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Just in Time System: A Study and Review

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Abstract : *Just in Time has been a very popular operation strategy partly because of its success in Japanese industry. JIT is a methodologies used to enhance manufacturers' competitiveness through inventory and lead time reduction. JIT implementation can involve a series of incremental steps and missteps, before the desired outcome is achieved. How many people in the automobile industry, manufacturing industry, and electrical industry can truly say that they have not heard about JIT? JIT implementation improves performance through lower inventory levels, reduced quality cost and greater customer responsiveness. This paper will examine the roll of a company's resource. This paper present a literature review on a small manufacturing that altered its resources configuration from a producer- consumer relationship separated by a buffer, to a simultaneity constraint. The result of this paper shows that the removal of the buffer system increased the manufacturing system's need for mix flexibility and indicates that JIT system is success full, and operating JIT system can lead to many advantages to the case company.*

Keywords –Buffer System, Faster response, Inventory reduction, Just in Time, Producer-Consumer relationship

I. INTRODUCTION

The aim of JIT is waste elimination. The principle of Just in Time (JIT) is to eliminate sources of manufacturing waste by getting right quantity of raw material and processing the right quantity of products in the right place at the right time. The roots of JIT system can probably be traced to Japanese manufacturing industries. Just-in-Time widely used in the Japanese automobile industry and the electronics industry, though more and more applications can be found in many industries over the world.. Lean manufacturing or also known as lean production has been one of the most popular pattern in waste elimination in the manufacturing and service industry. Just in Time (JIT) is a production strategy that strives to improve a business return on investment by reducing in-process inventory and associated carrying costs. Just in Time (JIT) is a type of operations management approach which originated in Japan in the 1950s. Just-In-Time (JIT) is a system that focuses on waste reduction and continuous improvement to achieve operational excellence. In a manufacturing context, JIT involves a manufacturing system where the parts needed to complete finished products are produced or delivered at the assembly site as required. Over the last three decades, hundreds of journal articles have been written on research carried out in the area of JIT manufacturing. The vast majority of these articles praise the benefits that can be achieved through the implementation of JIT practices, including increased performances with respect to manufacturing costs, quality levels, delivery responsiveness and flexibility. JIT manufacturing is said to be based on a number of principles. These principles, though somewhat varied depending on the research focus, almost always list two factors: elimination of waste and total employee involvement; with researchers sometimes including other factors such as supplier participation, total quality control and workplace organization. The objective of JIT system is to improve profits and return on investment through cost reduction, inventory reduction and quality improvement. Involvement of workers and elimination of waste are the means of achieving these objectives.

II. JIT MEANING

JIT Meaning is a Japanese management philosophy which has been applied in practice since early 1970s in many Japanese manufacturing industries. JIT means set the method of manufacturing.

III. JIT PURPOSE

The purpose of JIT manufacturing is to eliminate waste hence better inventory control, better product quality and better overall financial and operational procedure can be achieved. The main objective is to achieve that the manufacturing time is less than or equal to customer requested lead time. Companies use a Just-in-Time manufacturing and inventory management system to improve the efficiency of the company and reduce costs. The system requires manufacturers to purchase only when customer orders create a demand. Companies must develop a relationship with vendors to ensure parts reach the facility in time to manufacture products for the customer request. Businesses only produce inventory when there is a customer order in place. The system does not allow the business to produce or store excess inventory. Just-in-Time systems work in large and small organizations and those that produce products or services. With adjustments, the principles of Just-in-Time inventory management and manufacturing can work in any business.

The list of seven wastes is the target for continuous improvement in the production process.

1. TRANSPORTATION

This type of waste is when you move resources (materials), and the movement doesn't add value to the product. Excessive movement of materials can be costly to your business and cause damage to quality. Often, transportation may force you to pay additionally for time, space, and machinery.

2. OVERPRODUCTION

Eliminate by reducing setup times, synchronizing quantities and timing between processes, compacting layout, visibility, and so forth. Make only what is needed now.

3. WAITING

Eliminate through synchronizing work flow as much as possible, and balance uneven loads by flexible workers and equipment.

4. PROCESSING ITSELF

Extend thinking beyond economy of scale or speed, like why this part or product should be made at all, then why each process is necessary.

5. STOCKS

Reduce by shortening setup times and reducing lead times, by synchronizing work flows and improving work skills, and even by smoothing fluctuations in demand for the product. Reducing all the other wastes reduces the waste of stocks.

6. MOTION

Study motion for economy and consistency, economy improves productivity, and consistency improves quality.

7. MAKING DEFECTIVE PRODUCT

Develop the production process to prevent defects from being made so as to eliminate inspection. At each process, accept no defects and make no defects.



Fig no.3.1

IV. SUCCESSFUL COMPANIES ARE USE

TOYOTA

Toyota was the first to implement JIT effectively in 1970 and is still one of the most successful companies practising JIT systems. Their method, also known as the Toyota production strategy, sees that raw materials are not brought to the production floor until the order is received from the customer and the product is ready to be built. During the production process, no parts are included in the next node or station unless they are required to. This keeps the amount of inventory to a minimum which as a result, lowers costs. This also allows Toyota to adapt quickly to customer's demands, significantly reducing the risk of having excessive inventory at its disposal.

Important factors to Toyota's success

1. Small quantities of raw material are kept at each station of production, assuring that there is always enough inventory stock to start production of any product. This is also replenished once used.
2. Accurate forecasting to stock raw materials at the correct levels.

APPLE

Tech giant Apple has also leveraged JIT principles to make its manufacturing process a success. Apple's approach to JIT is different in that they leverage their suppliers to achieve JIT goals. Apple has only one central warehouse in the US and about 150 key suppliers worldwide; they developed strong and strategic relationships with their vendors. This outsourcing of production made Apple leaner and resulted in slashing costs and reducing overstock.

Important factors to Apple's success

1. A willingness of suppliers to keep inventory on hand allowing Apple to be free of this responsibility
2. Holding inventory at their retail stores
3. Dropshipping arrangements for online purchases

DELL

Dell has also leveraged JIT principle to make its manufacturing process a success. Dell's approach to JIT is different in that they leverage their suppliers to achieve the JIT goal. They are also unique in that Dell is able to provide exceptionally short lead times to their customers, by forcing their suppliers to carry inventory instead of carrying it themselves and then demanding (and receiving) short lead times on components so that products can be simply assembled by Dell quickly and then shipped to the customer.

Important factors to Dell's success

1. Dependable suppliers with the ability to meet Dell's demanding lead time requirements.
2. A seamless system that allows Dell to transmit its component requirements so that they will arrive at Dell in time to fulfill its lead times.
3. A willingness of suppliers to keep inventory on hand allowing Dell to be free of this responsibility.

V. JIT TOOLS

1. Preventive maintenance.
2. Eliminating waste.
3. Set up time reduction.
4. Mixed production.
5. Kanban.
6. Cellular work flow.
7. One piece flow production.
8. 5 S's.
9. Poke yoke.
10. Total productive maintenance.

Kanban This is a Japanese word meaning signal and is usually a card or tag accompanying products throughout the plant. Indicated on the kanbans is the name or serial number for product identification, the quantity, the required operation and the destination of where the part will travel to. The use of kanbans assists in trying or linking the different production processes together. A Kanban system ideally controls the entire value chain from the supplier to the end consumer. In this way, it helps avoid supply disruption and

overstocking of goods at various stages of the manufacturing process. Kanban requires continuous monitoring of the process. Particular attention needs to be given to avoid bottlenecks that could slow down the production process. The aim is to achieve higher throughput with lower delivery lead times. Over time, Kanban has become an efficient way in a variety of production systems.

Poka-yoke is a Japanese term that means "mistake-proofing" or "inadvertent error prevention". A poka-yoke is any mechanism in a process that helps an equipment operator avoid mistakes. Its purpose is to eliminate product defects by preventing, correcting, or drawing attention to human errors as they occur. Poka-yoke can be implemented at any step of a manufacturing process where something can go wrong or an error can be made. For example, a fixture that holds pieces for processing might be modified to only allow pieces to be held in the correct orientation, or a digital counter might track the number of spot welds on each piece to ensure that the worker executes the correct number of welds.

Shigeo Shingo recognized three types of poka-yoke for detecting and preventing errors in a mass production system

1. The contact method identifies product defects by testing the product's shape, size, color, or other physical attributes.
2. The fixed-value (or constant number) method alerts the operator if a certain number of movements are not made.
3. The motion-step (or sequence) method determines whether the prescribed steps of the process have been followed.

Either the operator is alerted when a mistake is about to be made, or the poka-yoke device actually prevents the mistake from being made. In Shingo's lexicon, the former implementation would be called a warning poka-yoke, while the latter would be referred to as a control poka-yoke

Shingo argued that errors are inevitable in any manufacturing process, but that if appropriate poka-yokes are implemented, then mistakes can be caught quickly and prevented from resulting in defects. By eliminating defects at the source, the cost of mistakes within a company is reduced.

VI. JUST-IN-TIME ADVANTAGES AND DISADVANTAGES

The main advantages of JIT are that it can improve production efficiency and competitiveness.

1. preventing over-production
2. minimising waiting times and transport costs
3. saving resources by streamlining your production systems
4. reducing the capital you have tied up in stock
5. dispensing with the need for inventory operations
6. decreasing product defects

The main disadvantages of JIT

1. Risk of Running Out of Stock - With JIT manufacturing, you do not carry as much stock. This is because you base your stock off of demand forecast, and if those are incorrect, then you will not have the correct amount of stock readily available for your consumers. This is one of the most common issues with manufacturing that utilize methodologies such as JIT and lean.
2. Lack of Control Over the Time Frame - Having to rely on the timelessness of suppliers for each order puts you at risk of delaying your customers' receipt of goods. If you are unable to meet consumer expectations, then they could take their business elsewhere.
3. More Planning Required - JIT inventory management requires companies to understand sales trends and variances in close detail. Many companies have seasonal sales periods, meaning that a number of products will need a higher stock level to combat consumer demand. Therefore, you must plan ahead for instances like this and ensure that your suppliers are able to fulfill the requirements.

VII. CONCLUSION

Just-In-Time is a manufacturing philosophy which leads to producing the required items, at the required quality and in the right quantities at the precise time as they are required. Just-In-Time manufacturing is a system of enforced problem solving. Managers have the choice between putting a huge effort in finding and solving causes of production problems, or they can learn to live with an intolerable level of interruptions in production. As everybody knows, the situation in which one has to put huge efforts is highly undesirable, and the system is called enforced. Quality within JIT manufacturing is necessary, because without a quality program in JIT, the

JIT will fail. Therefore JIT implies on high quality at the Source and the Plan, Do, Check, Action with its statistical process control. Furthermore, techniques are also very important. The JIT technique is a pull system rather than a push system, based on not producing things until they are needed. The well-known Kanban card is used as a signal to produce. Moreover, integration also plays a key role in JIT systems. JIT has its influence in ordering, scheduling and producing sides of a manufacturing firm. This influence in manufacturing firm is depending on employees, suppliers or customers. Therefore a large element of training is put towards the JIT to reach certain goals. One of the important principles of JIT is mutual trust and team work. When the managers and workers find each other as equal, committed to the organisation and its success, they are more willing to co-operate with each other in order to find the problems and solve these problems. It is concluded that the implementation of JIT system, the positive outcomes that arise from the use of the system is far greater than those that are not. The JIT system really is a state of the art idea that is beginning to catch on in a tremendous way all over the world. From these papers we are identified that value mapping activity is an ideal tool to find out wastages. Just in Time (JIT) manufacturing makes outstanding improvement in area of cost and productivity through best use of human resources by focusing on simplicity, waste elimination and time reduction. It helps the companies to reach their ultimate goal of sustainability and profitable growth in the future.

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