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Just in Time (JIT) and its basic Elements : a Review

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Abstract : In the past two decades, Japanese manufacturing practices in general and Just-In-Time production in particular have received a great attention from western researchers and manufacturing firms in trial to catch-up Japan in terms of quality, productivity, and low cost. The JIT advocates the elimination of waste by simplifying production processes, reductions in set up times, controlling material flows, and emphasizing preventive maintenance are seen as ways by which excess inventories can be reduced or eliminated, and resources utilized more efficiently.

APICS (American Production and Inventory Control Society) defined JIT as "a philosophy of manufacturing based on planned elimination of all waste and on continuous improvement of productivity". It has also been described as an approach with the objective of producing the right part at the right place at the right time and at minimum possible cost. Waste can be defined as any activity that adds cost without adding value such as the unnecessary transportation of materials, large WIP Inventory and the use of faulty production methods that create products requiring subsequent rework. Waste can also be defined as other than minimum amount of equipment, material, machine and space required for the production of desired product or we can say that an thing for which customer do not want to pay.

Introduction : JIT has been defined in different manners by different researchers. For some people it is an approach to manufacturing production, control and purchasing and for others it is a methodology to achieve manufacturing excellence. JIT has also been accepted as a winning strategy in the highly competitive market place of the 1990s. Originally JIT was mainly used in the manufacturing sector but now it is equally applied in service sector. JIT is a demand pull system. In short, JIT attempts to accurately match demand with supply. Products are steadily flown through the system from the supplier to the final output without slack.

JIT has also been defined as a driver that establishes regular, frequent deliveries in small lots from a distributor, and which reduces inventory from a thirty days or sixty days to ten days supply and if possible then reduces to hourly supply. A manufacturer with a stockless program can carry an even lower amount of inventory and receives items in small number of units from a distributor. A JIT system aims at optimization of all the processes and procedures by continuously pursuing waste reduction. JIT is just not a technique or set of techniques but is an overall philosophy which consists of both new and old techniques and offers a wide range of benefits by overhauling of present manufacturing systems. A simple definition of JIT is to produce and deliver finished goods just in time to be sold, subassemblies just in time to be assembled into finished goods, fabricate parts just in time to go into subassemblies, and purchase parts just in time to be transferred in to fabricated parts. The main mantras of JIT Shown in figure 1.1.

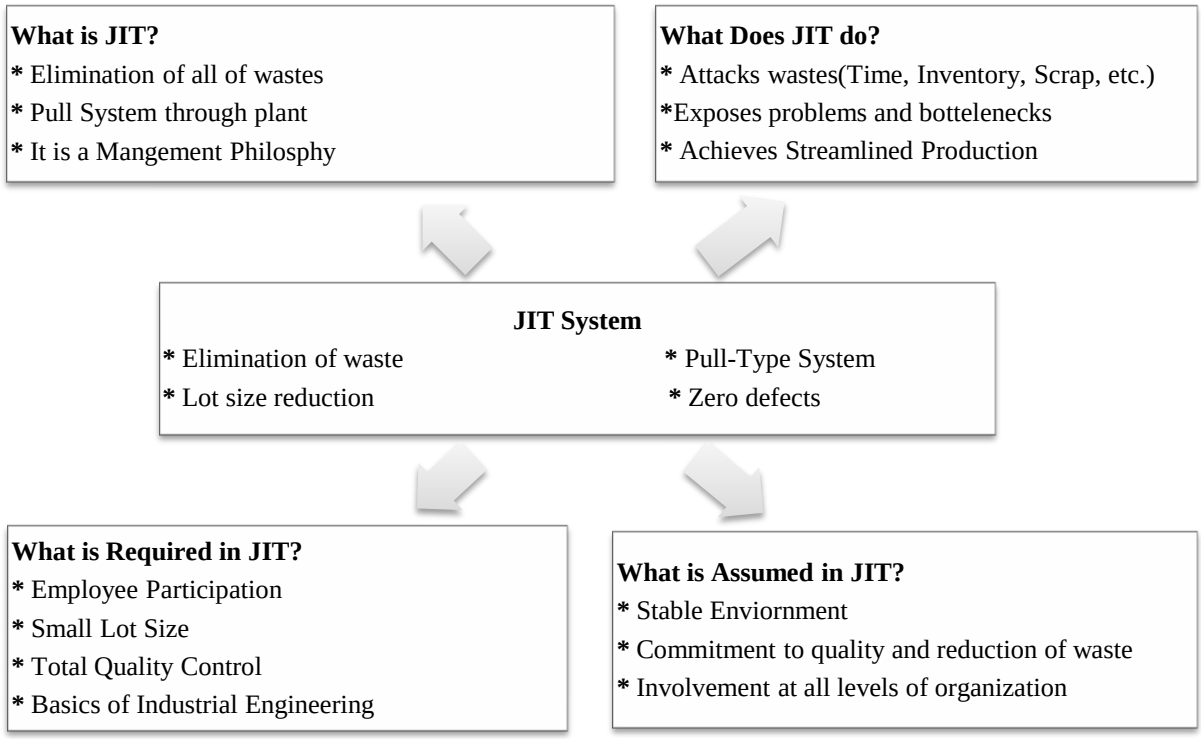

Fig.1: JIT System

JIT is observed as a near perfect situation achieved by continuous elimination of the wastes. JIT has been viewed as a strategic weapon for productivity improvement by making all processes streamlined, efficient and effective and quality oriented in an order to enhance the responsiveness of the firm towards customer needs. JIT is also defined as a journey of continuous improvement. JIT cannot be attained in one day or one week or one month or in a year. There is no end as far as JIT is concerned and it is a continuous process.

The first basic principle involved in JIT production approach is the Flexible Workforce. In a JIT system, waste is defined as anything associated with the production process that does not add value to the product. Thus, waste includes quality defects, inventories of all kinds, time spent to move material and time spent in setting up the machines. If the implications of managing the reduction in waste for the categories mentioned above are analyzed, it becomes obvious why JIT is involved in all aspects of the management of production Process. The second principle of JIT involves the management of people.

The production worker is also given the responsibility for the maintenance of his equipment. Frequently, a production worker goes through a check list before starting to operate the equipment similar to that done by a Pilot before Flying an Aircraft. Along with the new job responsibility for workers comes the responsibility for management to provide the training, time, tools and most important, the authority necessary to accomplish the job.

Basic Elements of JIT

The elements of JIT, when applied to manufacturing system, ensure that parts or raw materials arrive on the factory floor only at the point of required use or when they are actually needed. Not only does this help with inventory control and costs, but also with inventory storage concerns. Ideally, JIT also ensures that the finished product is only

achieved when it is required by the end user or customer. If such JIT methods are properly implemented, the vast savings in inventory can translate to lower costs and benefit the customer as well as the manufacturer. Following are the basic elements of JIT.

1. Flexible Resources
2. Cellular Layouts
3. Kanban System
4. Small-Lot Production
5. Quick Setups
6. Standardization
7. Jidoka
8. Total Quality Management
9. Total Productive Maintenance
10. Life Time Employment

1. Flexible Resources

Flexibility might be considered as the ability of a manufacturing system to produce a variety of products. It also means being able to respond quickly to customer's need.

2. Cellular Layouts

- Group dissimilar machines in manufacturing cell to produce family of parts
- Work flows in one direction through cell
- Cycle time adjusted by changing worker paths
- Cells operated by worker teams who are cross-trained
- Frequently light systems are used to indicate potential problems. A worker experiencing difficulty can turn on warning lights and others will assist.

3. Kanban System

Kanbansare tag like cards on which type and quantity of units needed are written. Kanban system is an information system which mainly controls the production quantities in every process.

4. Kinds of Kanban cards

1. Move Kanban It details the quantity which the subsequent process should withdraw.

2. Production Kanban It details the quantity which the preceding process must produce.

5. Information via Kanban

These cards circulate within the organization and its many co-operative companies and within the factories of co-operative companies. In this manner, the Kanbancan convey information about withdrawal and production quantities in order to achieve JIT production as shown in Fig. 2 given below:

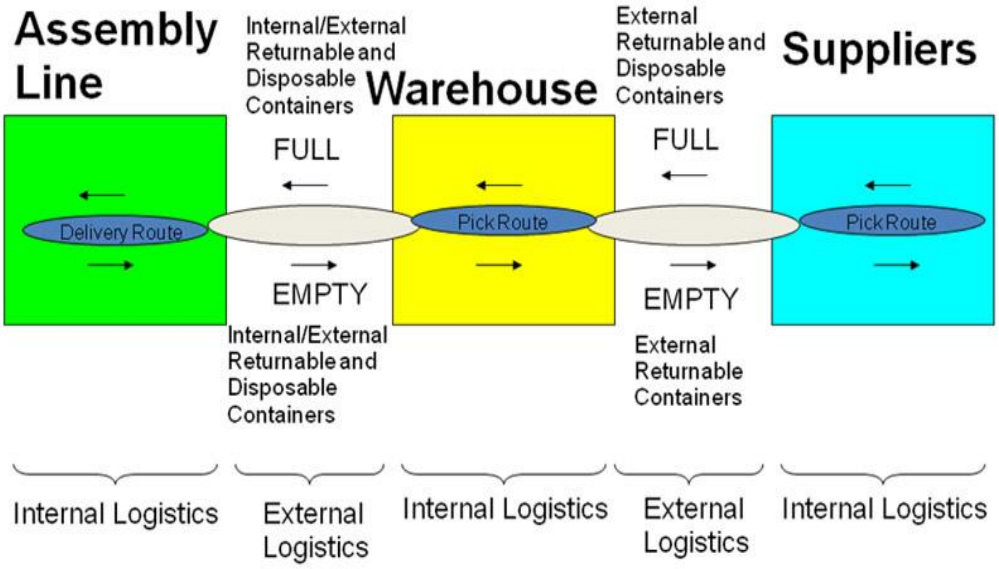

Fig. 2: Information Sharing via Kanban System

Small - Lot Production

- Requires less space & capital investment

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- Moves processes closer together
- Makes quality problems easier to detect
- Makes processes more dependent on each other

5. Quick setups

Reduction in machine set-up time is required to accomplish the ideal lot size of one unit. In implementing JIT practices, machines have to be set up frequently for producing smaller lot sizes. Simplified and standardized set-up procedures must be developed.

- Preset desired settings
- Use quick fasteners
- Use locator pins
- Prevent misalignments
- Eliminate tools
- Make movements easier

6. Standardization

Standardization is the development of a set of defined reference conditions and procedures (standards) to consistently apply to a process or artifact to obtain consistent results.

7. Jidoka

The term ' Jidoka' as used at Toyota means “to make the equipment or operation stop whenever an abnormal or defective condition arises”. In short, its distinctive feature lies in the fact that when an equipment trouble or machining defect happens, the equipment or entire line stops, and any line with workers can be stopped by them. The reasons for' Jidoka ' being so important are as follows:

1) To prevent making too much. If the equipment is made to stop when the required amount is produced, making too much cannot arise. Consequently, the just-in-time production can be accurately carried out.
2) Control of abnormality becomes easy. It will only' be necessary to make improvements by directing attention to the stopped equipment and the worker who did the stopping. This is an important requirement when making up the system of ' full utilization of workers' capabilities' related next.

Toyota has made countless number of improvements to realize 'Jidoka'

8. Total Quality Management (TQM)

TQM is a quality management strategy that seeks to integrate all activities related to quality planning, quality design, quality manufacturing and quality control in any organization.

9. Total Productive Maintenance (TPM)

In TPM, the machine operator is thoroughly trained to perform much of the simple maintenance and fault-finding. Eventually, by working in "Zero Fails" teams that include a technical expert as well as operators, they can learn many more tasks and sometimes all of them. TPM aims at maximizing the effectiveness of equipments.

10. Life Time Employment

In Japan, workers have been guaranteed lifetime employment. This leads to a work force committed to the organization, and motivated to ensure its success.

References :

[1] Akbar J.K. and K. NagendraBabu(2013), "Just In Time manufacturing system: from introduction to implementation" International Journal of Economics, Business and Finance Vol. 1, No. 2, pp.07 – 25.

[2] Bonney M.C. (1994), "Trend in Inventory management", International Journal of Production Economies Vol. 35, pp.107-114.

[3] DewanMdZahurulIslama, (2013) "Logistics and Supply Chain Management". Research in Transportation Economics, Vol. 41, pp. 3-16.

[4] E. Jewkes and M. Power, (1993) "A Microeconomic Analysis of Investment in JIT Manufacturing", International Journal of Production Economics, Vol. 29, pp. 313-321.

[5] G. Chengalvarayan and Sandra C. Parker, (1991) "Simulation Analysis of JIT feasibility in a manufacturing environment", Vol. 21, pp. 303-306.