Kaizen Approach in Indian Industries

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Abstract—*Day by day as we observe the increasing competition among industries, it becomes important for them to think about increasing productivity and quality. Increasing productivity and quality are both mutually interrelated to each other which require continuous improvement in present working methods and environment of industry. There are basically two approaches used in a company for improvement purpose. First of them is innovation in which a new method is adopted for improvement purpose. Second one is kaizen which means improving the existing methods. In the present work, requirement of Kaizen philosophy with their implementation in Indian industry has been studied through review of literature.*

I. Introduction

Kaizen means continuous improvement, a Japanese philosophy which is generally used to find out the basic problems in existing situation so that the problems can be solved with a little effort. This approach includes every member for the improvement in Organization and therefore holds that "if something is not broke, fix it anyway". Kaizen is known for incremental improvements but can also be applied as a tool of corporate strategy of embracing lean manufacturing [1].

A. Principles of kaizen

A problem can be small or big depend upon the company structure. Kaizen principles are applied at 'Gemba'. It is a Japanese word whose meaning is 'actual place of work'. There are basically five principles that normally help people in getting the process back on right track in case of any deviations or error [2]. These principles are shown in fig. 1

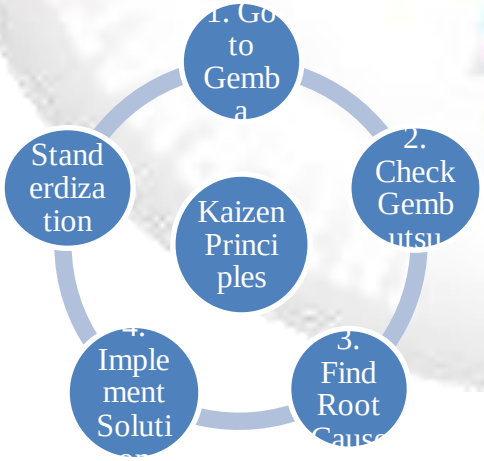

Fig. 1: Kaizen Principles

B. Tools and Techniques used in kaizen

Kaizen approach consists of observing a process to find various problems or opportunities for improvement. There are various techniques available for this approach. Use of any one technique can result in improvement. Kaizen forms an umbrella which shows all these technique as shown in fig. 2.

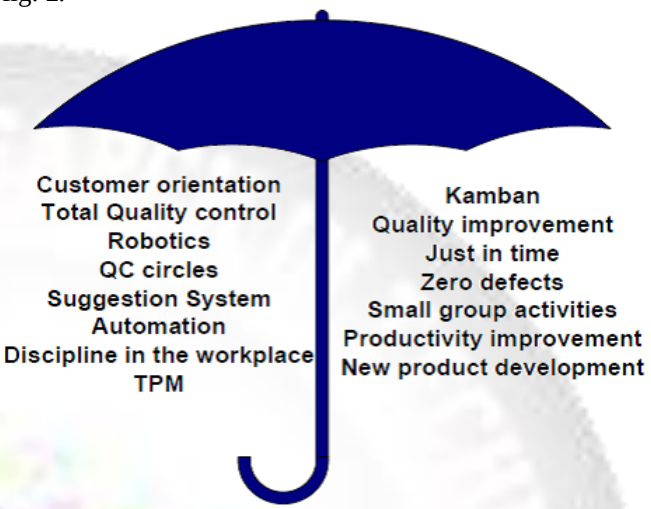

Fig. 2: Kaizen Umbrella-Concept

Further various tools are available for finding problem and its root cause. The uses of these tools can vary on the basis of different kinds of problems and objectives. Selection of optimum tools is an necessary step to ensure the successful implementation of kaizen. A list of all important tools is explained as below:

1) Pareto analysis-It is an important technique for selecting a critical problem among various problems of an organization. Sometimes it becomes impossible to solve out each and problem due to lack of sources or time. In that situation the major problems are need to be solved first so that the improvement can be achieved at a higher rate. This technique works on the Pareto principle which is also known as 80/20 rule. According to this rule we can improve the efficiency of a process up to 80% by solving only 20% major causes [3].

*2) Fish Bone Diagram-:*As its name suggest, its shape is almost similar to a fish whose head represent the effect or problem which is need to be solved and its bones represent the various categories of causes. It is also called as Ishikawa or Root- Cause effect diagram. This is a visualization technique which is used to find the root cause of a problem. For selecting the root cause, brainstorming sessions are organized to gather all possible causes. Then why-why analysis is used to select the most appropriate causes [4]

3) Why-Why analysis-The approach uses a systematic questionnaire technique to search for root causes of a problem. For every problem there exist some causes which can be identified by asking 'why?'. Once it becomes difficult to respond to "why?" the problem cause of the problem may have been identified [5].

4) Fault tree analysis-This technique is used to find the root cause of failure in an organization i.e. aerospace, nuclear power etc where safety is much more important. In

this technique the undesired conditions or events are analyzed by using Boolean Logic. This technique works with a formation of tree in which undesired outcome is shown as the root of tree while various reasons of this outcome is shown as branches whose relationship can be formed with the help of 'OR' and 'AND' gate.

5) Failure modes and effect analysis-This technique is very much similar to the fault tree analysis. This technique was used for the first time in military operations to find the basic causes behind the malfunctioning of system. In this analysis every component is observed very carefully to recognize failure modes with its cause- effect relationship. Failure modes for every part are recorded in some specific worksheets. It is basically a systematic approach of finding all failure modes in a particular process or area.

II. Literature Review

Literature review has been done to find out the real life application of kaizen in an Indian industry to show its importance. Various researchers have done work in this field of implementing kaizen to find out the results and benefits. A number of work studies has been reviewed to discuss the kaizen philosophy, to find that is it really beneficial for steel industry to improve productivity and quality?

*A. Radharamanan*et al. implement Kaizen technique in a small size furniture industry. The main aim was to produce product with higher quality, lower cost and higher productivity to satisfy customers. Various problems were identified through brainstorming process i.e. absence of proper methodology, improper use of individual protection equipments, old machines, disorganized workplace, lack of training, poor quality of raw material and insufficient illumination at some places. Implementation of solutions results in achievement of target [6].

*B. D. Rajenthirakumar and P. R. Thyla*discussed about the importance of kaizen by implementing it in an automotive component manufacturing company with a focus on tube sub-assembly line to fulfill the objective of eliminating waste on shop floor. Value stream mapping was used to visualize the non value added activities. After a detailed study and analysis of the standard work procedure and thorough investigation on the assembly line, they found the change-over time as a critical factor. The thirteen best kaizen among the twenty solutions were selected to improve the tube bending process took into consideration the directions of the management. The results showed that the change-over time during the bending process was reduced from 2815 sec to 755 sec which was 73% change over time reduction [7].

C. Pratesh jayaswal and Hemant singh rajput implemented kaizen in a leaves spring manufacturing company to identify the areas of improvement in equipment. The company was facing problems due to break downs, equipment defects and poor working conditions. Solutions were applied to increase the availability along with increase in quality and performance of the shot peening machine by controlling the losses that affected the production. The numbers of breakdown hours were reduced considerably. This resulted in turn decrease of throughput time, better quality products and reduction in rejection costs. OEE of the machine was increased from 43 % to 68 % whereas the labour cost decreased up to 67% [8].

D. Sanjay Kumar et al. implemented Kaizen in one of the leading Indian industries manufacturing pre-stressed concrete steel strands (PC wire). During study lot of scrap was observed. Reasons for scrap were found out using certain total quality management tools such as brainstorming, cause & effect diagram and pareto analysis. Main reasons were left over rings, non-conformity, chheda and weld/wire breakage. In this study, scraps due to left over rings were reduced gradually by taking suitable action [9].

E. Anil S. Badiger et al. made an attempt to identify the areas of improvement in equipment through the implementation of kaizen and poka-yoke. The objective of work was to enhance its overall performance to increase the productivity. Why-why method of root cause analysis was used to eliminate the causes. The OEE of the equipment was increased from 49.9% to 74.68%. The improved OEE resulted increase in availability, better utilization of resources, high quality products and also raised employee morale and confidence [10].

III. Methodology Suggested By Researchers

Implementation of kaizen starts with the identification of problems. Brainstorming is the best tool which is used for this purpose. Even in the above case studies brainstorming was used by everyone but some other tools likecause and effect diagram, Pareto chart and why-why analysis were also used by them. The methodologies applied by them were different but with a common objective of improvement. Some of the methodologies discussed by them are discussed in table 1.

Table 1: Methodologies of Various Researchers

Sr. No.	Name	Methodology
1.	R. Radharamanan et al.	Brainstorming tool was used to find various problems. Further pareto chart was used to select critical problems.
2.	D. Rajenthirakumar et al.	Value Stream Mapping was used to find area of problem.
3.	Pratesh jayaswal et al.	Various tools were used for finding the root cause and improvement i.e. 5S, Brainstorming and Why-Why analysis.
4.	Sanjay kumar et al.	Firstly brainstorming and Fishbone diagram was used to find the problems with its classification into various categories. Then Pareto chart was used to select the critical problem.
5.	Anil S. Badiger et al.	Why-why analysis was used for finding the root cause of problem.

IV. Result And Discussions:-

These literatures proved that Kaizen is a very important tool for incremental and continuous improvement in an organization. The use of various tools can vary for a particular industry depends upon the objective and size of organization. Its importance increase because of the fact that it does not lost in any money. With the help of little efforts done by team and ideas generation of every person can brings improvement.

V. Conclusions

In today's competitive world it becomes important for steel industries to increase its productivity and quality of product for the survival. It can be concluded from the above literature surveys that kaizen is an important tool which brings remarkable improvements with the help of people's ideas and a little efforts. Further many tools can be used for finding root causes i.e. brainstorming, Ishikawa diagram, why-why analysis and Pareto chart. Every tool has its own importance but improvement can be assured by implementing kaizen with these tools if applied properly. In short kaizen is an effective tool for the steel industries.

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