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GYAN VATIKA

A Leading Multi-lingual Multi-disciplinary Annual Research Journal

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Editorial

For the first time in the glorious history of Janakpur, the **Gyan Vatika,** a leading multi-lingual, multi-disciplinary annual research oriented Journal, has been published as its third edition by a group of research loving scholars. The present journal is really a matter of pride for all lovers of education and research.

The Journal is the composition of different articles from different distinguished scholars who have done research in their fields. It has, indeed, brought a great opportunity to explore, elaborate and develop our creativity and research writing, The vatika as an annual Journal provides us knowledge about different academic disciplines which are very relevant to our courses and lives.

To bring out this volume of the Gyan Vatika was really a challenging Job amidst the unfavourable environment created by the political turmoil of the nation. However, our desire of publishing this volume has been fulfilled only by the support of all knowledge loving individuals. The effort to bring out this present Journal become possible only by the Joint and constructive effort of all researchers who favoured us by contributing their research works in it.

This Journal also remembers those who physically and mentally worked for the development of this locality. We promise that the publication of it will be continued if you provide your warm inspiration.

Finally, we would like to thank to all well-wishers, teachers, students, research scholars and lovers of education who have positive attitude towards this creative work. Any correction or constructive suggeston is warmly welcomed.

Editorial Board

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Just - in - Time Manufacturing System

Dr. Binod Shah*

Abstract

JIT manufacturing system also called demand pull manufacturing is a process of manufacturing goods after receiving the demand. This system has been accepted as a systematic approach to achieve competitiveness and excellence in manufacturing by many researchers and practitioners in many countries. Even though the JIT system seems to be interesting and less complicated, it requires lot of coordination with supply chain to avoid delays in the production schedule. This article discusses in depth the concept, history and development, requirements, elements, benefits and JIT manufacturing v/s traditional manufacturing.

Key Words

Traditional Manufacturing, Just - in - Time, Just in Case, JIT Manufacturing, Pull Production System, Push Production System.

1. Introduction

JIT is system where company starts manufacturing once the customer orders the goods effectively making zero inventories. In a JIT environment, goods are produced as and when it is needed. The opposite of the JIT production is known as just in case (JIC) system. JIC is a system where company produces goods for inventory with the intention of having goods just in case a customer places an immediate order. JIT system has been accepted as a systematic approach to achieve competitiveness and excellence in manufacturing by many researchers and practitioners in many countries. This system has potential to compete in the present scenario of rapid development and growth of industrialization. This system identifies the hidden problems in the value chain and reduces

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the production waste of the system. Even though the JIT system seems to be interesting and less complicated, it requires lot of co-ordination with supply chain to avoid delays in the production schedule. The whole concept of JIT is differentiated from traditional production system using push vs pull system of production. The push system of production pushes materials to the next stage of the production irrespective of whether time and resources are needed at the next level of production creating lot of inventories at each level of the production flow. The traditional manufacturing organisations adopt push system where they produce for inventory and work - in - progress. The pull system of production is where the materials are pulled by next level of the production only when it is signaled or required by the next stage of production. This directly reduces the inventory held as it does not keep any work - in - progress. JIT system is built based on the concept of pull production which eliminates the total inventory.

2. Research Methodology

This research is based on the review of existing literatures on the just in time manufacturing system. Concept, history & development, requirement, elements and benefits of JIT manufacturing as well as JIT manufacturing v/s traditional manufacturing are looked after. For this purpose, different books and journals are reviewed to find out facts and information about JIT Manufacturing. Different libraries are consulted to search books and journals about JIT Manufacturing. Thus, it is a Library Method of Research. With the help of this method, it becomes possible to know the work already done and that remains to be done.

3. Concept of Just - in - Time

Carrying of inventories results in costs in the form of storage, opportunity cost of capital invested in inventories, insurance, obsolescence, wastage etc. These costs can be reduced by keeping inventories as low as possible. Just in time production system is developed to keep inventory at the lowest possible level. Just in time is a term usually, thought of as describing inventory arriving or being produced just in time for the shipment or next process. It is a process for optimising manufacturing processes by eliminating all process waste including wasted steps, wasted material and

excess inventory. JIT system is a tool which can be used to minimise investment in inventory by keeping inventory as low as possible.

JIT manufacturing is a Japanese management philosophy applied in manufacturing which involves having the right items of the right quality and quantity in the right place and the right time. Proper use of JIT manufacturing has resulted in increase in quality, productivity and efficiency, improved communication and decrease in costs and wastes.

Gitman (2001, p. 726) states "The JIT system is used to minimise inventory investment. The philosophy is that materials should arrive at exactly the time they are needed for production. Ideally the firm would have only work - in - progress inventory. Because its objective is to minimize inventory investment, a JIT system uses no or very little safety stock."

According to Maheshwari (2004, p.D.324), "JIT inventory system, as its name suggests, means all inventories whether of raw materials, work-in-process and finished goods are received in time. In other words, raw materials are received just in time to go into production, manufactured parts are completed just in time to assembled into products and products are completed just in time to be shipped to customers".

Hay (1988 p.I) has rightly said "Just in time (JIT) is a manufacturing philosophy, a philosophy of eliminating waste in the total manufacturing process, from purchasing to distribution. If this philosophy is properly implemented. JIT enables a company to develop manufacturing a strategic weapon."

JIT can be summarized as a system to eliminate waste and achieve excellence in an entire organisation. The sole purpose of JIT is to eliminate waste. Anything that does not add any value to the product is known as waste.

4. History and development of JIT manufacturing

JIT is a Japanese management philosophy which has been applied in practice since the early 1970 in many Japanese manufacturing organisations. It was first developed and perfected within the Toyota manufacturing plants by Taichi Ohno as a means of meeting customer

demands within minimum delays. For this reason, Taichi Ohno is frequently referred to as the father of JIT. Hay (1988, p. 10) described that just in time began some time after Second World War as the Toyoya production system. The Toyota production system was invented and promoted by Taichi Ohno, empharising the elimination of all kinds of unnecessary functions in the factories. In the 1960s, Toyota worked hard on developing a whole range of new approaches to manage manufacturing. Until the late 1970s, the system was limited to Toyota and the Toyota Family of key suppliers. Since 1976, JIT has been spreading through more and more of Japan's manufacturing business. Around 1980, a few people in the United States studied what leading edge Japanese companies (especially Toyota) were doing to make them so successful. The study identified 14 points. Seven of them had to do with what was termed "respect for people" and the other seven of them had to do with the "elimination of waste," which is more technically oriented. They lumped these 14 points together as the "Japanese Approach to Productivity".

They then studied the 14 points in more detail to determine which would be appropriate in the Western context and could be introduced into Western manufacturing. The analysis ended up focusing on 7 of the 14 points as being the most appropriate for the West. Those seven points make up the essential elements now referred to as "just in time". Those seven elements are JIT philosophy, quality at the source, uniform plant load, overlapping operations, minimum set up time, type of control system (pull system, Kanban or linking operations) and JIT purchasing.

With the automotive industry as a catalyst - through the Automotive Industry Action Group - JIT began to be used in North America. Outside the automotive industry, Omark Industries, Black and Decker, and Hewlett Packard are among the best known of JIT's early North American implementers. The philosophy began to filter into Canada and Europe, mostly through divisions of U.S. based corporations. Around 1982-1985, it began to show up in South and Central America again through divisions of U.S. based corporations.

5. Requirement of JIT system

Just - In - Time inventory system depends upon logistics that include transportation, warehousing and several strategies for handling the potential supply chain uncertainties. Just-in-time is easy to grap conceptually, eveything happens *just-in-time*. Conceptually there is no problem about this; however achieving it in practice is likely to be difficult. JIT is not possible without reliable delivery, short distances between the client and server or a speedy transportation and materials handling system, consistent quality and the ability to respond to outside fluctuations. JIT systems can be disastrously affected by outside forces. For effective implementation of JIT system, there must be extensive coordination between the company, supplier and shipping company to meet the schedules of the production line. It requires sound logistics that include transportation, warehousing and several strategies for handling the potential supply chain uncertainties. The key requirements for the effective operation of JIT inventory system are as follows :

- The company must have only few reliable suppliers.
- Suppliers must be bound under long-term contracts,
- Suppliers must be willing to make frequent deliveries in small lots.
- Quality of goods should be assured.
- The company must have total quality control system.
- A flexible work force will be a requirement.
- There must be commitment from all involved in the organisation to adopt to change.
- The idea of continuous improvement must be adopted into the philosophy and goals of the company.
- The use of team work becomes critically important to the development of a co-ordinate system.

6. Elements of JIT manufacturing

JIT manufacturing consists of several elements which must be integrated together to function in harmony to achieve the JIT goals. These

elements essentially include the human resources and the production, purchasing, manufacturing, planning and organising functions of an organisation. These elements can be grouped together into Toyota production system of people, plants and system.

6.1 People

Obtaining support and agreement from all individuals involved in the achievement of organisational goals is essential for JIT success. Obtaining support and agreement will require involving and informing all groups who have an interest in the company. This can greatly reduce the amount of time and effort involved in implementing JIT and can eliminate the likelihood of creating implementation problems. Support and agreement should be obtained from stockholders and owners of the company, labour organisation, management support and government support. People will be more compelled to work toward goals when they are included in the development of the goals. JIT builds the ideas of involving employees at different levels in the organisation.

6.2 Plants

Plants, the another element of JIT, include plant layout, demand pull, kanbans, self ispection and continuous improvements. Under JIT production, plant layout is arranged for maximum worker flexibility and is arranged according to the product rather than process. The concept of demand pull involves the use of demand for a given product to signal when production should occur. Kanban is a Japanese word meaning signal and is usually a card or tag accompanying products throughout the plant. The use of kanbans assists in trying or linking the differente production processes together. The use of self inspection by each employee is done to ensure that their production input adds value to the product and is of high quality. Continuous improvement is an integral part of the JIT concept which involves a change in attitudes toward the overall effectiveness of an organisation.

6.3 Systems

Systems within an organisation refer to the technology and process used to link, plan and co-ordinate the activities and materials used in production. Material requirement planning and manufacturing resource planning are the two systems. Material requirement planning is a computer based method for managing the materials required to carry out a schedule. Manufacturing resource planning is a computer based programme which can be used to provide information on financial resources available to carry out the plan of material requirements planning. Other systems within an organsation include those that provide linkages with suppliers and assist with the coordination of the overall functioning of the organisation.

7. Benefits of JIT system

The JIT system is aimed at improving profits and return on investment through cost reductions, inventory reductions and quality improvements. Following are some benefits of a JIT system stated by researchers and practitioners.

- Improved worker efficiency
- Improved equipment efficiency
- Increased direct and indirect labour productivity
- Reduced manufacturing lead time
- Closed supplier / customer relations
- Reduced labour requirements
- Reduced space requirements
- Improved quality of the product
- Reduced inventories
- Reduced machine set up time
- Improved worker motivation
- Increased administrative efficiency

JIT manufacturing	*Traditional Manufacturing*
1. Pull system	1. Push system
2. Insignificant or zero inventories	2. Significant inventories
3. Manufacturing cells	3. Process structure.
4. Multifunction labour	4. Specialised structure
5. Total quality control	5. Acceptable quality level.
6. Decentralised services	6. Centralised services

9. Conclusion

JIT system has been defined and identified worldwide by many researchers and practitioners for world class manufacturing. This system has been accepted as a systematic approach to achieve competitiveness and excellence in manufacturing. This system has potential to complete in the present seenario of rapid development and growth of industrialization. Better decisions can be made and competitive advantage of the organisation can be increased by applying the concept of JIT manufacturing. JIT is a concept that can be applied to many aspects of business other than inventory or manufacturing. The most expensive inventory is one that you need and can not obtain that is the greatest challenge for the JIT philosophy to overcome.

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