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# JIT in Auto Industry – A Boon or Ban?

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**Abstract:** JIT aims to minimize the cost of inventory al all the stages of the supply chain of a manufacturing company. This paper critically analyzes the pros and cons of JIT system in auto industry. Traditional ideas of quality and client satisfaction are challenged in recent years and new benchmarks are established. Japanese makers were the primary contributors to fulfill these challenges by introducing many inventions in production system and management. One amongst that is that the philosophy of "Just in Time" (JIT). Several studies have been initiated in numerous countries to grasp the characteristics of JIT to effectively implement it. Literature shows a widespread use of JIT in industrialized countries besides Japan, a number of these studies have conjointly recognized that the sensory activity variations between Great Britain and U.S.A. had a big influence on JIT implementation.

**Keywords:** JIT, Production Management, Quality circles.

## 1. INTRODUCTION

The principle of Just- In-Time (JIT) is to eliminate sources manufacturing waste by obtaining right amount of raw materials and producing the proper amount of merchandise within the right place at the proper time. Just-In-Time is a Japanese production management technique developed in Seventies. It absolutely was first adopted by Toyota production plants by Taiichi Ohno.

The main concern at that point was to fulfill shopper demands. Owing to the success of JIT management, Taiichi Ohno was named the father of JIT. After the primary introduction of JIT by Toyota, several firms followed up and around middle nineteen seventies, it gained extended support and widely utilized by several firms. One actuated reason for developing JIT and a few different higher production techniques was that since warfare II, Japanese folks had a really robust incentive to develop honest producing techniques to assist them in reconstructing the economy. They conjointly had a powerful operating ethnic that was focused on work instead of leisure, seeking continuous improvement, life commitment to figure and cluster aware instead of individualism to achieve their common goal. This quite motivation had driven Japanese economy to succeed. Because of the natural constraints and also the economy constraints during the World War II, Japanese makers hunted for the simplest way to achieve the foremost economical use of restricted resources. JIT production system identifies the hidden issues within the price chain and reduces the assembly waste of the system and simultaneously increasing the throughout (Sales material Cost). Even if the JIT system looks to be attention-grabbing and fewer difficulties it need on coordination which provide chain to avoid delays within the production schedule. The whole idea of the JIT is differentiated from ancient productions systems victimization push vs. pull systems of production. The push system of production pushes materials to successive stage of the assembly regardless of whether they are needed there. The traditional producing organizations adopt push system wherever they manufacture for inventory and add progress. The pull system of production is wherever the materials shifted to the next level of the assembly only when signal is given by the succeeding stage of production. This drastically reduces the inventory control because it doesn't keep any in-process inventory. Today, JIT has evolved into a management philosophy containing a body of data and encompassing a comprehensive set of production principles and techniques.

The integrated framework of the JIT principle is shown in Fig.1. As shown in the Fig.1, the supply from the vendor flows to the company through the raw material stores. The raw material stores facilitates the materials receipt in terms of quantity and quality, and directly sends them to shop floor. Between the supplier and the raw materials stores of the company, supplier kanban operates, which informs the supplier about the item specification, quantity to be supplied. JIT is implemented in the form of Kanbans, which circulate between adjacent stages as the case may be, depending on the criticality of the stages as well as the vendors supply capacity. Within the company, the JIT is implemented in a production line by circulating necessary number of kanbans between adjacent pair of machines in it as shown in Fig.2. The kanban is classified into two types, viz. withdrawal kanban (WK) and production order kanban (POK). The withdrawal kanban circulates between

adjacent machines. The production order kanban circulating within the machine gives instruction to produce the quantity of production as stated in the kanban (Sendil Kumar and Panneerselvam, 2006 and Panneerselvam, 2012).

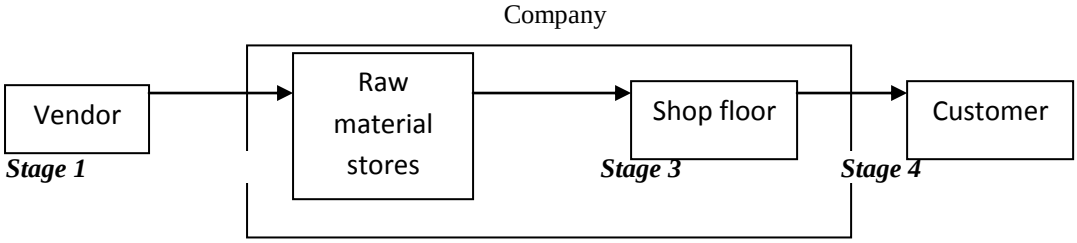


Fig.1 Integrated framework of JIT in supply chain

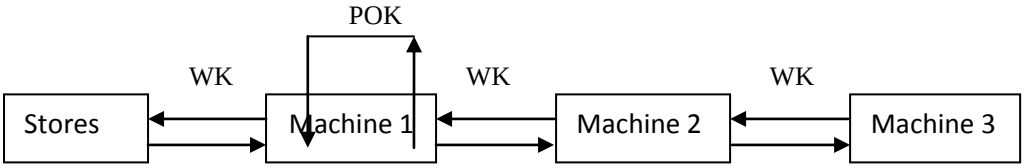


Fig.2 JIT Kanban system in a production line

## 2. LITERATURE REVIEW

The basic activities in JIT operations, the environmental conditions which will inspire JIT implementation, the impact of JIT on patrons further as suppliers, and Toyota Production System combination and its implications on JIT performance area are reviewed. The JIT system is classified into JIT manufacturing and JIT buying.

In JIT manufacturing class, several researchers have accomplished to a big level of research. The JIT buying has abundant scope to try with the links of the supply chain starting from the first level vendor.

In the supply chain, the basic raw materials emanate from vendor to reach either intermediate raw material warehouse or directly to company. In the first case, the flow is from a vendor to a warehouse, which in turn as acts as a vendor to a company (buyer). In the second case, the flow is between a vendor and the buyer (company).

Next, within the company, a product line consists of several machines or workstations. The flow between the raw material stores to the first machine in a product line and the flow between each adjacent pair of machines in a production line form supplier-buyer form of relationship to exploit the advantage of JIT.

JIT alludes generally to a theory "where the whole supply channel is synchronized to react to the prerequisites of operations or clients". Many authors recognize JIT assembling and JIT acquiring. The JIT advances the decrease of waste by chopping down inventory, reduce the set up times, controlling material streams, and underscoring preventive support, which are viewed as courses by which overabundance inventories can be lessened or killed.

Taiichi Ohno, the maker of Toyota creation framework, portrayed JIT generation by saying, "All we are doing at the timetable from the minute the client gives us a request to the moment that we gather the money, and we are lessening that course of events by expelling the non-esteem included waste".

Since various financial specialists recommended the JIT may make a pickle, despite the fact that it could take out inventories and adds to decrease the expenses connected with inventories. It is not evident why an unwavering drive toward a zero stock approach (ZIP) ought to be useful. Consider Zangwill's (1992) portrayal of JIT. In most manufacturing methodologies, stock is vital, and also a decent lot is required for compelling operation. This for sure is not the same for the Japanese generation theory, which concentrates on various perspectives and requires zero inventories. Stock is a reflectivity of waste, this speculation declares, and the more in the stock, the more the fundamental waste. At whatever point quality is terrible, extra parts must be close by to replacement of faulty parts. This extra stock is uneconomical and, if quality were better, then this could be wiped out. Stock is much of the time controlled to supply parts in the event that a machine breakdowns, or specialist does not go to, or parts neglect to touch base on time. The stock is controlled, along these lines, to cover for basic wasteful aspects (Zangwill, 1992).

The incorporation of JIT was not outline for the U.S. at first. There were numerous obstructions, for example, undependable request (conceivable out of stock), supply (endeavors on re-item and drag out holding

up time), work relations, swelling (diminishing worth in stock and debilitate budgetary force), and even administration lose it viability. The components above can be ordered with a focus on the following.

1. Lessening Cost
2. Quality and Supply
3. Work relations/Management activities (TQM)

**Lessening Cost**

Decreasing Cost is an exhaustive field of diminishing stock, quality control, and workers' pay rates. Lessening stock is to chop down the amount of stock close by to specific levels, which meet the base wellbeing level for surprising requests. The US automobile industry attempted to receive numerous Japanese creation strategies with huge amounts of exertion; however the results did not mirror the exertion. In Japan, the providers take their separate undertakings and techniques to perform and won't go over those cutoff points, in a manner of speaking. Then again, in the U.S. it has been an issue of both organizations and providers making parts for a similar reason, along these lines making inefficient allotment of assets, and waste. This has been lessened by actualizing another arrangement of progressive supply.

**Quality and Supply**

Kanban and quality control are the top strategies utilized as a part of Japan, these days. Since makers chop down their stock, more tightly requests are pointed on the providers. This turned into a debate of arranging and booking of the maker, notwithstanding quality, area, and cost. The arranging and booking is a center idea, as producer applies material necessities arranging (MRP) and extra substance to balance out creation. Basically, they should work with providers to build up the move streams easily, subsequently; the parts can land in the correct places and right circumstances. The Kanban, planned by the Japanese, is a framework to approve creating, and acquiring the required substitution. Actually, this permits least lead times. In any case, JIT is about minimization of inventory at all stages of the supply chain.

Numerous worldwide associations have endeavored to utilize vertical coordination as a technique. This procedure necessitates associations to procure new divisions that supply distinctive required parts for the assembly of the item. They can isolate their individual needs and deliver and afterward accumulate those required parts in expansive scale amount, thus chopping down their own particular costs considerably more. As per Rubenstien (1992), Ford and GM set up offices and made their own particular parts everywhere to meet requirements such that down item cost is minimized.

**Work relations/Management activities (TQM)**

As indicated by Aghazadeh (2003), TQM is a vital part in JIT as urge specialists to help in the advancement of cost funds measures to complete employment, and numerous different zones of decrease. TQM can be connected in group activities in the form of gathering information, retraining work and correspondence. Here are the essential specialist centered ideas.

1. Picture the strategy in fewer strides if conceivable
2. Keep in mind that stock is a moving thing not a steady one
3. Emphasis ought to be put on the synchronization of every system
4. Disentangle, join together, and dispense with superfluous exercises
5. Wastes are over (under) yield, unneeded strides and exorbitant stock and movement

These fundamental strides can attribute to JIT achievement. Routine representatives appropriately in the workshop can spare work cost without deferring the generation stream. JIT is an apparatus for senior administration to execute TQM.

The focal points and hindrances of JIT, and the benefits of JIT stock framework are as listed below.

1) Takes out waste by focusing on conveyance the right part at the perfect time.
2) Minimizes stockpiling use and lessens the cost of capacity stockroom cost. Restricted the stock space utilized for creation lines will spare cash for the organization.
3) Provides quicker reaction time to take orders from clients.
4) Can decrease the part sizes.
5) Reduce cost in wages, and spare cash on transporting merchandise to distribution centers.
6) Decreases the time vital for lead, setup, and creation.

## 3. CAUSTIONS WHILE USING JIT

Though JIT aims to reduce the cost of inventory, it brings many associated risks, which are as listed below.

- Uncertainty in supply as per JIT requirement
- Stoppages of manufacturing line due to nonconformance of specifications
- Variation in operators' skill

### 3.1 Uncertainty in supply to Meet JIT Demand

The basic necessity of JIT implementation is to have utmost vendor loyalty towards its buyers in terms of supplying the items in right quantity at right time with right quality. In Japan, the vendors are nurtured by buyer company. This makes the vendors to be part of the buyer company starting from planning and execution of the items concerning to them. This facilitates the supply of right quantity at right time with right quality.

In contrary, vendors are selected using vendor rating technique in most of the countries. This inserts a gap between vendors and buyers and in turn sometime they may not be in position to meet the buyer's demand, because of the following reasons.

3. The internal operating systems and procedures of the vendors may not be known to the buyer.
4. Inefficient planning and execution of production plan may affect the agreed supply to the buyer.
5. Frequent machine breakdowns in supplier company reduce it output.
6. Traffic congestion in the supply chain segment corresponding to the vendor and the buyer may affect the timely delivery of the items to the buyer.
7. If a vendor supplies to more than one buyer, then the priority for the buyer of concern may be reduced based on volume of supply and price per unit.

One or more of these reasons will result with frequent disruption in the supply of items to the buyer, which in turn will affect the output of the buyer.

### 3.2 Stoppages of Manufacturing Line Due to Nonconformance of Specifications

The tight control of inventory may lead to stoppages of manufacturing line due to nonconforming supply of items due to the following reasons.

- Variation in the hardness of materials, which will introduce processing time and/ or material rejections.
- The dimensions of the component may not be matching with specifications, which will lead to damage of components while fixing it in the assembly to be produced.

Such occurrence will lead to out of stock situation and production stoppages, which in turn will increase the number of kanbans to be circulated between adjacent workstations/ machines.

### 3.3 Variation in Operators' Skill

The skills of the operators in the production line may not be as per the expected level and/ or they may be inconsistent. These will lead to change in the throughput time of the production line. Mostly, there will be reduced speed of executing tasks, which in turn will increase the in process inventory.

## 4. NEED FOR INTEGRATION OF VENDORS AND PRODUCTION SUBSYSTEMS

The discussion of the section 3 necessitates the integration of the vendors and the production subsystems of the buyer company. The design of the supplier kanban should give due considerations for the points addressed in the sections 3.1 and 3.2 to avoid under supply or over supply of items. Further, the buyer organization should inculcate the nurturing concept of vendors in the form given incentives to vendors for their long time association and reliable supplies.

There should be strong feedback system to vendors about the variation in material quality and specifications such that the deficiencies at their sites are corrected without any time gap.

The employees in the buyer organization should be well motivated to operate the JIT system with the awareness that any inefficiency on the part of any operator will affect the performance of the entire production line.

## 5. CONCLUSION

It known that JIT system brings the befit of reduced inventory cost and many other associated benefits such as less throughput time, less rework, etc. In the supply chain, the kanban operation between supplier and buyer mainly controls the inventory of raw materials in the form of components and subassemblies. Similarly, the kanban operating between adjacent pair of machines controls the in process inventory of the plant.

The kanban at each stage may introduce some uncertainties in the form of stock out, nonconforming items, etc. So, there should be proper feedback system among the stages of production within the plant and also between the supplier and buyer, which will help to design a proper number of kanbans and size of those kanbans at each stage of the supply chain. If these are not taken into account while designing the manufacturing system, the use of JIT is of no use. Hence, proper care is required in this direction by taking the culture of supplier as well as operators in the shop floor.

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