

# Quality and Productivity Improvement in Industry Using Kaizen: A Review

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## Abstract:

Kaizen is a mixture of two Japanese words which together mean "good change" or "improvement," but it has come to mean "continuous improvement" because of its link with lean systems. Kaizen is harmonizing to Six Sigma. It is a continuous improvement of process, and it is often considered to be the building block of all lean production methods. The ultimate goal of this paper is to increase efficiency and productivity in Industry, by simplifying system, standardization of the processes, reducing waste and incremental improvements by using latest techniques like Kaizen. Every company wants to succeed in that competitive world. Some small improvements lead to perfection but it is not to be reached even though we try to get as close as possible by it again and again.

## Introduction:

Lean Manufacturing focuses on reducing waste and eliminating waste without producing efficiency, and also considers waste created as a result of job volatility and overburdening. The book "The Computer That Changed the World" launched it in the year 1990, based on a 5-year MIT analysis of \$5 million. The principles of lean have helped industries of manufacturing, healthcare, service and software industries. It uses various tools (as shown in Figure 1.) which helps to reduce waste and increase productivity of an organization in different ways.

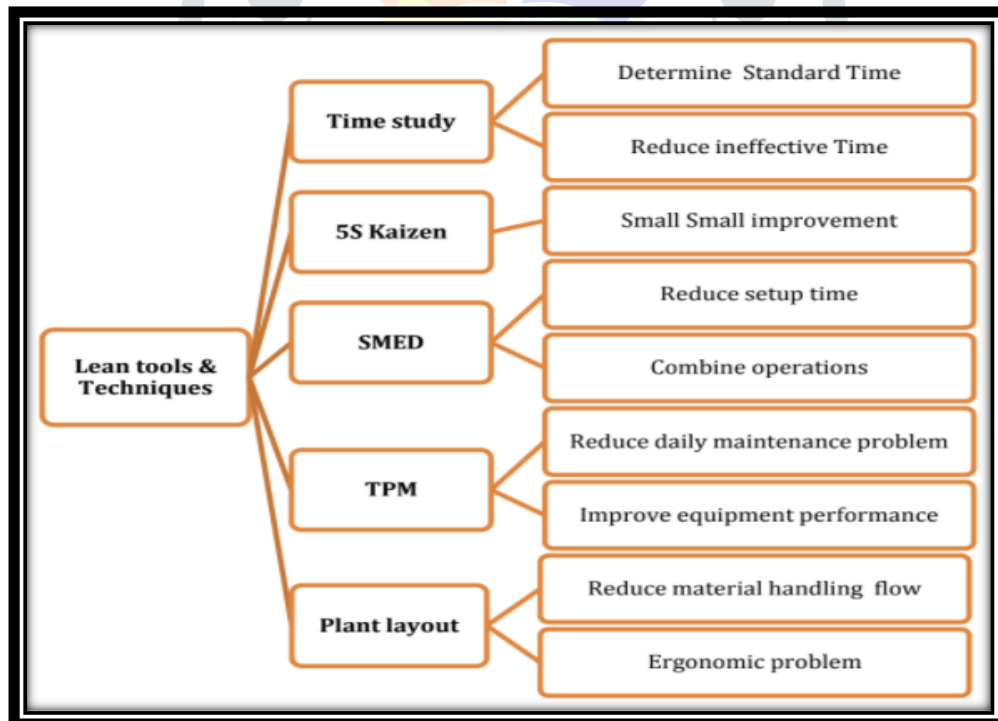


Figure 1. Tools and Applications

## Literature Review:

Imai said in the year 1986 that Kaizen requires everyone's participation to demonstrate continuous improvement, managers and staff should all be directly involved together. In 1986, Watson said the Plan Do Check Act, also known as the Deming cycle, had a history back to Shewart's eminent work as a statistics expert in the 1920 period. He proposed PDCA's theory. Deming, the Full Quality Management innovator, has changed Shewart Process as Prepare, DO, Review and Act. PDCA, works as a continuous model of quality which consist of logical sequence of PDCA repetition for Continuous Improvement and gathering knowledge. The main areas with Kaizen improvement are flow in system, bottlenecks or constraints, stacking, Work in Progress, Process Cycle, Time, Work and Instruction etc. A lot of lean tools proved that they have expected impact relating to decreased waiting time. By the implementation of these tools, the man time has been reduced to 15.99 sec depending on the score of benefits (as shown in Figure 4.) and the total machine time has been reduced to 299.83sec depending on the score of main tools (as shown in Figure 5.). Value Stream Mapping helps in analyzing the value and non-value adding element in the process and with the help of VSM, non-productive elements can be eliminated from the process. This study is concerned with the application of Kaizen in a garment trade organization in Bangladesh. The objective to implement Kaizen in this industry is to progress the line effectiveness, reduction in waste and to increase the 5s score. For implementation of 5s the existing data was collected and the existing time was calculated. The top 5 defects of current sewing line were identified and their root causes were analyzed using cause and effect analysis. After identifying the defects, corrective actions were taken against the problems which results in the improvement of efficiency from 54% to 61% and DHU is reduced to 84 pieces from 108 pieces. In India there is a large number of medium and small scale industry and most of these industries faces the problem such as lack of productivity, high lead time, greater W.I.P. In order to solves these types of problems the concept of Kaizen and 5s is adopted by the industry. This study demonstrates the application of Kaizen and 5s helps in reducing the lead time and increasing the productivity in the industry. These concepts reduce the chances of bottle necking and helps in the easy work flow. The concept of Kaizen and 5s also helped in the better utilization of the available space and reduces the possibility of accident in the industry. To achieve Continuous Quality improvement in this organization various tools of Kaizen were implemented such as VSM, FMEA, Check Sheet, Pareto Diagram, 3G , 3M , 5S and PDCA by help of which the organization were able to find the root cause of the problem. Using lean manufacturing methods, the assembly line was strengthened, the case organization was able to reduce its inventory by 66% further defect rate was reduced to 32% and the organization were able to manage equipment, manpower and storage capacity or inventory. It is vital to keep records of data for maintaining price and inventory index. For identifying problems and its root cause, analyzing data and collecting it tools such as Pareto Chart, Histogram, Fishbone Diagram, Scatter Diagram, Check Sheet, Process Flow Chart and Check Sheet were used. KAIZEN - (SMED) single Minute Exchange of Die after implementation of SMEAD, Setup Reduction Lean manufacturing. In manufacturing industry which helps to enhance the overall results and efficiency of the production system and helps to reduce the various types of processing time i.e Trails runs and adjustment time ,Measurements ,setting and calibration time, tools, mounting and removing blades and parts ,Preparation ,Checking of Materials and Tools the overall results have improved from about. (30%, 5%, 15%, 50%) respectively. Apart from SMED in this experiments PDCA, lean manufacturing Which helps to standardize the process of manufacturing and helps to cut the manufacturing cost & helps to improve in increasing the productivity and customer services and of course save the inventory cost, scrape, and space etc. It is a known fact that small scale industries of India have suffered from issues such as quality, huge lead time, hazardous working environments etc. This study shows how these problems were handled using Kaizen which helped to save both money and time. Kaizen's implementation helped to reduce machining cost up to 44.44 % and amount of Rs. 17 has been saved per lot when compared to lot of forty pieces. Before the Kaizen was implemented, facing process and clamping workpiece in the jaw of chuck takes 50 sec, 10 sec to reverse the plate, 30 sec for machining on the other side. For the completion of whole process

90 sec has been taken and total of 180sec was taken for producing 2 jobs. After the implementation of idea, 20 sec for setting the workpiece in the chuck and 35 sec has been taken for facing on other side. As in total 100s for producing two jobs and 200s for 4 jobs. A lot of forty pieces was produced in 3600s but after the helpful actions and implementation forty pieces took 2000s. This case study is concerned about the application of Kaizen in a small-scale electrical industry. The industry is facing problem of excessive cycle time and also the poor quality of final product. For the implementation of the Kaizen the whole process is analyzed from the initial process and a flow chart is prepared which shows the whole process. After the analysis of the process it was found that poor quality of product is because of problem in resister leg bending and Irrax tube bending. After knowing the source of problem jigs and fixtures are installed to overcome the problem and it results in the good quality of the final product and also in total time reduction of 50-60%. This study shows the implementation of kaizen and 5s in small scale manufacturing. The aim for the implementation was to solve different problems faced industry and to increase the efficiency of the process. The whole process was analyzed carefully and by the help of fishbone diagram different problems were noticed which reduces the productivity of the process. The problems faced by the workers were also taken into consideration. In the 5s implementation process unnecessary items were red tagged so that they can removed from the main working space. Weekly audits were done after the implementation of 5s to ensure that the workers is following the 5s procedure and 10 weeks it was noticed that the productivity has been increased to 315/ month from 310/month. Kaizen is a concept which is implemented for continuous improvement of all the functions in an organization. Kaizen implementation process involves all the employee working for the organization. If we only focus on working harder and faster, we can't achieve Kaizen and 5s. In order to achieve 5s and Kaizen systems the involvement, assurance and support from top management is very imperative. Kaizen takes problems as an opportunity to progress. Kaizen creates an environment for employee where his/her ideas or suggestions are valued and respected. In those organizations where Kaizen is regularly done, work gets easier and more enjoyable and it results in building a high morale for the employee. In the modern era there is a huge competition between the large manufacturing firms and it's becoming very problematic to last in this competitive situation. This case study shows the application of Kaizen is helping the small-scale industry to survive in this competitive environment. This case study shows that the implementation of Kaizen has helped the industry by reducing the inventory flow time for store from 600 to 63 seconds and also helped in saving around Rs 9709.2 over 12 number of workers. A significant change has been introduced in layout of the industry which results in reducing the total distance travelled by the product from 226 to 126 ft and also the total time interval to cover these distances is decreased from 319 to 172 seconds. Before the implementation of 5S most of the time was wasted by the worker in searching of tools or some required assembly. There was no proper bin placed for collection of different incoming raw materials instead all the materials were collected together at same place. Each tool present was given specific name or code which made it easy to identify the required tool. Later after implementation for keeping a track record on improvement the rating was given from the scale of 7 to each S of 5S. After the good results from 5s the company is also planning to apply more quality tools like FMEA. After implementation of 5s i.e. Sort, Set in Order, Shine, Standardize, Sustain. In small-scale industry there were a-lots of improvement which take place in various department theoretically and practically in industry where 5S has implemented their various types of processing effectiveness has been changed like - working processing time, Material searching time, Tool arrangement time, Tool searching time, tool sequences, Material arrangement, Process path cleaning, Working Environment, Safety, Working Efficiency in fact overall effectiveness has improved from 50% to 75% after the application of 5S in an industry.

## Conclusions

Each industry we concentrate on or see with our naked eyes following the path of the Kaizen only shows efficiency growth and profits in all areas from shop floor to top management. Yeah, it's true it's hard to implement because it goes and focuses on such small detail that requires an expert eye, but it's definitely

worth it because what the company gets in return is enormous in terms of growth. The Kaizen methodology has been used to build companies like Toyota, Godrej, Moto, Ford etc.

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