International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 08 Issue: 05 | May - 2024 SJIF Rating: 8.448 ISSN: 2582-3930

Productivity improvement tools used in the Industry-An Overview

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Abstract - Productivity is generally considered to be the efficient utilization of organizational resources and is measured in terms of the efficiency of a worker, company or nation.[1] Productivity is one of the widely used manufacturing performance measure and is essential for driving and managing production improvements[2]. Productivity relates to the efficiency of production factors in the production process. The higher the productivity, the lower the input, and consequently the lower the product cost [3]. The full benefits of productivity improvement measures are realized when productivity is examined from two perspectives: operational efficiency (output/input) of an individual worker or a business unit as well as performance (effectiveness) with regard to end user or customer satisfaction [1]. Productivity is an aggregated concept of overall efficiency/effectiveness of the organization concerned. Today most firms are interested in a strategic approach for improving productivity and quality in their organizations. Tools are playing vital role to increase productivity in the Industry.

***Key Words*:** Productivity, tpm, lean, value engineering, JIT

1.INTRODUCTION

In today's global and competitive business environment, managers are increasingly under pressure to improve the financial performance, productivity and the profitability of their companies [1] .Manufacturing has a significant role both during and after a global crisis. During a crisis, manufacturing attempts to resolve the shortage of products and after the crisis, manufacturing tries to retrieve the economy. In both cases, quality and productivity play crucial roles [7].Productivity relates to the efficiency of production factors in the production process. The higher the productivity, the lower the input, and consequently the lower the product cost. The latter improves a company's competitiveness. Improving productivity is an important part of business management in terms of cost reduction and profit growth [3]. Productivity is generally defined as the relation of the output and the input of a system or process, while both quantities may be expressed differently [5]. In any manufacturing industry, the process of improvement or innovation to improve productivity is nothing more than the process of creating new "knowledge". In other words, it is not an exaggeration to say that the improvement of productivity, or competitiveness, of any enterprise depends upon the ability to create new "knowledge", as well as on the amount of existing "knowledge". The "knowledge of manufacturing technology" does not simply refer to the technology for making some products. It refers to technology for making the right things of the right quality that the market wants, at a lower cost, in the required amount, at the proper time, with more safety, more comfort, and more friendliness to the environment. This requires extensive knowledge, including marketing, process design, production, maintenance, training and education, cost management, and quality control. improving productivity and consequent competitiveness in any manufacturing industry involves (i) Increasing knowledge of skills (esoteric art),knowledge of science (knowledge of seeds), and knowledge of engineering (knowledge of means), and then,(ii) Converting those elements of "knowledge" into "knowledge of technology" and further integrating them into "knowledge of manufacturing technology" [11].

2. Tools to Improve Productivity

To increase the productivity different tools are used in the industries, List of important tools are given below,

2.1 Total productive maintenance (TPM)
2.2 Advanced TPS
2.3 Just-In-Time (JIT)
2.4. Value Engineering
2.5. Six Sigma and Lean Manufacturing

2.1 Total productive maintenance (TPM) is one such methodology that has a strong potential to enhance productivity, quality and reduce product cost. TPM is being implemented in industry as a group activity that reduces equipment maintenance, enhances productivity and improves profit by implementing various kaizen projects. TPM develops 'can do' spirit among employees for a continual improvement in the process. TPM combines productive and preventive maintenance techniques with an innovative approach to overcome production losses . TPM initiatives helped in effective utilization of existing resources for continuous productivity improvement in a manufacturing system. OEE optimizes productivity and increases line efficiency by improving production rate and quality rate . TPM is a business tool that can help management to unleash hidden capacity and therefore reduce production cost and allow deferral of major capital investment [2].

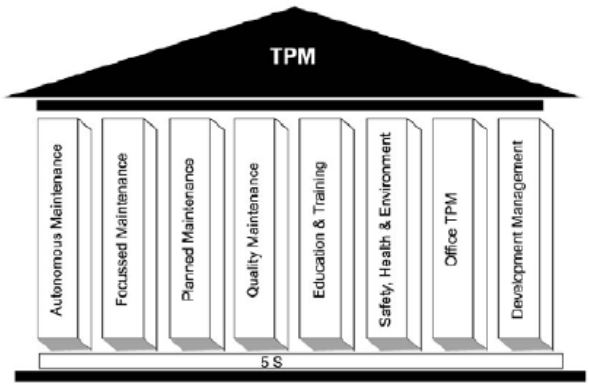

Fig. No 1: Pillars of Total Productive Maintenance

2.2 Advanced TPS has a mission in global deployment is to realize CS (customer satisfaction), ES (employee satisfaction) and SS (social satisfaction) through production that achieves high quality assurance. In implementing Advanced TPS for uniform quality worldwide and production at optimal locations (concurrent production), (i) renewal of production management systems appropriate for digitized production and (ii) creating attractive workshop environments tailored to increasing the number of older and female workers are fundamental requirements. In more definite terms, (a) requires strengthening process capability maintenance and improvement by establishing an intelligent quality control system. (b) requires the establishment of a highly reliable production system that achieves high quality assurance. (c) involves renovating the work environment for enhancement of intelligent productivity.(d) requires bringing up intelligent operators (skill level improvement) and establishing an intelligent production operating system. These factors combined will realize higher-cycled next-generation business processes for early implementation of uniform quality worldwide and production at optimum locations [4].

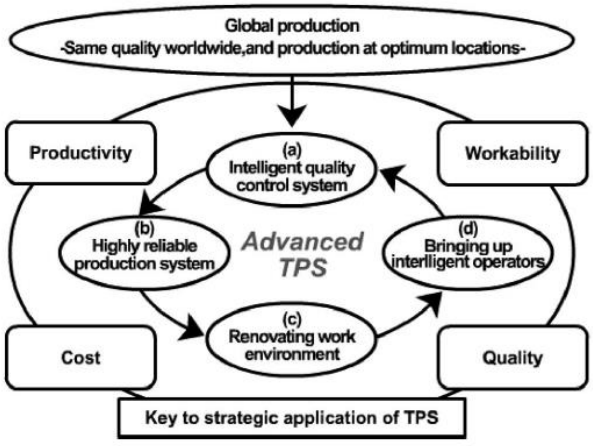

Fig. No 2 Advanced TPS, global production technology.

2.3 Just-In-Time (JIT) strategies on manufacturing productivity having positive effects on productivity [5]. JIT may be viewed as a production methodology which aims to improve overall productivity through the elimination of waste and which leads to improved quality. In the manufacturing/assembly process JIT provides for the cost effective production and delivery of only the necessary quality parts, in the right quantity, at the right time and place, while using a minimum of facilities, equipment, materials and human resources. JIT is dependent on the balance between the stability of the users 'scheduled requirements and the suppliers' manufacturing flexibility. It is accomplished through the application of specific techniques which require total employee involvement and teamwork . The JIT system is a concept or philosophy which employs as tools several production management practices such as setup time reduction, cellular manufacturing, level production planning, preventative maintenance, multifunctional workers, quality circles, kanban, JIT purchasing, etc. Because of its very nature, each company must develop its own JIT system. [6].

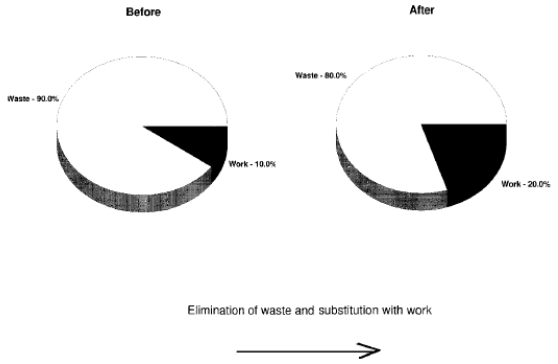

Fig. No. 3 Productivity improvement through the elimination of waste.

2.4. Value Engineering defines as "the systematic application of recognized techniques which identify the function of a product or service, establish a monetary value for that function, and provide the necessary function reliability at the lowest overall cost". Value engineering has one more feature, which distinguishes it from all other cost reduction programs. That feature is "function analysis." Value engineering analyzes the function as a means of understanding everything about the product. In other words, by getting an individual to think about a product (or service) in terms of "function" rather than "things," new alternatives (to design, to engineering, and to manufacturing) may be found to improve efficiency, reduce cost, or increase performance. So by questioning methods, processes and materials that are proposed (or have been used,) cost reduction may be achieved. Thus understanding the function and its value is the essential difference between value engineering and all other cost-reduction programs.

2.5. Six Sigma and Lean Manufacturing have diverse roots. The driving force behind Toyota's development of lean management was waste elimination and increased product flow velocity. Six Sigma was developed by Motorola to improve product quality where high component counts often resulted in a correspondingly high probability of defective final products. Six Sigma improves productivity through variation reduction. Lean improves productivity through process design and the elimination of wasted activities. Both focus on process, but with different perspectives. [9] Lean manufacturing tools are effective wherever there is a selection of correct tool, genuity in collected data, involvement of people around with positive mindset, to bring out and accept the change in there working method or culture that will lead to better working environment. Lean manufacturing is not a gimmick or magic but identifying the non-valued things around the production industry and trying. to reduce or eliminate it to increase the productivity or profit with streamlining of the process are some silver lining associated with it. The seven types of waste that are considered in lean manufacturing are Over processing, Over production, High inventory, Waiting time operator/ Material, unnecessary motion, Defects and Unnecessary transportation [10].

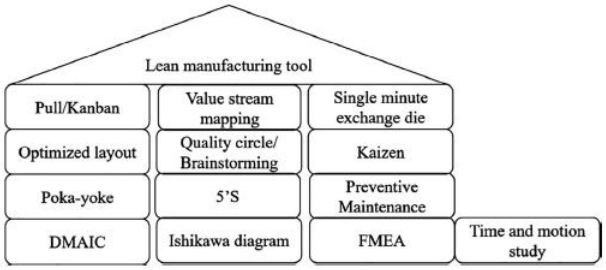

Fig No. 4: Various Techniques in Lean Manufacturing.

3. CONCLUSIONS

Improving productivity is increasing "knowledge of manufacturing technology. In any manufacturing industry, the process of improvement or innovation to improve productivity is nothing more than the process of creating new "knowledge". In other words, it is not an exaggeration to say that the improvement of productivity, or competitiveness, of any enterprise depends upon the ability to create new "knowledge", as well as on the amount of existing "knowledge". The principal purpose of implementing above tools in industries is to help manage the operations of a firm to facilitate a better competitive position in today's global market by increasing the productivity and saving on costs.

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