

Process Optimization Methods for Shop Floor Planning : A Study

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Abstract— Process optimization methods means regulation of production processes, and it must have done for shop floor improvement without changing any constraints. Process optimization is a quantitative technique for industrial decision making. So far whatever methods used for shop floor planning so far include mainly lean, kaizen, total quality management, and six sigma. These methods are used for maximizing productivity by the elimination of non-productive activities. The research work done so far, mostly focuses on the implementation of lean manufacturing as process optimization methods. The main aim of the present paper is to evaluate the present condition of process optimization methods used for shop floor planning. To do so, several articles were collected from journals which dealt with the implementation of process optimization methods. This study illustrates the present implementation level of process optimization methods in the worldwide industrial scenario and provides a unified theory for the implementation of process optimization methods.

Keywords- Process optimization methods; Lean manufacturing; Shop floor management; Waste elimination; Non-productive activities

I. INTRODUCTION

The main objectives of a production system such as maximizing throughput, minimizing costs, maximizing efficiency and maximizing workforce utilization can be achieved by the implementation of process optimization methods [1]. Process optimization methods are mostly evolved from the Toyota production system. These methods are used for improvement in productivity level by the elimination of non-value added activities. Lean manufacturing, kaizen, total quality management, and six sigma, are mostly implemented methods in industries because of a higher improvement rate in production [2]. In which, lean manufacturing is a prevalent method in present industries [3]. The main objective of the production system is to achieve high productivity with minimum utilization of resources and for this, lean manufacturing is a superior method [4]. Several articles demonstrate that most of the researches focus on finding out the source of wastes and suggest their views on implementing the lean method on the shop floor.

II. OVERVIEW OF PROCESS OPTIMIZATION METHODS

The major methods considered by the earlier articles for the implementation of the process optimization methods are Lean manufacturing, kaizen, total quality management, and six sigma. These methods improve each process required to transform the raw material into the final product through the observation of the process on the shop floor [5]. Lean eliminates non-productive activities [6]; Kaizen means continuously improvement in processes by involvement of overall employee of the shop floor [7]; Total quality management (TQM) is used for identification and elimination of non-productive activities, it improving the customer perception, and ensuring that workers must be upgraded with training [8]; Six Sigma is used for improvement in the quality of the product by identifying and eliminating the causes of defects [12]. The output of each process optimization methods is different, and implemented according to customer expectation and condition of the shop floor.

III. PURPOSE AND METHODOLOGY

The aim of present paper is to evaluate the implementation level of process optimization methods in industries and provides a unified theory for the implementation of process optimization methods. From several journals, the 180 papers were searched and in which found just 21 according to the objective. This significant reduction in the number of articles is because the process optimization methods are used in various areas like physics, chemistry, business, and economics, and the present article focuses on in the area of mechanical, mining, mining machinery, electrical, electronic, and automobile. The results obtained by the implementation of process optimization methods for shop floor planning as found in extensive review has been described by table 1.

TABLE I. PROCESS OPTIMIZATION METHODS AND IMPROVED FACTOR OF PRODUCTION SYSTEM

(IN TABLE, I MEANS IMPROVEMENT AND R MEANS REDUCTION)

S.N.	Authors	Process optimization methods	Improved factors					
			Utilization of resources	Working environment	Quality	Total time	Total cost	Productivity
1.	Alhuraish et al	Lean manufacturing, six sigma	I	I	I	R	R	I
2.	Esa et al	Lean manufacturing	I	-	-	R	R	I
3.	Rohani et al	Lean manufacturing, Kaizen	I	-	-	R	R	I
4.	Mwanza et al	Lean manufacturing	-	-	-	R	R	I
5.	Choomlucksana et al.	Lean manufacturing	I	I	-	R	R	I
6.	Santos et al.	Lean manufacturing	I	I	I	R	R	I
7.	AR et al.	Lean manufacturing, Kaizen	-	-	I	R	R	I
8.	Salleh et al.	Lean manufacturing, total quality management	I	-	-	R	-	I
9.	Rahman et al	Lean manufacturing	-	-	-	R	R	-
10.	Dotoli et al	Lean manufacturing	-	-	-	R	R	-
11.	Gupta et al	Lean manufacturing	I	I	-	R	R	I
12.	Timans et al	Lean manufacturing, six sigma	-	-	-	R	R	I
13.	Ostlin et al	Lean manufacturing	I	-	-	R	R	I
14.	Motwani	Lean manufacturing	-	-	-	R	R	-
15.	Vinodh et al	Lean manufacturing	-	-	-	R	R	I
16.	Solding et al	Lean manufacturing	-	-	-	R	R	I
17.	Singh et al.	Lean manufacturing	I	-	-	R	R	I
18.	Tripathi et al.	Lean manufacturing	I	I	I	R	R	I
19.	Tripathi et al.	Lean manufacturing	I	I	I	R	R	I
20.	Deshkar et al.	Lean manufacturing	-	-	-	R	R	I
21.	Masuti et al.	Lean manufacturing	I	-	-	R	R	I

IV. RESULTS & DISCUSSION

The implementation of process optimization methods for shop floor planning as found in the literature review shows that lean manufacturing is a prevalent method and mostly used by industries. The results obtained by lean manufacturing are superior in comparison to other methods, and lean manufacturing may have applicable in most cases. Figure 1 shows the implementation of process optimization methods. Figure 2 shows an analysis of industries where process optimization methods have implemented.

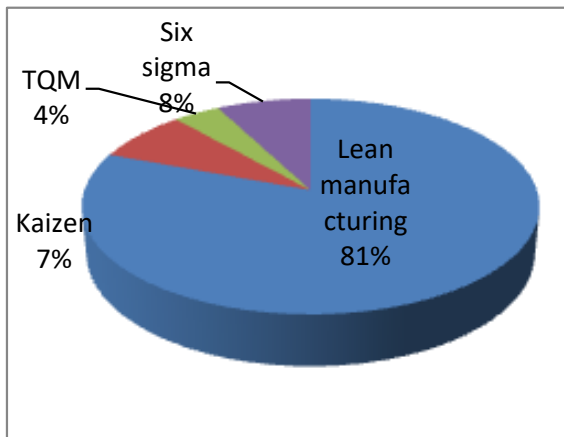


Fig. 1. Process optimization implementation

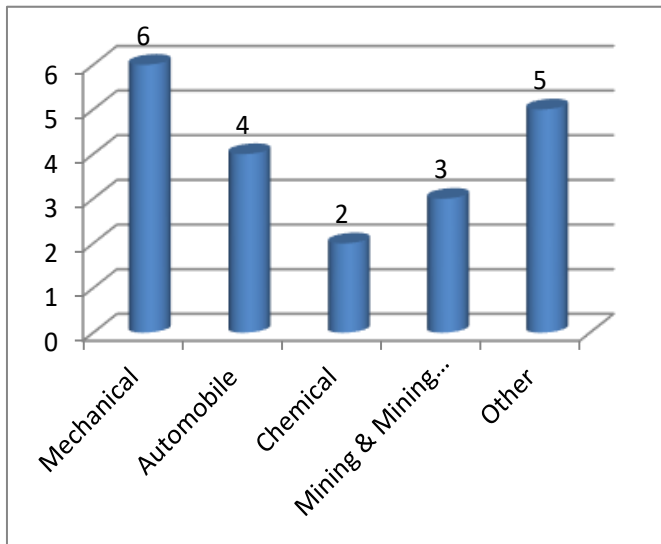


Fig. 2. Description of industries

V. CONCLUSIONS

There is extensive work has done on process optimization methods, which provides a wide perception for the implementation of a suitable method on the shop floor. Literature has proved that lean manufacturing has been broadly implemented method in industries. The higher level of improvement in results demonstrates that lean manufacturing is the most effective method in comparison to other process optimization methods. Process optimization methods represented through literature, and by these methods, different factors have been improved of the shop floor. The reduction of

work in process, transportation, waiting, time, cost, reworking, have the major aim of these methods. This improvement has been established perception that lean is a superior method in industries and may have applicable easily on the shop floor.

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