Scope of JIT Elements in North Indian Manufacturing Industries

Sandeep kumar, Lecturer in Mechanical Engineering, GBN Govt. Polytechnic, Nilokheri

Shyam Singh, Lecturer in Mechanical Engineering, GBN Govt. Polytechnic, Nilokheri

Abstract

In the face of global competition, the need of customers' demands from the companies to improve the product quality and customer service. The reduction of wastage has long been used by the manufacturing sector to reduce costs and improve the product quality. It is perceived that Just-In-Time (JIT) is highly beneficial in manufacturing industry. JIT is an approach to improve overall productivity and eliminate waste. It provides the parts of right quantity and right quality, at right time and at right place, while using minimum number of facilities, equipment's, materials and human resources. JIT in the context of Indian manufacturing industries were identified using a mail survey approach. The questionnaire was sent to the 60 service industries and 30 industries responded. On the basis of the responses, critical elements were identified. Attempts have been made to examine the degree of importance and degree of difficulties of these critical elements in North Indian manufacturing industries. A matrix has been suggested to branch off the difficult and important elements. The results revealed that JIT plays important role in service industries. It is suggested that the elements which are less difficult but more important should be implemented at the initial stage.

Keywords*: Just in time, kanban, Standardization etc.*

1.0 INTRODUCTION

Most successful companies develop and implement strategies that will give them a competitive advantage. A company that improves performance on a regular and continuous basis certainly will gain a competitive edge. Companies seek competitive advantage by emphasizing on performance factors such as flexibility, quick responsiveness, cost, efficiency, quality, reliability and service. JIT manufacturing is the ideal strategy to achieve these desired objectives. JIT is indeed a system, which consists of a series of techniques. JIT provides cost efficient production in an organization and delivery of only the necessary parts in the right quantity at right time and place while using the minimum facilities.

JIT enables one to conceive, design, implement and operate a manufacturing and supporting systems, as an integrated whole, based on the principles of continuous improvements and elimination of all kind of waste.

1.1ORIGIN OF JIT

JIT was developed by Toyota's vice president Taiichi Ohno. In 1960's, the idea was formalized into a management system, when TOYOTA sought to meet the precise demand of customers for different models and colors with minimum delay. Toyota production system has played a vital role in the development and popularization of JIT all over the world. By 1972, new approaches have begun to attract wide attention in Japan. In mid 1970's other Japanese companies began to experiment to adopt these approaches. Then, by the end of 1970's JIT system attracted the attention in the west. The JIT concept was first transferred to the United States around 1980 at Kawasaki's Lincon, Nebrasks. Since then many of the best corporations in the United States, including those in the automotive and electronics industries, have followed suit and have begun implementing JIT. But still concept is just beginning to be understood and used by many industrial enterprises throughout the world today.

1.2 LITRATURE REVIEW

Many researchers have carried out significant work in the area of JIT. The literature related to the present work was reviewed. Inmam and Mehra (1990) stressed upon the applicability of JIT in service environments, including service part of manufacturing line. Some benefits of JIT were reported as improved communication, elimination of warehouses, reduced supplier base, improved vendor performance, improved quality, improved service, lower price levels, quick response time etc. Benson (1996) reported that diverse service organizations from bank cheque processing centers to hospital operating rooms are now applying JIT philosophy to the special problem of service production. It was hoped that service industries will continue to investigate the potential advantages of JIT and soon the list of successful case histories will include hotels, educational facilities and leisure establishments Garg et al. (1996) analyzed some vital issues in JIT purchasing in an Indian context on the basis of a questionnaire (n=28) sent to 80 different Indian

Industries. The issues include the importance of JIT attributes, problems in implementing JIT, and expected benefits from JIT purchasing implementation. Some research directions were also identified for future work. Garg and Deshmukh (1999) said that JIT have great importance in Indian context due to its wide range of benefits. Although, the success stories of these management philosophies are limited in India yet, several Indian Industries are implementing basic principles of JIT. Yasin and Small (1994) concluded on the basis of investigation of 86 organizations of US public sector, that JIT is a form of "managerialism", has the potential to increase the operational efficiency, service quality and organizational effectiveness of public sector organizations. Sharma and Singh (2005) conducted a case study on two Indian agricultural equipment-manufacturing companies, which have implemented JIT. In one case the profits of the company were found to have increased by 10%. While in the second case the company was successful in reducing the level of inventory by over 20%

1.3 RESEARCH METHODOLOGY

The elements of JIT, which affect the performance of Indian service industries, were identified through literature survey [8,6] etc. A questionnaire was designed to collect the relevant data regarding the quantum of importance, difficulties, expected benefits and the possible constraints in the implementation of JIT in Indian industries. Questionnaire had two sections A and B. Section A carried general information regarding the industries like, annual turn-over, number of employees, ISO certification, whether they are implementing JIT or not, type of product manufactured etc. In section B main emphasis was given to degree of importance, and degree of difficulties regarding JIT in Indian service industries. The questionnaire prepared was based on 5 point Likert scale. This questionnaire was then sent to the various service industries (N=60). Industries were selected from northern India and are situated at Chandigarh, Delhi, Punjab, Haryana, Himachal Pradesh etc. Out of 60 the 30 responses were collected. The collected data was arranged in order and analyzed by checking it at 95% acceptable limit through t-test. SPSS-11.0 software was used to make the calculation work easy. Conclusions were then drawn on the basis of this analysis.

Here importance of JIT elements means that how much an element is important for the industry i.e. automation, bar code technology etc., whether it is important for the industry or not, if yes, then how much. Similarly, difficulties of JIT elements show that how much an element is difficult to implement in industry. For this, forty most important elements, according to the Indian service industries, were chosen on the basis of literature survey (Anderson and Elziabeth 2000, Billesbach 1991, Vikas and Garg 2000, Garg and Gupta 2003).

The importance and difficulties of JIT elements were evaluated by 5 point Likert method. The mathematical analysis was done according to the score of each element.

1.4 DEGREE OF IMPORTANCE IN MANUFACTURING INDUSTRIES

The data was collected from the selected manufacturing industries and analyzed. The results of Degree of importance are given in table -1. The table consists of mean value, Standard deviation and value of t' calculated. The value of five elements i.e. Group technology, process simplification, special process control, waste reduction and zero defect did not fall I the acceptance range. Figure-1 represents the score of each important element for all the selected service industries. The elements are plotted along X-axis while their score are along Y-axis. The most important element recognized by manufacturing industries was waste reduction (mean=0.8929). The least important element was JIDOKA (mean=0.5625)

1.5 DEGREE OF DIFFICULTIES IN MANUFACTURING INDUSTRIES

To check the degree of difficulties in case of manufacturing industries the same procedure was adopted as in case of difficulties. The data was collected from manufacturing industries and then analyzed. Table-2 illustrate the mean value, standard deviation and value of't' calculated. Analysis disclosed that all values come in the acceptable range. The score of each difficult element is shown in figure-2. The most difficult element recognized by the service industries was total productive maintenance (mean=0.4911). The least difficult element was automation (mean=0.2232)

1.6 PRESENT STATUS OF IMPORTANCE AND DIFFICULTIES OF JIT ELEMENTS IN MANUFACTURING INDUSTRIES

To check the status of degree of importance and degree of difficulties, a graph was prepared as shown in figure 3. The graph was divided in to four zones such as; zone 1- less important and high difficult elements to implement, zone 2- less important and less difficult elements to implement, zone 3- most important and less difficult elements to implement and zone 4- most important and high difficult elements to implement. It is clear from the graph that the most of the elements fall in the zone 3 i.e. most important and less difficult. Hence, for the successful

implementation of JIT, concentration should be focused upon these elements. The elements, which lie in the zone-1, are less important and difficult to implement; the industries can neglect these JIT elements to implement. It is concluded from the study that the elements which are less difficult and more important should be implemented at the initial stage. Group Technology, Product simplification, Process improvement, Customer Care, Process simplification

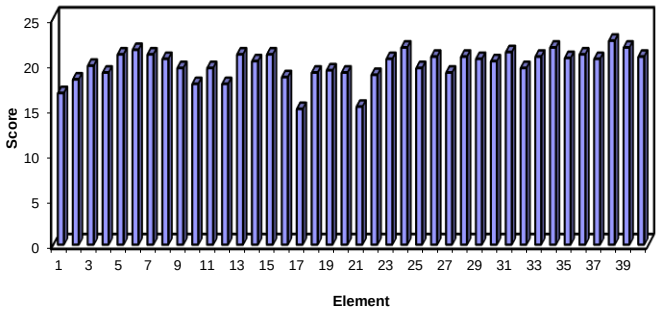

Figure 1 Degree of Importance in Manufacturing Industries

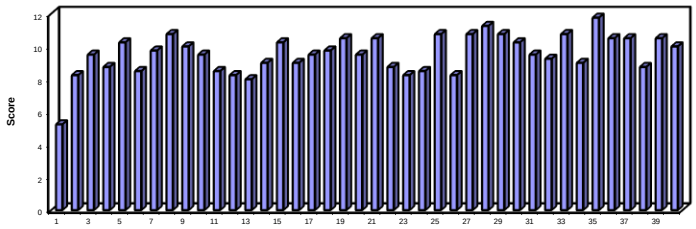

Figure 2 Degree of Difficulties in Manufacturing Industries

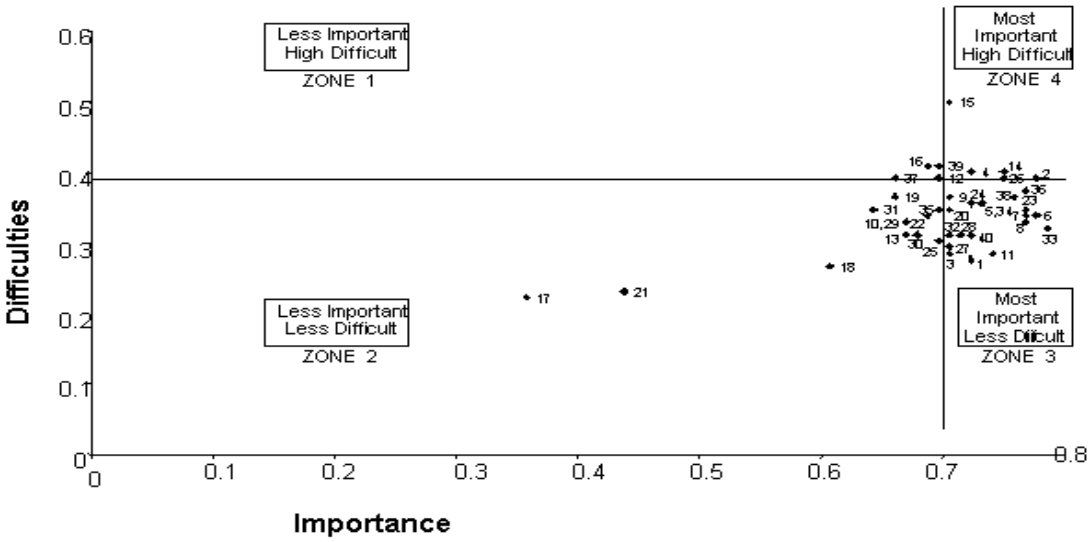

Figure 3 Present status of degree of importance and difficulties of JIT elements in manufacturing industry

1 Automation 2 Administrative Efficiency 3 Bar-code Technology 4 Buffer stock removal 5 Continuous Improvement 6 Customer Care 7 Customer satisfaction 8 Communication and information sharing 9 Design for service 10 Employee involvement 11 Flow Layout 12 Flexible Workforce 13 Group Technology 14 House Keeping (tidiness, clarity, cleanliness) 15 Inventory Reduction 16JIT Purchasing 17 JIDOKA 18 Kanban card or system 19 Lot size reduction 20 Lead time reduction 21 Poka yoke 22 Preventive maintenance 23 Product simplification 24 Process simplification 25 Process flexibility 26 Process improvement 27 Quality Circles 28 Quality Function deployment 29 Standard Containers 30 Small Lot Size 31 Setup time reduction 32 Smooth flow of materials 33 Standardization 34 Statistical process control (SPC) 35 Total productive maintenance (TPM) 36 Teamwork 37 Work-In-Process Reduction 38 Waste Reduction 39 Zero-Defect 40 Zero deviation schedule

Table 1 Degree of importance in manufacturing industries

S. No	Elements	Mean	Std. Deviation	t-calculaed
1	Automation	.6429	.17252	-4.513**
2	Administrative Efficiency	.6964	.20813	-2.379**
3	Bar Code technology	.7679	.17910	-.654**
4	Buffer Stock removal	.7589	.18612	-.883**
5	Continuous improvement	.8571	.17252	2.059
6	Customer Care	.8661	.14405	1.703*
7	Customer Satisfaction	. 8393	.13699	1.559*
8	Communication & Information Sharing	.8125	.18789	.634**
9	Design for service	.7768	.20794	-.336**
10	Employee involvement	.6964	.15749	-3.144**
11	Flow layout	.7768	.19649	-.356**
12	Flexible workforce	.7054	.21574	-2.076**
13	Group technology	. 8393	.17252	2.059
14	House keeping	.8125	.17513	.680**
15	Inventory reduction	. 8393	.13699	1.559*
16	JIT purchasing	.7411	.26772	-.967**
17	JIDOKA	.5625	.34443	-3.495**
18	Kanban card or system	.7321	.20331	-1.506**
19	Lot size reduction	.7679	.16567	-.707**
20	Lead time reduction	.7679	.17910	-.654**
21	Poka yoke	.6161	.32262	-2.853**
22	Preventive maintenance	.7500	.19245	-1.100**
23	Product simplification	.8036	.18456	.389**
24	Process simplification	.8861	.12729	3.533
25	Process flexibility	.7768	.17131	-.408**
26	Process improvement	.8125	.21109	.564**
27	Quality circles	.7589	.19816	-.830**
28	Quality functions deployment	.8304	.11890	1.703*
29	Standard containers	.8125	.23199	.513**
30	Small lot size	.8125	.14633	.814**
31	Setup time reduction	.8482	.19649	1.568*
32	Smooth flow of materials	.7768	.14174	-.493**
33	Standardization	.8304	.19309	1.106**
34	Statistical process control	.8861	.15931	2.527
35	Total productive maintenance	.8250	.28561	.648**
36	Team work	.8393	.13968	1.067**
37	Work-in-process reduction	.8214	.16467	1.010**
38	Waste reduction	.8929	.12599	2.320
39	Zero defect	.8861	.14405	2.794
40	Zero deviation schedule	.8393	.16962	1.538*

* Significant at 5%level
** Significant at 1% level.
Population Mean (μ) =0.79

1.7 CONCLUSIONS

The following conclusions were drawn form this study:

1. Most important elements for manufacturing industries are total productive maintenance, process flexibility, JIT purchasing, smooth flow of materials, house keeping, process flexibility, set up time reduction, administrative efficiency.
2. The difficult elements for manufacturing industries are total productive maintenance, quality function deployment, standardization, standard containers, and quality circles.
3. It is recommended that the manufacturing industries should implement most important and less difficult elements at the initial stage.

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