility of injuries occurring.
- Increase product quality and process quality.
- Workplace becomes cleaner and better organized.
- Shop floor and office operations becomes safer.
- Visible results enhance the generation of more and better ideas.
- Lead-time reduced.
- Changeover time reduced by streamlining operations.
- Breakdowns and minor stops eliminated on production lines.
- Defects reduced by mistake proofing.
- Clear methods and standards are established.
In-process inventory is reduced.
Space usage improved.
Customer complaint are reduced.

6s Implementation 6s

The 6s approach outlined in this paper is a simple and systematic methodology which can be introduced and implemented in any size and type of organization. In order to start the step-up-step implementation of 6s, each phase must be thoroughly analysed and addressed using P-D-C-A Cycle approach.

Plan
Before going to the implementation phase, training on 6s must be provided for all. Then the 6s council is required to be formed. The council would set up 6s zones and also would determine 6s objectives, goals and implementation phases. The action plan is to be then framed and 6s is launched.

DO

• **Sort**
  Identification of necessary items is required to be listed.

• **Set in order**
  After identifying the necessary items, the necessary arrangement for the same is worked out.

• **Shine**
  The dirt sources are identified along with its root causes. The necessary action to be taken for elimination of the dirt sources and root causes are then framed.

• **Standardize**
  After framing the action plan the responsibility assignment is identified and executed. Further actions required to be taken to maintain the desired condition is also framed. The assigned personnel then decide on the periodicity, place and procedure for execution of such actions.

• **Sustain**
  The training and educating everyone would make everybody understand. Obey and practice the rules and procedures. The understanding would help in developing continual efforts in sustaining the desired condition.

• **Safety**
  Management systems, Environmental Health and safety Management systems are described and their relationship is discussed, safety is the foundation for all improvement programs.
4. SORT

Sort is the first step of 6S. The purpose is to identify what is not needed in the work arranged and removing it from the work area. Sometimes this means disposing of it, keeping it in another area, selling it or donating it. Other items to include are items that may cause safety hazards and unused items that are in inventory for extended periods. A method of doing this is done by "red tagging" these unneeded items. Once red tagged, these items are evaluated before disposition is made. Evaluation should include decisions on how much is truly needed if there is surplus.
The Steps of Sorting

- Look at the ALL equipment, tools, paperwork, storage areas and supplies (17).
- Define what is needed.
- Define what is not needed. Evaluate all items in question and make of note, i.e. red tag.
- Decide on the disposition of the item at this time. When possible use hard data to decide on disposition with team.
- Dispose of items.

STRAIGHTEN/SET IN ORDER

The motto for this step is “A place for everything and everything in its place.”. New locations for items should be easily accessible and reduce the motion and effort in obtaining them. Make it obvious where things belong. Examples of this include but are not limited to, providing visual labels to show where things are, color coding items, creating easily accessible tool kits for commonly used tools and creating divider lines for different types of work.

Take a look at the following items
- Equipment: tools, machinery, cleaning equipment, etc…
- Furniture: cabinets, carts, desk space, etc…
- Overall Layout: aisle ways
- Material: Work in progress, parts, parts storage, raw material, etc…
- Other: paperwork, computer interfaces, digital storage labeling.

SHINE

Once you have kept what is needed, labeled them and organized them what follows is physically cleaning the area. This goes beyond the typical cleaning, replace worn out components to key equipment and ensure equipment is operating in safe manner. Create a check list for periodical cleaning of equipment or an area with those who work in the area. Create pride for keeping the area clean.

Steps of Shine

- Clean the workplace
- Maintain the appearance of the work place Use preventative measures to keep the work.

STANDARDIZE

This step of 6S focuses on creating the systems and procedures to monitor the first 3S’s. Standardization allows for continuous improvement. Standardize the way you sort, straighten/set in order, and shine. Standardize the training to ensure that everyone understand 6S as the same methodology. Attach clear responsibilities to tasks that need to be done. Create the pride and ownership as described in the shine step. As time passes, keep the best practices and part ways with those that don’t add value to the process.

The managers of 6S must set the tone and lead by example. As leaders, managers need to be committed, have time to develop other leaders, provide guidance and support 6S
changes. Standardization allows the process to be examined by allowing errors to be pinpointed to particular steps in the process.

**Steps of Standardize**

1. Identify the tasks that have to be completed.

2. Name the individuals who have ownership of each task.

3. Identify the scheduled time during which the tasks will be completed.

4. If implemented correctly, standardization provides reinforcement to facilitate a culture change, practice leads to habit.

5. **SUSTAIN**

   This phase of the 5S is the most difficult. Engraining 5S into the culture and making sure it isn’t a single time event is tough. In order to sustain you must have overall involvement, support, commitment and good communication. Create the habit of auditing periodically and rewarding the best teams. Always keep an open forum of idea flowing on how to do 5S better because even the smallest of ideas can lead to bigger solutions. Lastly, make sure all problems are responded to promptly and pay special attention to what caused the problem. 5S does not only create a visual workplace but it should create quality in a process.

6. **SAFETY**

   A vital foundation for all of the other steps! We develop and maintain workplaces that are safe for ourselves, our customers and anyone else who may be affected by our work place.

**EXHIBIT 6S IMPACT IS EASY TO UNDERSTAND**

<table>
<thead>
<tr>
<th>BEFORE</th>
<th>AFTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Before Image]</td>
<td>![After Image]</td>
</tr>
<tr>
<td>6S Area: [Silk reeling industry]</td>
<td>Item score</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>------------</td>
</tr>
<tr>
<td><strong>Sort (Organization)</strong></td>
<td><strong>Distinguish between what is needed &amp; not needed</strong></td>
</tr>
<tr>
<td>Have all unnecessary items been removed?</td>
<td></td>
</tr>
<tr>
<td>Are walkways, work areas, locations clearly identified?</td>
<td></td>
</tr>
<tr>
<td>Does a procedure exist for removing unneeded items?</td>
<td></td>
</tr>
<tr>
<td><strong>Stabilize (Orderliness)</strong></td>
<td><strong>A place for everything and everything in its place</strong></td>
</tr>
<tr>
<td>Is there a place for everything?</td>
<td></td>
</tr>
<tr>
<td>Is everything in its place?</td>
<td></td>
</tr>
<tr>
<td>Are locations obvious and easy to identify?</td>
<td></td>
</tr>
<tr>
<td><strong>Shine (Cleanliness)</strong></td>
<td><strong>Cleaning and looking for ways to keep it clean</strong></td>
</tr>
<tr>
<td>Are work areas, equipment, tools, desks clean and free of debris, etc.?</td>
<td></td>
</tr>
<tr>
<td>Are cleaning materials available and accessible?</td>
<td></td>
</tr>
<tr>
<td>Are all aisle markings, location indicators, etc., clean &amp; unbroken?</td>
<td></td>
</tr>
<tr>
<td>Cleaning schedules exist and are posted?</td>
<td></td>
</tr>
<tr>
<td><strong>Standardize (Adherence)</strong></td>
<td><strong>Maintain &amp; Monitor for adherence</strong></td>
</tr>
<tr>
<td>Is all necessary information visible?</td>
<td></td>
</tr>
<tr>
<td>Are all standards known and visible?</td>
<td></td>
</tr>
<tr>
<td>Are all visual displays current and up to date?</td>
<td></td>
</tr>
<tr>
<td>Is there adherence to existing standards?</td>
<td></td>
</tr>
<tr>
<td><strong>Sustain (Self-Discipline)</strong></td>
<td><strong>Following the rules to sustain</strong></td>
</tr>
<tr>
<td>Are procedures being followed?</td>
<td></td>
</tr>
<tr>
<td>Does an on-going audit and feedback system exist?</td>
<td></td>
</tr>
<tr>
<td>Does a system exist to respond to audit feedback?</td>
<td></td>
</tr>
<tr>
<td><strong>Safety (Zero incidents)</strong></td>
<td><strong>Maintaining a safe work place</strong></td>
</tr>
<tr>
<td>Is a green tag system in place?</td>
<td></td>
</tr>
<tr>
<td>Are appropriate controls in place to identify safety equipment?</td>
<td></td>
</tr>
<tr>
<td>Is all safety equipment unobstructed and accessible?</td>
<td></td>
</tr>
</tbody>
</table>

**Total Score**

**Evaluators Name:**

**Scoring:**
0= No problems
1= One to Two problems
2= More than Two problems
REFERENCES