JIT IMPLEMENTATION IN AGRICULTURE AND IMPLEMENTS INDUSTRY

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ABSTRACT

The survival of manufacturing companies in a competitive market depends upon its ability to produce high quality product at reasonable cost and with a shortest possible time. It is not difficult to build the high quality product, but it is difficult to maintain that quality. Just-in-Time (JIT) system is capable of achieving this goal. This approach combines the objectives of high quality, manufacturing flexibility, reducing inventory, reasonable cost and delivery dependability. It stimulates new directions of planning and performing activities in a manufacturing. JIT Based Quality Management is one of JIT elements having high potential in achieving many benefits such as improving company competitiveness, cost saving, quality improvement etc. This approach in Indian context is be helpful for those industries, which are struggling with problems of unreliable and long lead-time, quality of product , low productivity, high rate of scrap and defects, shortage of raw material, and least utilization of workers and equipments.

Keywords: *Just in Time, agriculture and implements industry.*

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1. INTRODUCTION

The product quality is very important for survival of a company. Therefore, the question of `how much quality is enough' seems relevant. During the late 1970s and early 1980s, the common answer to the question in western countries was to accept a allowable amount of poor quality in the manufactured goods. The Japanese during same time chose a different course of action called `JIT Based Quality Management'. Under this approach, product perfection is goal and poor quality of any kind is not acceptable.

JIT Based Quality Management has not only affected the manufacturing but also marketing, planning, human resource management, and other organizational functions in today's highly competitive business environment. This approach requires detailed attention to quality both in purchasing and production because it cannot function with high defects. The ideal goal of JIT Based Quality Management philosophy is to operate entire production system without interruption and without non-value added activities. This approach put stress on long-term benefits resulting from waste elimination, and continuous improvement in system, people, and products.

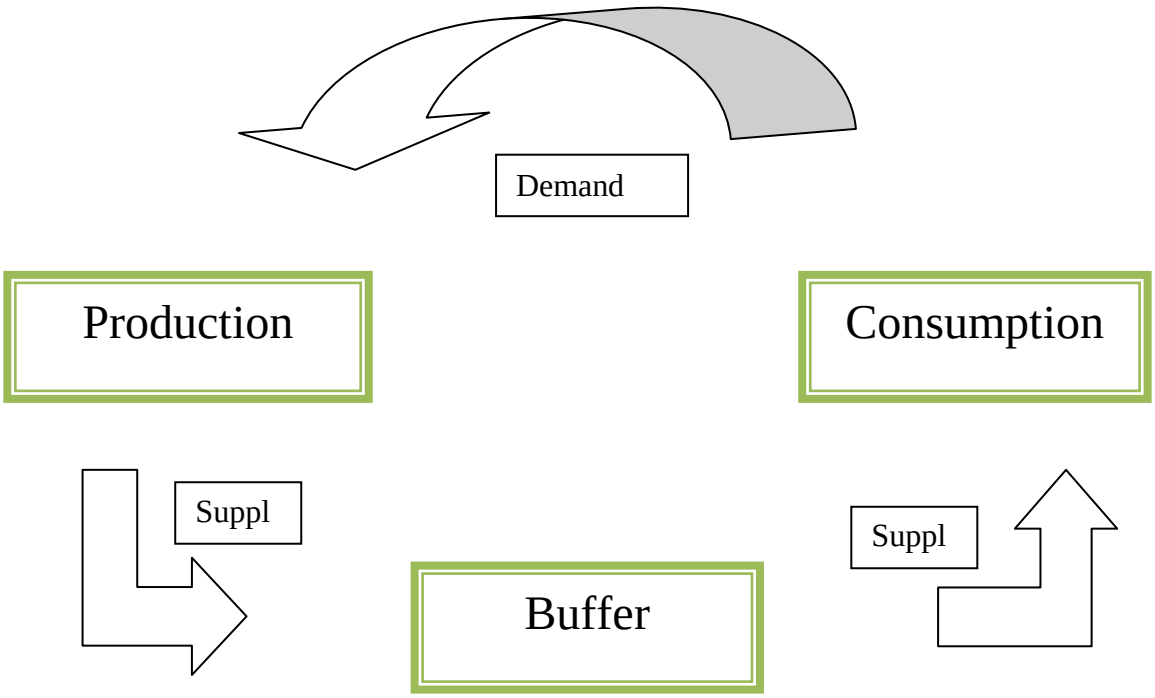

Fig 1.1 Concept of JIT

2. METHODOLOGY

This study includes four phases a) questionnaire preparation b) data collection c) analysis d) final conclusions. First phase includes the preparation of questionnaire. The questions in questionnaire were based on the implementation of JIT based quality management and related problems and expected benefits. The questionnaire given to 15 companies of Karnal in Agricultural Implements Sector. An experiment was conducted on 26 attributes given on JIT based quality management & data generated through attributes . Out of 15 companies only 5 companies responded with suitable data. Questionnaire was given to 15 respondents by taking in to account 26 attributes. The data collected from various companies is analyzed. Than new data is generated through various attributes taken on a five point LIKERT scale measuring the degree of difficulty in implementation of these attributes is subjected to statistical analysis to draw scientific and logical conclusion. Each was given to 15 respondents. The distribution of response was recorded on LIKERT scale. The score of 3 was taken as neutral or average & above that measuring a degree of satisfaction. However a below 3 response for any attribute was tending towards low satisfaction. The underline null hypothesis was $\mathbf{H_0}$ **$\mu = 3$ against** H_1 alternate $\mu>3$.

Since the product is likely to accepted by the masses if it is scoring average more than 3. The mean score is calculated for attributes from the data that is filled by each respondent taken degree of difficulty as X_1, X_2 ------ X_5 and data filled by the respondents is as F_1, F_2 ------ F_5

$$\overline{X} = \frac{\sum FX}{\sum F} \qquad (1)$$

Let $X1, X_2$ ------ X_5 be the average mean of the k variables under study taken for measuring the satisfactory level of the respondents. To measure the impact of these variables a index known as satisfaction index. In this satisfaction factor or index (I) is calculated on the base of the mean score by using

$$I = \frac{\overline{X}}{\overline{\overline{X}}} * 100 \qquad (2)$$

Where

$\overline{X}$ = mean score

$\overline{\overline{X}}$ = average mean score

$$\overline{\overline{X}} = \frac{\overline{X_1} + \overline{X_2} + \overline{X_3} ..... + \overline{X_n}}{15} \qquad (3)$$

15 is number of respondents

As per objective of study 26 attributes of JIT based quality management were subjected to further analysis. To draw a conclusion about the effectiveness of these attributes. For this purpose an index is generated to measure the degree of difficulty based on five LIKET scale mean score. As per logic If satisfactory index (I) taken as 100 indicates a normal level of satisfaction contribution of the attributes. If index I<100give an idea that particular attribute is low intensity in its implementation so that the overall performance can be improved and if comes out to be more than 100 or equal to be 100 than the attributes satisfactory index (I>=100) good or excellent.

Formula used

$$t = \frac{\overline{X} - \mu}{S/\sqrt{n}} \qquad (4)$$

Where X = Mean of each attribute

μ = null hypothesis

S = Standard deviation

n = No of attributes

t = T test

$$S = \sqrt{\frac{\sum FX^2}{\sum F} - \left(\frac{\sum FX}{\sum F}\right)^2} \qquad (4.1)$$

TABLE 1 CALCULATION OF MEAN AND AVERAGE SCORE FOR ATTRIBUTES

Sr. no	Mean score $\overline{X}$	Average mean score $\overline{\overline{X}}$
1	4.07	2.94
2	4.2	2.94
3	3	2.94
4	3.27	2.94
5	3.73	2.94
6	3.53	2.94
7	2.6	2.94
8	4.13	2.94
9	3.67	2.94

10	3.4	2.94
11	3.27	2.94
12	3.2	2.94
13	3.73	2.94
14	3.2	2.94
15	2.8	2.94
16	3.73	2.94
17	3.4	2.94
18	3.46	2.94
19	2.53	2.94
20	3.13	2.94
21	3.33	2.94
22	3	2.94
23	3.2	2.94
24	2.6	2.94
25	2.67	2.94
26	3.33	2.94

After calculating the mean score and average mean score of the attributes .Then satisfaction index was calculated by using the formula given in eq.1.

TABLE 2 CALCULATION OF SATISFACTION INDEX (I) >100 FOR ATTRIBUTES

The satisfaction index of 26 attributes is calculated. The index having more than 100 is tabulated in table2 and index having less than 100 is tabulated in another table2.1

RANK	ATTRIBUTES	INDEX
1	Continual quality improvement	142.81
2	Kanban System	140.51
3	Buffer stock removal	138.27
4	Total preventive maintenance	126.94
5	Error prevention	126.94
6	Set up time reduction	126.94

7	Line stop strategy	124.67
8	Frequent and reliable delivery	120.14
9	Small lot size	117.871
10	Short lead time	115.61
11	Long term contract	115.61
12	Process control	113.34
13	Scheduling flexibility	113.34
14	Employee Empowerment	111.07
15	Long term quality commitment	111.07
16	QC training to workers	108.81
17	Multi functional worker	108.81
18	Strong buyer relation ship	108.81
19	Standardization	106.54
20	Statistical Quality control	102.01
21	Effective Communication	102.01

TABLE 2.1 CALCULATION OF SATISFACTION INDEX (I) <100 FOR ATTRIBUTES

RANK	ATTRIBUTES	INDEX
1	Standard Container	86.41
2	Group incentive scheme	88.41
3	Team work	88.41
4	Vendor rating	90. 67
5	Self correction defects	95.21

There are four attributes in which are less than 100 so work has to be done these attributes

3. RESULTS

Attributes	Degree of difficulty: High ← low 5	4	3	2	1	Mean Score	$T_{calculated}$	Let $H_o = 3.00$

Buffer stock removal	5	6	4	0	0	4.07	7.05	H_o = accepted
Continual quality improvement	6	6	3	0	0	4.2	8.17	H_o = accepted
Effective Communication	0	4	7	4	0	3	0	H_o = rejected
Employee Empowerment	3	1	8	3	0	3.27	1.36	H_o = rejected
Error Prevention	4	6	3	1	1	3.73	3.32	H_o = accepted
Frequent and reliable delivery	3	6	3	2	1	3.53	2.37	H_o = rejected
Group incentive scheme	0	3	4	7	1	2.6	-2.32	H_o = rejected
Kanban system	7	4	3	1	0	4.13	6.04	H_o = accepted
Line stop strategy	4	5	4	1	1	3.67	6.04	H_o = accepted
Long term Contact	3	4	5	2	1	3.4	1.83	H_o = rejecter
Long term quality commitment	2	4	6	1	2	3.26	1.21	H_o = rejected
Multi functional worker	4	6	3	1	1	3.2	0.87	H_o = rejected
Total preventive maintenance	2	4	5	3	1	3.73	3.32	H_o = accepted
QC authority to worker	3	2	7	2	1	3.2	0.92	H_o = rejected
Self correction defects	2	3	3	4	3	2.8	-0.76	H_o = rejected
Set up time reduction	4	5	4	2	0	3.73	3.74	H_o = accepted

Short lead time	3	4	5	2	1	3.4	1.78	H_o = rejected
Small lot size	5	3	3	2	2	3.46	1.69	H_o = rejected
Standard containers	0	3	4	6	2	2.53	-2.48	H_o = rejected
Standardization	2	4	5	2	2	3.13	0.56	H_o = rejected
Process control	4	2	6	1	2	3.33	1.30	H_o = rejected
Statistical Quality control	2	3	5	3	2	3	0	H_o = rejected
Strong buyer relation ship	2	5	3	4	1	3.2	0.87	H_o = rejected
Team work	1	2	4	6	2	2.6	-1.88	H_o = rejected
Vendor rating	1	2	4	7	1	2.67	-1.68	H_o = rejected
Scheduling flexibility	2	4	6	3	0	3.33	1.80	H_o = rejected

The value of $H_o = 3$ if the value comes out to be more than 3 it is accepted otherwise it is rejected.

4. DISCUSSION

The conducted survey has revealed the great importance of 'quality techniques' in Indian industries. This is favorable sign in ease the implementation of JIT Based Quality Management. However, industries have need to cautious planning and full teamwork for effective implementation quality programs. Some techniques such a total preventive maintenance, quality circle etc requires more attention since their successful implementation may be helpful to determine the ways and means to improve present

Position of our industries in area of quality, cost and flexibility.

4.1 BENEFITS

The benefits such as improved equipment utilization, improved quality control, improved worker efficiency, increase inventory turn, increased flexibility, increased productivity, increased profit margin, increased team work, low scrap rate, reduced inventories, reduced product cost, reduced production lead time, reduced purchase lot size, reduced frequency of

stoppage and reduced work-in-process are highly expected benefits from implementation of JIT Based Quality Management.

4.2 PROBLEMS IN IMPLEMENTATION

The managers were asked to identify the problems faced during implementation of JIT Based Quality Management. Poor and inadequate maintenance of machines is cited by three managers. Two managers mentioned that multifunctional workers are often not available. The survey results indicates that informal and casual quality auditing, lack of support from suppliers, lack of training and lack of' understanding about JIT concepts, are some another reasons for slow implementation of JIT Based Quality Management. In addition, participated industries have also indicated they do not have full support from top management, and research and development (R&D) department.

5. CONCLUSION

In this the degree of difficulties in implementation of JIT Based Quality Management is found calculated on scale (0-5) implying that implementation of JIT Based Quality Management in its totality is slightly difficult in Indian industries. Another significant difficulty in implementing JIT Based Quality Management is huge investment in installation of visual control, training of employees and restructuring of production process costs. Consequently, quality control and maintenance activities are now' considered as staff function. This may be the favorable sign for implementation of JIT Based Quality Management. This may require the organization to modify its operating procedures, production system, and in most cases work -culture. In this context, in many cases, the plant layouts have to be changed, and kaizen have to be implemented. This study indicated that implementation of JIT Based Quality Management in Indian organization is not an easy job yet numbers of attempts are being made in several Indian industries to implement this approach in phased manner with belief that it would be helpful in facing the global competition.

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