Implementing Kaizen and 5s for Process Flow Improvement in Medium Scale Industry

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Abstract—The purpose of this research is to use Kaizen and 5S to assist manufacturing organisation to become more productive and more efficient. Producing high quality of products and services is one of the key concerns in order to keep up with the competition in the global markets. The main objective of manufacturing industries today is to increase productivity through system simplification and incremental improvements. A simple approach has been adopted to create the teams for implementing Kaizen and 5S. This system helps to organize a workplace for efficiency and decrease wasting and optimize quality and productivity via monitoring an organized environment. The study highlights the contributions of Kaizen and 5S strategies to identify the effectiveness of the organisation as well as employee performance and their attitude towards it. It has been analysed that implementation of Kaizen and 5S has resulted in overall improvement of the organization.

Key words: Kaizen, 5S

I. INTRODUCTION

Improving customer service, making operation faster, more operation and reduction in costs are the challenges faced by manufacturers today and to meet these challenges many companies are searching to improve their ability to compete globally. Wastage during production process is rapidly growing day by day in industries. There are different techniques of waste reduction and performance enhancement like Kaizen and 5S. The word KAIZEN comes from a Japanese words KAI (change) and ZEN (good) which originated in 1950. “The essence of Kaizen is simple and straightforward: Kaizen means improvement involving everyone, including both managers and workers”. The Kaizen methods are internationally acknowledged as methods of continuous improvement, through small steps of the economical results of the company. The small improvements applied to key processes will generate the major multiplication of the company’s profit while constituting a secure way to obtain the clients loyalty. Continuous improvement is one of the core strategies for excellence in production and is considered vital in today’s competitive environment. In the management context Kaizen has three main roles: creativeness, maintainance and improvement of management standards. In contrary, Kaizen emphasis human resources, trainings, communication, team work, engagement and self-discipline. Kaizen system concentrates on all areas which makeup the company. 5S is a technique originated in Japan and it was first developed by Hiroyuki Hirano. 5S is a system in which to reduce work and optimize productivity and quality through maintaining orderly workplace. The 5S technique is included within Kaizen. It is the methodology of creation and maintaining well organized, clean, high effective and high quality workplace. The benefit of good workplace include the prevention of defects, prevention of accidents and the elimination of time wasted for searching tools, documentation and other ingredients of manufacture.

A. Summary of Kaizen and 5S:

<table>
<thead>
<tr>
<th>Japanese</th>
<th>English</th>
<th>Translation</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seiri</td>
<td>Sorting</td>
<td>Organize</td>
<td>Creating a difference between wanted, unwanted, obsolete items and removing unnecessary items</td>
</tr>
<tr>
<td>Seiton</td>
<td>Storing</td>
<td>Order</td>
<td>Arranging the items in a systematic order within the reach of the user</td>
</tr>
<tr>
<td>Seiso</td>
<td>Shining</td>
<td>Clean</td>
<td>Cleaning the workplace for avoiding accidents</td>
</tr>
<tr>
<td>Seiketsu</td>
<td>Standardizing</td>
<td>Standardize</td>
<td>Maintaining the above 3S’s</td>
</tr>
<tr>
<td>Shitsuke</td>
<td>Sustain</td>
<td>Self Discipline</td>
<td>Making a habit of maintaining the above 4S’s</td>
</tr>
</tbody>
</table>

Table 1: Summary of 5S Tools
Implementing Kaizen and 5S for Process Flow Improvement in Medium Scale Industry
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Fig. 2: PDCA cycle for Kaizen

B. 5S the Process:
Success of 5S totally depends upon total employee involvement, its continuous monitoring and everyone should work in a team. It is explained as:

1) Seiri:
It means sorting things that are necessary from those that are unnecessary and keeping quantity of necessary ones minimum and at an accessible location. Red tagging is done to the unnecessary items and then they are either disposed off or stored in a remote location and are redeemed if required in future.

2) Seiton:
It means “A place for everything and everything in its place”. It is to make arrangement of necessary items in good order so that they can be easily picked up for use. It is a study of efficiency.

3) Seiso:
It means cleanliness which should be the concern of everybody in the organisation right from top management to the bottom. Cleanliness is helpful to notice damage of equipment. A good, neat and clean working place provides motivation for effective functioning.

4) Seiketsu:
It means making the first 3S a routine practice by implementing clear procedures for sorting, straightening and scrubbing. Regular audits should be done and scores against each S should be displayed. Display through photographs should be encouraged.

5) Shitsuke:
It means promote communicate and train in the 5S to secure that it is part of the company’s corporate culture.

C. MUDA:
Muda is a Japanese word meaning uselessness, wastefulness. It consists of the following seven wastes:

1) Transportation:
Each time a product is moved it stands the risk of being damaged, lost, delayed etc. As well as being a cost for no added value. Transportation does not make any transformation to the product.

2) Inventory:
Inventory in the form of raw material, work in progress of finished goods, represents a capital outlay that has not yet produced an income. Any of these three items not being actively processed to add value is waste.

3) Motion:
Motion refers to the damage that the production process inflicts on the entity that creates the product, either over time or during discrete events.

4) Waiting:
Whenever goods are not in transport or being processed they are waiting which is a waste of time.

5) Over-Processing:
Over-processing occurs any time more work is done on a piece then is required. This included using components that are more precise, complex, higher quality or expensive than absolutely required.

6) Overproduction:
Overproduction occurs when more product is produced than is required at that time which leads to excess inventory which then requires the expenditure of resources on storage space and preservation.

7) Defects:
Whenever the defects occur, extra cost are incurred reworking the part, rescheduling production etc. which results in labor cost and more time in work-in-progress.

II. METHODOLOGY

Fig. 3: 5S implementation methodology

III. 5S AND KAIZEN APPROACH IN INDUSTRY

A. Seiri (sort-1S):
Sorting aims for removing all the unwanted materials from the workplace. After sorting the unwanted materials from workplace, they are placed in the red tag area and the details are noted on the red tag card after which they are either moved to scrap yard or located properly or rectified or segregated or returned to the supplier.

Fig. 4: Red Tag Card (front)
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Fig. 5: Red Tag Card

Fig. 6: Red Tagging

B. **Seiton (set in order-2S):**
Set in order aims at placing everything at its place. After sorting the specific location is defined for the useful material and located in the predefined order.

Fig. 7: Tool Shadowing in drawers

Fig. 8: Tool Board

C. **Seiso (Shine-3S):**
Shine aims at keeping cleanliness at workplaces, workstations, offices, stores, passage, gangways etc in the organization.

Fig. 9: Sections for components
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After Fig. 10: Removal of components from gangway

Before

After

Fig. 11: Formation of gangway at shop floor

D. Seiketsu (Standardize-4S):
To strictly follow the first ‘3S’ in the daily routine. Standardize aims for preparation of standard method to continue to follow the first ‘3S’ effectively in the organisation.

Fig. 12: Cleanliness in Quality and Assembly Department

E. Shitsuke (Sustain-5S):
Sustain aims for maintaining the implemented ‘5S’ system effectively. Thus in short, sustain defines the discipline for employees to strictly follow the implemented ‘5S’ in the organization to obtain the required result. For sustaining the ‘5S’ technique effectively and to strictly adhere to it in the organization, internal audits as well as surprise audits are conducted periodically.

Fig. 13: Flow chart for 5S

Fig. 14: Audit Sheet of 5S
F. Kaizen Sheet:

1) Kaizen Sheet for Production

<table>
<thead>
<tr>
<th>Kaizen No.</th>
<th>Sheet Date</th>
<th>Implementations Area</th>
<th>Team members</th>
<th>Kaizen for</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1st Sep 2016</td>
<td>Production</td>
<td>1. Team</td>
<td>Reduce wastes, stock confinement, tool theft, increase in safety</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Team</td>
<td>Increase efficiency, cost reduction</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. Team</td>
<td>Improve process handling</td>
</tr>
</tbody>
</table>

- Post-causes identification
  1. Lack of employees
  2. Maintenance issues
  3. Tool theft

- Action to be taken
  Translation

- To be completed by: 1st Sep 2016

2) Kaizen Sheet for Purchase

<table>
<thead>
<tr>
<th>Kaizen No.</th>
<th>Sheet Date</th>
<th>Implementations Area</th>
<th>Team members</th>
<th>Kaizen for</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1st Sep 2016</td>
<td>Purchased</td>
<td>1. Team</td>
<td>Reduce Purchased cost, stock confinement, tool theft, increase in safety</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Team</td>
<td>Increase efficiency, cost reduction</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. Team</td>
<td>Improve process handling</td>
</tr>
</tbody>
</table>

- Post-causes identification
  1. Lack of employees
  2. Maintenance issues
  3. Tool theft

- Action to be taken
  Translation

- To be completed by: 1st Sep 2016

3) Kaizen Sheet for Quality and Assembly

<table>
<thead>
<tr>
<th>Kaizen No.</th>
<th>Sheet Date</th>
<th>Implementations Area</th>
<th>Team members</th>
<th>Kaizen for</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1st Sep 2016</td>
<td>Quality and Assembly</td>
<td>1. Team</td>
<td>Reduce wastes, stock confinement, tool theft, increase in safety</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Team</td>
<td>Increase efficiency, cost reduction</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>3. Team</td>
<td>Improve process handling</td>
</tr>
</tbody>
</table>

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  1. Lack of employees
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  3. Tool theft

- Action to be taken
  Translation

- To be completed by: 1st Sep 2016

Hence by implementing Kaizen and 5S there has been a lot of improvement in the process flow due to better usage of workplace, stock confinement, prevention from losing tool, increased efficiency, process development by cost reduction, travel time of materials has been reduced, improvement in safety, improvised working conditions for workers, increase of awareness and morale, etc. So the target of process improvement has been achieved in the industry by using Kaizen and 5S tool for finding the problem and taking corrective action against it.

IV. Conclusion

Tools and techniques for eliminating wastes, helps manufacturers to improve the productivity of their enterprises. The manufacturing firms should develop their general plans and schedules according to the nature of their production to be able to reduce production costs.

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REFERENCES