JIT System: A Cultural Difference between Japan and Indian Implementation

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Abstract
Just-in-time system has attracted the attention of industries all over the world. JIT Purchasing is an integral part of the Just-in-Time System. It has been identified as one of the most important JIT elements because of its potential for cost savings and quality improvement. Despite the profound interest of prospective managers and researchers, the extent of JIT Purchasing implementation in Indian industries so far is not satisfactory. The real challenge before Indian managers is to establish priorities among potential JIT system techniques to achieve best possible advantages. This paper attempts to study the cultural difference between India and Japan regarding JIT implementation.

Keywords
Just-in-Time (JIT), Purchasing, Attributes, Survey, Buyer, Supplier

I. Introduction
Just in Time (JIT) is a philosophy from Japan. It involves efficient production of high quality goods using minimum amount of raw materials, WIP (Work in progress), and finished products. It aims at eliminating all kinds of waste and seeks continuous improvement in terms of quality and productivity. The basic elements of JIT were developed by Toyota in the 1950’s, and became known as the Toyota Production System (TPS). JIT was well-established in many Japanese factories by the early 1970’s. JIT began to be adopted in the U.S., India and other countries and now the JIT concepts are widely accepted and used throughout the world. According to Mohan and Singh [12] the most challenging area for most manufacturers in achieving JIT is the purchasing of raw materials and parts. The supplier system has to be integrated with JIT, which leads gradually to JIT purchasing. Although organizing for JIT purchasing will certainly remain a vexing issue, learning from the experience of those who have ventured successfully into this domain will be of immense help in facilitating the shift to JIT purchasing. Due to some cultural differences in societies and transportation, education, technology and area of different countries, JIT implementation is affected.

II. Why Study JIT?
JIT being a concept, method, approach, or philosophy, it is a strategy for success in business. One of the reasons why we need to study JIT is to re-learn how to successfully compete against international competitors, like the Japanese. The evidence of market dominance by the Japanese using JIT is all too clear to U.S. automobile manufacturers. The origin of JIT production techniques is often traced to the Toyota Corporation of Japan. As of 1990, the Japanese automobile manufacturer’s market share of the U.S. automobile industry equals the market share of General Motors, the largest manufacturer in the country. For the Japanese automobile manufacturers to accomplish this objective in a period of about twenty years demonstrates in part how powerfully successful JIT can be for organizations embracing it. The logic behind JIT market dominance strategy becomes evident as we examine the productivity cycling process in fig.1. The application of JIT is focused on identifying production flow and product quality problems. The identification of the problems in JIT environment

- Continuous improvement in quality of product
- Cost of product is reduced
- Elimination of wastes at each stage
- Reduced manufacturing time
- Better productivity
- Lower Work in progress
- Better supplier relationships
- Cost efficient production
- Defect free output
Table 1: Some JIT Benefits Experienced by Corporations

<table>
<thead>
<tr>
<th>Corporation</th>
<th>JIT Related Benefit</th>
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<tbody>
<tr>
<td>Hewlett-Packard, Sunnyvale, CA</td>
<td>Cut WIP requirements from three weeks to three days and eliminating warehouse</td>
</tr>
<tr>
<td>General Electric, Louisville, KV</td>
<td>Cut lead-time production for dishwasher products from six days to eighteen hours and reduced scrap and rework by 51 percent.</td>
</tr>
<tr>
<td>Westinghouse, Fayetteville, NC</td>
<td>Inventories in motor-control centers cut from 4.2 months’ supply to 0.89 month’s supply.</td>
</tr>
<tr>
<td>Baylock Manuf. Corp., Johnstown, CO.</td>
<td>Installed computer-integrated JIT system and sales increased 400 percent because of improved scheduling.</td>
</tr>
<tr>
<td>Tektronix Corp., Johnstown, CO.</td>
<td>Reduced WIP by 34% and reduced throughput time by 66% in only 75 days of the JIT program implementation.</td>
</tr>
<tr>
<td>Computervision Corp., Manchester, NH</td>
<td>Reduced throughput time by 50%, improved quality by reducing waste by 30%, and reduced WIP by 66%.</td>
</tr>
<tr>
<td>M Corp., Weatherford, OK</td>
<td>Reduced unit cost of flexible disk media products by 30% and increased productivity by 60%.</td>
</tr>
<tr>
<td>Ferro Manuf. Corp. Madison Heights, MI</td>
<td>Increased productivity by 46%, and reduced rework hours by 93%.</td>
</tr>
<tr>
<td>Bytex Corp., Southborough, MA</td>
<td>Inventory cut by 43% and floor space reduced by more than 30%.</td>
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</tbody>
</table>

Alan W. Mackelprang and Anand Nair [1] meta-analytic investigation revealed that several JIT practice to performance relationships are subject to moderating factors. Aslı Aksoy and Nurset Ozturk [2] observed that most companies have begun to apply JIT production systems as a tool to become competitive. Companies applying JIT production systems aim at minimizing all inventory levels and delivering goods and services to customers on time. I-Chiang Wang [7] observed how to implement the JIT system under a global environment. Since the downstream assemblers ask the upstream manufacturers to deliver products using the JIT system. Khalouli et al. [8] have found that the increase of competitiveness has motivated the implementation of JIT production on scheduling problem to reduce process inventories and delivering goods at time. R. J. Schonberger [14] analyzed the core of Japanese management – the quality, flexibly quick response, and employee involvement concepts and techniques – now more than a quarter century old, seem built to endure. Sandanayake YG, Oduoza CF [16] stated that in this era of globalization and fierce competition amongst businesses, there is a need to implement new manufacturing strategies to enhance business performance. just-in-time (JIT) philosophy is designed to achieve high volume production using minimum inventory at the right time based on planned elimination of all wastes and continuous improvement.
III. JIT Purchasing

JIT purchasing is an integral part of the entire JIT manufacturing system. In JIT Manufacturing, inventory is seen as an evil, because it covers up quality problems and is costly to maintain. The essence of JIT purchasing is to purchase materials and be “just-in-time” for consumption. JIT Purchasing can be defined as an uninterrupted flow of 100% acceptable materials delivered on due dates and time at optimal cost 100% of time. JIT purchasing is carried out in small lots with frequent deliveries in small standard containers used to hold exact quantity and to the required specifications from a nearby local single supplier with a long-term contract. Sultan and Garg [19] stated that JIT System is not new to the present scenario of industrialization. This technique is not limited to any particular country but due to its large potential benefits, it has a widespread application throughout the world. Garg et al [5] have emphasized that JIT purchasing implementation is the need of the hour in view of increased competition. The identified JIT purchasing and supplier evaluation criteria attributes are being given good importance by Indian industries. Therefore, a lot of scope for JIT purchasing implementation in Indian context exists. Manoocheri [10] identifies the problems arising from having multiple suppliers in a JIT system as follow:

1. Difficult to manage the coordination of production schedules and relationships.
2. Increased costs arising from training of the suppliers by the manufacturer.
3. Due to decreased volume of individual shipments if multiple suppliers are used, it is not possible to maintain the same service of delivery as is possible from a single supplier, without significantly increasing delivery costs.

Further he claims that single sourcing results in a number of benefits shown below:

- Increased focus on establishing cost or quality based process improvement programmes with supplier.
- Transportation costs are reduced.
- Increased opportunity of special arrangements for transportation, material handling and communications.
- Product quality and customer service improves

Other authors like Schonberger and Gilbert [17] show that JIT purchasing is facilitated by ‘loose’ design engineering specifications and close cooperation between engineering, quality and purchasing managers.

IV. Characteristics of JIT Purchasing

Suppliers
1. Few suppliers.
2. Nearby suppliers.
3. Repeat business with same suppliers.
4. Active use of analysis to enable desirable suppliers to become / stay price competitive.
5. Clusters of remote suppliers.
6. Competitive bidding mostly limited to new part numbers.
8. Suppliers are encouraged to extend JIT buying to their suppliers.

Quantities
1. Steady output rate (a desirable prerequisite).
2. Frequent deliveries in small lot quantities.
3. Long term contract agreements.
4. Minimal release paper work.
5. Delivery quantities variable from release, but fixed for whole contract term.
6. Little or no permissible overage or underage receipts.
7. Suppliers encouraged to package in exact quantities.
8. Suppliers encouraged reducing their production lot sizes

Quality
1. Minimal product specification imposed on supplier.
2. Help suppliers to meet quality requirements.
3. Close relationships between buyers’ and suppliers’ quality assurance people.
4. Suppliers encouraged using process control charts instead of lot sampling inspection.

Shipping
1. Scheduling of inbound freight.
2. Gain control of use of company owned / contract shipping, warehousing and trailers for freight consolidation/ storage where possible - instead of using common carriers.

V. JIT in Indian Context

Goonatilake [6] has exposed the problems of developing countries on the basis of their studies of manufacturing firms. The problems include underutilization of capacity, low productivity; unreliable and long lead times, shortage of raw materials and parts, inferior quality, lack of technology transfer and management etc. These problems identified by researchers in context of developing countries including India are shown in Table-2. Since most manufacturers enjoys a certain degree of monopoly status, they are more concerned about maintaining efficiency rather than reducing cost, which is just reverse the case of developed countries, where maintaining efficiency is automatically achieved due to better infrastructure and practices. Schonberger and Gilbert [17] have also suggested JIT and TQC (Total Quality Control) to solve such problems of developing countries. Singhvi [18] has described Eicher experience in implementing JIT. Significant improvements were observed in throughout time reduction, reduction in space, in-process inventory reduction, material handling and quality levels. Large investments are not found to be essential, but it is impossible to implement JIT without employee involvement, mutual trust, and unremitting focus on quality. Supplier is nothing so difficult about Japanese JIT approach, which cannot be applied in India. Prem vrat et al. [13] have identified problems in JIT implementation in India context. These include poor quality of incoming material, non-receipt of delivery by buyer of exact quantity on exact time, little workers’ motivation, unreliable transportation system etc. the delphy study indicates the JIT index to be 23.38 on a 40 point (0-40) scale, implying that though quiet difficult, JIT implementation in India is possible. It may take 10-20 years before JIT can be fully implemented in Indian industries. Garg et al. [5] have found ‘work culture’ a critical element if a company wants to implement JIT. Adopting JIT culture in India is not an impossible task. According to them, dimensions of work culture in JIT include multifunctional workers, long term employment motivation and trust, top management attitude and commitment, support from union leaders, effective communication, poka yoke inspection method, and incentive scheme. It is felt that JIT could be a great opportunity for India in the context of recent reforms in economy and trade towards opening of economy and globalization. Roy and Guin [15] have reviewed the literature relating to applications of JIT in different sectors of manufacturing from 1980 to 1995. They have also identified various requirements for the success of JIT in Indian industries. The requirement needs to be fulfilled includes: leveled and stable final assembly schedule, change in
layout, multiskilled workforce, training for workers, respect for human system etc. Kolay’s [9] approach to assess a vendor on an overall performance index is certainly useful in the area of supplier management in Indian context. As mentioned earlier, the study carried out by Mohan et al. [12] presenting existing buyer-supplier relationship in Indian diary co-operatives in Gujarat is also relevant for this area.

Table 2 : Relevant Problems of Developing Countries in JIT Context

<table>
<thead>
<tr>
<th>Problems</th>
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<tr>
<td>Shortage of raw materials and parts [3,5]</td>
<td>Underutilization of capacities [3,5]</td>
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</table>

VI. Comparison of Japanese and Indian Industries

Donald P. Morgan [4] stated that Toyota developed JIT in the 1950s-1960s followed by other Japanese firms in the 1970s. Analysis has discussed many reasons JIT was practiced by Japanese manufacturers before their U.S. counterparts. One important reason is the closer physical and business relationship between Japanese firms and their suppliers. For example, they are physically closer (because Japan is smaller) and this fact expedites delivery. Another reason is that strikes are rarer in Japan, which reduces the need for inventories. The decline in union membership in the United States facilitated JIT by, among other things, reducing the threat of strikes.

A comparison of Japanese and Indian industries will not only help in examining the applicability of JIT to the Indian industries but also in predicting possible problems areas and steps to be taken to tackle these problems. The comparison is made on the basis of the following:

1. People
2. Plant and equipment
3. Process: It is further subdivided into two parts
   A. Quality control
   B. Production management
4. The product and its value

1. People
The largest difference between India and Japan lies in the type of people. The individualistic “every man for himself” temperament of workers in India contrasts sharply with Japanese cooperation, dedication, harmony and group thinking decision process. Indians are generally lacking in the sense of belongingness with the company they work in and have not realized that the company’s profit is their profit. The Japanese worker is more literate than his Indian counterpart. Japan has the highest proportion of graduate engineers than any other country in the world. The Japanese worker is cross-trained and multifunctional, whereas the Indian worker is specialized in one particular task. Japan is having highly homogeneous society whereas Indian society is divided in caste, cultural, and religious differences.

2. Plant and Equipment
Automation in Japan is very high whereas Indian industry is labour intensive. Most of the Japanese companies have flexible manufacturing system. The Indian companies use the traditional processes, product or job layout. Most of the companies in Japan have their own toolmakers to build their machines but in India very few companies have self-manufactured machines.

3. Process
This section is divided into two parts:
(a) Quality control
   (b) Production management
Quality control: In Japan, TQC (Total Quality Control) concept is prevalent. They believe in ‘Quality at the Source’. If any error is caught it is corrected at the source, where the work is performed. In Indian and Western system it is the practice of inspection by statistical sampling after the lot has been produced. In Japan, workers and foreman have primary responsibility for quality. In India it is the quality control department that checks the quality. Production management: Indian companies use ‘Material Requirement Planning’ (MRP) for production management, whereas Japanese company uses KANBAN. The MRP is a push system and KANBAN is pull system. The Japanese system use preventive maintenance, but 100% preventive maintenance is absent in India.

4. The Product and its Value
Japanese strive for newer and better product designs and the products are customers oriented providing real value. Indian companies are lacking in progressive and actual research and development and the product design frequently depends upon what is available rather than what the customer demands. Japanese companies believe in long-term gains and profits. They keep profit margin low, which increase total demand and required production volume, which helps to accelerate productivity improvement. Indian companies strive for short-term gains, keeping high profit margin.

VII. Summary of Difference
The difference between Japanese and Indian industries is summarized in Table 3.

Table 3 : Difference between Japanese and Indian Industries

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Japanese industries</th>
<th>Indian industries</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. People</td>
<td>(i)Workers have dedication; cooperation, harmony and groups think decision process.</td>
<td>(i)Workers have thinking of “Everyman for himself”</td>
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<tr>
<td></td>
<td>(ii) High literacy</td>
<td>(ii) Low literacy</td>
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<td></td>
<td>(iii) Homogeneous society</td>
<td>(iii) Heterogeneous society</td>
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<tr>
<td></td>
<td>(iv) High level of motivation</td>
<td>(iv) Lack of motivation</td>
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<tr>
<td></td>
<td>(v) Multifunctional workers</td>
<td>(v) Specialized workers</td>
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<td></td>
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<td></td>
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<tr>
<td>Plant</td>
<td>(i) High level of automation</td>
<td>(i) Less automation</td>
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</tr>
<tr>
<td></td>
<td>(iv) Lighted displays to highlight troubled spots</td>
<td>(iv) Not used</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Quality control</th>
<th>(i) Quality at the source</th>
<th>(i) Statistical sampling when lot has been produced</th>
<th>(ii) Defect detection</th>
<th>(ii) Quality responsibility</th>
<th>(iii) Workers, foreman have quality responsibility</th>
<th>(iii) Preventive maintenance</th>
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<table>
<thead>
<tr>
<th>Production management</th>
<th>(i) KANBAN (Pull system)</th>
<th>(i) MRP (Push system)</th>
<th>(ii) Preventive maintenance</th>
<th>(ii) 100% Preventive maintenance absent</th>
<th>(iii) Production line slows up for quality problems, speed up when quality is right</th>
<th>(iii) Production line runs at fixed rate.</th>
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<tr>
<th>Product and its value</th>
<th>(i) Customers oriented product, Provides real value</th>
<th>(i) R&amp;D lacking, design depends on what is available, not on demands</th>
<th>(ii) Strive for short term gain</th>
<th>(ii) Strive for long term gain, low profit margin</th>
<th>(iii) Autonomous tool makers to build machines</th>
<th>(iii) Statistical sampling when lot has been produced</th>
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[7] I-Chiang Wang, "The application of third party logistics to implement the Just-In-Time system with minimum cost under a global environment Expert Systems with Applications” 37, 2010, 2117–2123.


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