

“HOW TO IMPLEMENT JUST-IN-TIME IN SMALL SCALE INDUSTRY”

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ABSTRACT

In today's competitive global business environment, the goal of the manufacturing system is long-term survival. A manufacturing company's survival in an increasingly competitive market closely depends upon its ability to produce high quality product at reasonable cost and in a timely manner with shortest possible lead-time. In addition, these goals should be achieved by paying utmost respect to the humanity of the employees who make the system work. Sometime, the difficulty of achieving the goals lies in the complexity of manufacturing operations. It is not difficult to build the high quality product, but is extremely difficult to do so while maintaining excellent quality, and at same time respecting the humanity of people in the organization who do actual work of building that product.

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1 INTRODUCTION

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 puts stress on long-term benefits resulting from waste elimination and continuous improvement in system, people, and products.

2 HISTORICAL BACKGROUND

Just-in-time had its beginning at Toyota Production Company not in a mere recession but in a genuine corporate crisis. After World War II Japanese manufacturers were faced with the dilemma of vast shortages of material, financial, and human resources. The problems that Japanese manufacturers were faced with differed from those of their western counterparts. These conditions resulted in the birth of the "JIT" production system concept. Toyota Motor company (TMC), led by its president Toyoda recognized that American automakers of that era were out-producing their Japanese counterparts; in the mid- 1940's American companies were out performing their Japanese counter parts by a factor of ten. After some experimentation, the Toyota production system was developed and refined between 1945 and 1970, and is still growing today all over the world. The basic underlying idea of this system is to minimize the consumption of resources that add no value to a product.

3 What is JIT?

Just in time' is a management philosophy and not a technique. It is referred as the production of goods to meet customer demand exactly, in time, quality and quantity, whether the 'customer' is the final purchaser of the product or another process further along the production line. It is also related to producing with minimum waste. "Waste" includes time, resources as well as materials.

1. It is not just a series of techniques, rather, it is a philosophy which requires the support, commitment and participation of human resources at all levels of organization. (Ansari, 1986)
2. It is an organizational philosophy, which utilizes employees to identify and resolve problems and inefficiencies in the workplace (Billesbach, 1994)

3. It is a philosophy that defines the way the work should be done. It is concerned with creating the right environment for effective operation (Garg, 2000)
4. It is not confined to set of techniques for improving production defined in the narrowest way as material conservation. It is a way to visualize the physical operation of the company from the raw material to customer delivery. (Hall, 1983)
5. It is based on concept of delivering raw materials just when needed and producing products just when needed. The focus is on minimizing raw material, work-in-process, and finished goods inventory with a view to cutting inventories costs and also helping to expose other more serious inefficiencies in the manufacturing cycle. (Vuppalapati, 1991)
6. It is an approach wherein waste in the production process is systematically identified and removed to reduce cost and lead times, and improve quality. (Miltenberg, 1990)

4 WHAT IS JIT PRODUCTION SYSTEM?

The new uprising in the manufacturing goods and service sector has created great challenges for an industry. The customer driven and highly competitive market has rendered the out-fashioned managerial style in inadequate tool to cope with these challenges. These factors present a big challenge to companies to look for new tools to continue moving up the ladder in a global, competitive, growing market while some companies continue to grow based on economic constancy, other companies struggle because of their lack of understanding of the change of customer mind sets and cost practices. To get out of this situation and to become more profitable, many manufacturers have started to turn to Just-in-Time manufacturing principles to elevate the performance of their firms. So the elimination of waste is the basic principle of JIT production system. For industrial companies, this could involve any of the following:-

1. **Material:** Convert all raw materials into end products. Try to avoid excess raw materials and scrap.
2. **Inventory:** Keep constant flows to the customers are not to have idle material.
3. **Over production:** produce the exact quantity that customers need, and when they need it.
4. **Labour:** Get rid of unwanted movement of people.
5. **Complexity:** Try to solve problems the uncomplicated way rather the complex way. Complex solutions tend to produce more waste and are harder for people to manage.

6. **Energy:** Utilize equipment and people in the most productive ways. Avoid unproductive operations and excess power utilization.
7. **Space:** Reorganize equipment, people, and workstations to get a better space arrangement.
8. **Defects:** Make every effort to eliminate defects.
9. **Transportation:** Get rids of transportation of materials and information that does not add value to the product.
10. **Time :** Avoid long set ups, delays, and unexpected machine down time.
11. **Unnecessary motion:** Avoid excess bending or stretching and frequently lost items.

In general all of these wastes are categorized into seven major types and it is summarized in table 1.1. All the waste sources described above are all related to each other and getting rid of one source of waste can lead to either elimination of, or reduction in others. There are many ways to reduce the amount of inventory, one of which is reducing production lot sizes, reducing lot sizes however, should be followed by a set up time reduction so as to make the cost per unit constant as the famous economic order quantity formula states.

Table 1.1 The Seven Categories Of Waste

Waste	Description
1) Over production	Producing to much or too soon, resulting in poor flow of information or goods and excess inventory.
2) Defects	Frequent errors in paper work, product quality problems, or poor delivery performance.
3) Unnecessary inventory	Excessive storage and delay of information or products, resulting in excessive cost and poor customer service
4) Inappropriate processing	Going about work processing using the wrong set of tools, procedures or systems, often when a simpler approach may be more effective.
5) Excessive transportation	Excessive movement of people, information or goods resulting in wasted time, effort and cost.
6) Waiting	Long periods of inactivity for people, information or goods, resulting in poor flow and long lead times.
7) Unnecessary motion	Poor workplace organization, resulting in poor ergonomics, e.g. excessive bending or stretching and frequently lost items.

5 BENEFITS OF JUST-IN-TIME

The goals of a successful business are continual improvement of customer satisfaction and minimal costs; both overhead and capital. Conventional attitudes toward lot size, production time and inventory can actually increase costs. The JIT philosophy strives to minimize cost and wasted time by producing exactly what is needed when it is needed. With JIT inventory planning, the only inventory is in transit; this result in lower capital costs. Furthermore, JIT production results in tighter bonds between the customer and he supplier because suppliers are considered partners. The underlying concept of JIT inventory is elimination of waste. JIT strives for an ideal lot size, where less is better. The idea is to drive all queues toward zero in order to: minimize inventory investment, shorten production lead times, react faster to demand changes, uncover any quality problems. Karlene (1988) has described five major benefits potential of JIT manufacturing system, these benefits are the following.

- a) **Reduction in Inventory**
- b) **Quality Improvement**
- c) **Increased Productivity**
- d) **Increased Profit Margin**
- e) **Increased Competition Position**

6 JIT AND THE CHOICE OF MANUFACTURING STRATEGY

A company, which is developing its manufacturing strategy, must start by considering customer needs in the market place and competitor activity. Manufacturing and marketing strategy issues are linked by identifying how products win orders in the market place, and by using such order-winning criteria to become the task for manufacturing to achieve.

Table 1.2 JIT and Competitive Advantage

JIT Capability	Competitive advantage derived from JIT capability
WIP reduction	Lower-cost manufacturer Reduced order to delivery lead time
Increased flexibility	Responsive to customer demands
Raw materials reduction	Lower-cost manufacturer
Increased Quality	Higher-quality products Lower cost manufacture
Increased productivity	Lower-cost-manufacture
Reduced space requirements	Low cost manufacture
Lower overheads	Lower-cost-manufacturer

The relationship of JIT to manufacturing strategy development can be considered in terms of both of its impact on customer needs and of matching-or improving on-competitor activities. Table 1.2 shows how JIT benefits can be used to provide different forms of competitive advantage. A company, which has already decided on the major aspects of its manufacturing strategy, can match this strategy to the particular capabilities of JIT. Table 1.3 shows how this can be done.

Table 1.3 Company Strategies and JIT

Competitive Strategy	JIT Capability Supporting Strategy
Rapid response to customer needs	1. Flexibility
	2. WIP reduction
Compete on quality	1. Increased quality
Compete on price	1. WIP reduction
	2. Raw material reduction
	3. Increased productivity
	4. Reduced space requirements
	5. Lower Overheads

A competitive strategy of rapid response to customer needs can be supported by the JIT capability of flexibility and WIP reduction and so on.

7 IMPLEMENTATION OF JIT CONCEPT

The implementation of the JIT in companies will depend on many factors. The implementation of JIT needs to be done in interaction with all departments as shown in figure 1.1.

- 1) Top management must accept idea of the JIT.
- 2) Employees should understand significance of the JIT concept
- 3) The third step is set up of the ERP (Enterprise Resource Planning). ERP is a system, which integrates all data and processes of an organization into a single unified system.
- 4) The next step is test the system after implementing JIT
- 5) The last step is testing and control for successful existence and developing of the JIT system there must be continuous control. Without control, things can away from the right direction.
- 6) The feedback loops also exist and they are very important for the whole process.

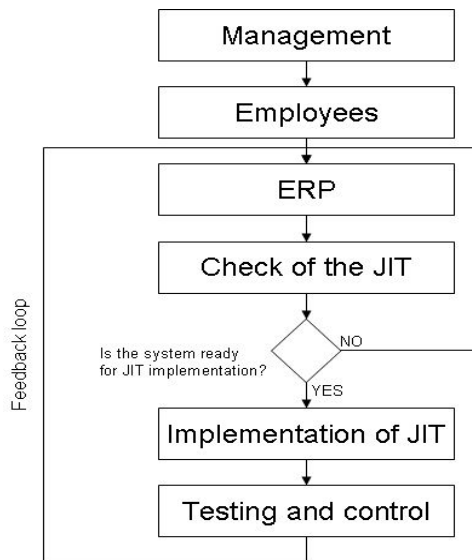


Figure 1.1 Implementation of JIT Concept

Table 1.4 Key Elements of JIT Based Quality Management

<ol style="list-style-type: none"> 1. Buffer stock removal 2. Continual quality improvement 3. Effective Communication 4. Error prevention 5. Group incentive scheme 6. High QC visibility 7. High QC visibility 8. Job Enlargement 9. Kanban system 10. Line stop strategy 11. Long term contract 12. Long term quality commitment 13. Multi functional worker 14. Total preventive maintenance 15. QC authority to worker 16. QC training to worker s 	<ol style="list-style-type: none"> 17. Quality certification of supplier 18. Quality circle 19. Self correction defects 20. Set up time reduction 21. Short lead time 22. Small lot size 23. Standard containers 24. Standardization 25. Process control 26. Statistical Quality control 27. Strong buyer relation ship 28. Team work 29. Total Quality control 30. Layout improvement 31. Vendor rating 32. Zero defect
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Table 1.5 Potential Benefits of JIT Based Quality Management

1. Improved competitive position	13. Lower overhead cost
2. Improved equipment utilization	14. Reduced inventories
3. Improved quality control	15. Reduced labor Requirement
4. Improved worker efficiency	16. Reduced paper work
5. Improved Worker motivation	17. Reduced product cost
6. Increased Inventory turn	18. Reduced production lead time
7. Increased administrative efficiency	19. Reduced purchase lot size
8. Increased productivity	20. Reduced raw material damage
9. Increased profit margin	21. Reduced space requirement
10. Increased product reliability	22. Reduced supervision
11. Increased team work	23. Reduced frequency of stoppage
12. Low scrap rate	24. Reduced work in process

8 MOTIVATION FOR PRESENT WORK

Now a day, Indian industries are facing many difficulties in competing with the multinational company at global level .The competition has forced the industries to new manufacturing approaches, managerial philosophies. JIT Based Quality Management has emerged as a key competitive strategy for business organizations in the global market place. Its effects are significant in improving the overall performance of whole organization. But still Industries are not able to fully exploit this new strategy because its implementation is a big problem in India. Vrat et.al (1993) conducted a Delphi study to assess the applicability or difficulty of implementing JIT elements in Indian context indicates that quality circles and good communication are not very- difficult to implement while other critical elements like, multifunctional workers, long term relationship with vendor, support from labour union and top management attitude have rating which indicates that JIT implementation in India is difficult not impossible. In another study, Singhvi et. al [1990] has presented the experience of implementing the JIT in an Indian automobile company. The study has found the 'employee involvement' as a critical element for implementing the JIT, while large investments are not found essential. These evidences with regard to JIT experience of Indian manufacturers seem to support the view that implementation of JIT is not difficult in India. Its implementation could be a great opportunity for Indian industries due to its wide range of benefits. On the surface, it may seem simple enough to gain the benefits of JIT by copying the procedures utilized by successful Japanese firms. However, its implementation in Indian industries requires very

different methods from those used by the typical Japanese and American firms due to numerous cultural geographical and philosophical differences. Therefore it is essential to study this approach in Indian context. Research plan is explained in figure 1.2.

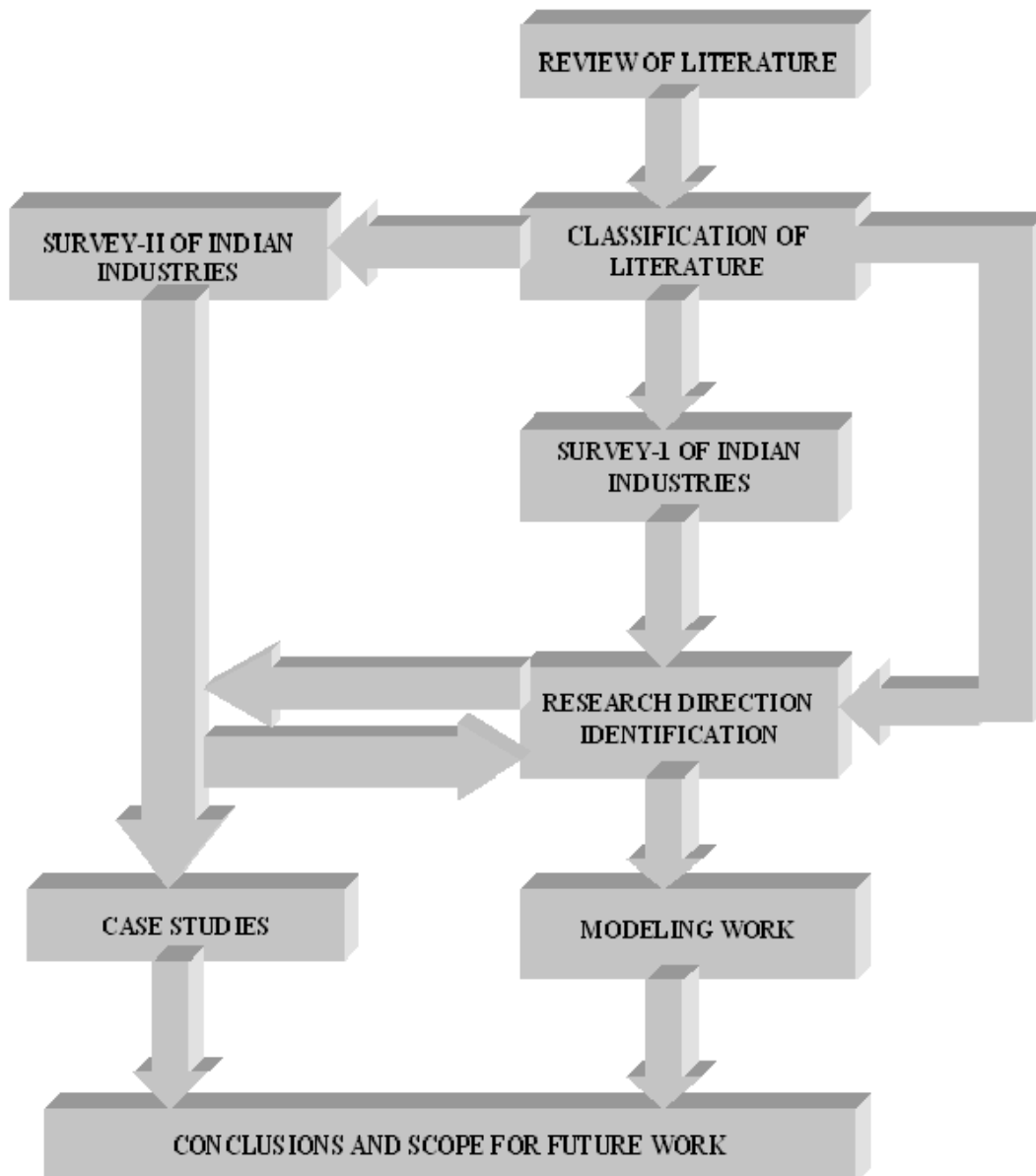


Figure 1.2 Research Plan

9 OBJECTIVES OF PRESENT WORK

The main objectives of the research reported in this thesis are:

1. To review and classify the literature on 'JIT'.
2. To identify the key elements of JIT and identifying the target attributes for implementation of JIT.
3. To categorize the applicability of various elements of JIT by the survey of the industries. Implementation of JIT attributes depending upon its level of difficulty

4. To highlight the most expected benefits of JIT. Evaluation of effects of JIT attribute implementation
5. To identify the importance and applicability of those quality techniques/methods, which play significant role in success of JIT?
6. To study the implementation process of various elements of JIT in industries and its impact on performance of an organization.

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