CHAPTER 3
LITERATURE REVIEW

How does a company become successful and stay successful? Certainly not by using the traditional ways of business! Even a company like General Electric, an established old-time Fortune 500 company with operations throughout the world, must constantly review itself and learn how to improve the business or else be outmaneuvered by aggressive newcomers (Wheelen and Hunger, 2002). Globalization, that is, the internationalization of markets and corporations, has changed the way modern corporations do business. Lau (1996) states that to be competitive in dynamic environments, corporations are required to become less bureaucratic and more flexible, and must develop strategic flexibility, that is, must have the ability to shift from one dominant strategy to another. Strategic management, on one hand, demands a long-term commitment to the development and nurturing of critical resources, while on other hand, it also demands that the company become a learning organization, that is, an organization that is skilled at creating, acquiring and transferring knowledge, and modifying its behavior to reflect new knowledge and insights.

Learning is an invaluable ingredient. It includes forgetting bad practices as well as embracing new ideas. Learning helps organizations to learn quickly from mistakes and failures, and to rectify the situation accordingly. It is a feature of world-class manufacturing companies. Learning organization facilitates the learning of all its members and continuously transforms itself (Pedler et al., 1991). A number of features of the learning organization have been reported in many literatures (Pettigrew and Whipp, 1991; Storey and Sisson, 1993; Mabey and Salaman, 1995; Lundy and Cowling, 1996). The company is required to become a ‘learning organization’ (McGill and Slocum, 1994), in which everyone engages in problem solving and continuous improvement, thereby gaining a competitive advantage by learning faster than the competitors.
Learning organization is a critical component of competitiveness in a dynamic environment, which transfers knowledge quickly and efficiently throughout the organization (Garvin, 1993). It is particularly important to innovation and new product development (Hitt et al., 1998). The success of JIT greatly depends on how the organization responds to changes required to make atmosphere conducive for innovative developments. The degree of centralization, formalization and complexity which are crucial for innovation, play an important role. Rubenstein (1976) found that innovation process is essentially a people process and that organizational structure, formal decision-making processes, delegation of authority and other formal aspects of a so called well-run company are not necessary conditions for successful technological innovation. Employee involvement, motivation and cooperation are critical in JIT implementation as they are directly related to increased flexibility in the organization. Organizations that are willing to experiment and are able to learn from their experiences are more successful than those that do not.

For effective learning, the organization must create an open, questioning environment, very different from the structures of the past, where staff obeyed orders either out of fear or blind loyalty. A highly developed mutually beneficial approach to work, far in advance of any worker-manager divide, which was a feature of the mass production system, is the absolute requirement for the world-class manufacturers, where individuals are empowered and motivated to act in the best interest of themselves and the organization as a whole. As a result, the organization becomes competitive. Having competitive advantage, the organization is able to create more value from the resources at its disposal, and becomes able to outperform competitors through better products and services at a lower cost. JIT requires organization to be of learning type so that the scope of continuous improvement always exists. Lei et al. (1999) concluded that the famous US computer firm Hewlett-Packard (HP) used an extensive network of informal committees to transfer knowledge among its cross-functional teams and to help spread new sources of knowledge quickly.
Innovation is of fundamental importance and a major strategic issue for firms. The success or failure of a company greatly depends on innovation. It will decide whether a firm can exist and grow or will have to exit from the market. Peters (1991, 1992) put it more succinctly when he stated that either get innovative or get dead. Innovation is one of the major factors to achieve competitive success (Kay, 1993). Over 50% of the US companies that were once enlisted in the Fortune 500 disappeared since 1985 (Industry Week, 1998). It was not because of the poor management of the companies, but the main issue was that the majority of them were unable to innovate either at the speed or at the rate of the success of their often new competitive rivals. Innovations of all kinds and product innovation (also called new product development) in particular is considered as the major driver for growth and customer retention.

Deciding how and on what basis a company wishes to compete with its competitors is of central concern to all companies (Porter, 1980). Firms need to consider a wide range of factors in order to maximize their products’ chance of success in competitive environments. A company has to identify the specific ways in which it can differentiate its products in order to gain competitive advantage (Brown, 1996; Hill, 1995).

The world has changed since Richard Schonberger wrote his famous book, World Class Manufacturing. The term ‘world class’ intends to make a company that is able to compete in a business world that is more intense than ever before due to the enhanced capabilities of existing firms, as well as the emergence of new entrants from all over the globe (Schonberger, 1986). A world class manufacturing firm has many salient features such as excellent layouts, customer-focused operations, excellent process technology, commitment to innovation, superb process and product quality, expert inventory systems aligned with strategic partnerships with suppliers, and trained and dedicated workforce. It is important to note that world class no longer means being better than a competitor, rather it means just being able to compete in global markets. Hayes and Pisano (1994) have rightly said, ‘How can a
company expect to achieve any sort of competitive advantage if its only goal is to be “as good as” its toughest competitors? It requires a collaborative, holistic and cross-functional approach at the senior level management. The process is more fluid and dynamic in world class manufacturing than in traditional manufacturing, where an elitist group tends to dominate the strategic process and where the approach is more top-down than collaborative in style.

Traditional plants use the concept of ‘mass production’ and as such they fail to equip their operations with sufficient capabilities in order to compete against the best in the world and to satisfy customer requirements (Brown, 2000; Kenney and Florida, 1993). Successful organizations, on the other hand, have shifted from being product-based organizations to customer-based organizations, and customer satisfaction management (CSM) is an integral aspect of this new way of thinking. Manufacturing is no longer just about being lean or world-class, but is about a radically different, strategically oriented approach to manufacturing. The manufacturing strategy is now changing from mass to small batch production in order to incorporate rapid changes in customer preferences and demand. The strategic approach uses core competencies and distinctive capabilities of a firm, and helps a company to effectively meet customer requirements. Mass production is being replaced by mass customization of goods and services. Pine et al. (1993) states that mass customization fulfills the need for volume combined with recognition of customers’ wishes. Products are not demanded in large quantity at one time but are spreaded over a period of time in order to minimize their tied-up capital in equipment or inventories (Anwar and Nagi, 1997). Clearly, inventory management is a major concern for all the enterprises, and has been one of the greatest areas of contrast between much of Western and Japanese manufacturing.

Inventories are needed in the manufacture of finished products, and serve as a cushion, as they absorb fluctuations in demand or supply of goods that disturb the schedule of the enterprise. Hence, for the smooth working of the organization, inventory is a must, and an organization cannot survive without it. However,
inventory incurs some costs, as it requires valuable space, capital and other overheads to maintain it. Excessive inventory involves more blockage of money, which can be used elsewhere for other useful purposes, but is not realized as long as the stocks are not getting consumed. Higher level of inventory may be desirable to meet the fluctuating demand pattern and ensuring smooth flow of production by eliminating any uncertainty (Buffa and Sarin, 2000), but excessive inventory clearly manifests a symptom of a poor production system reflecting poor quality, slow set-ups, poor scheduling and poor process design (Martinich, 2005; Brown et al., 2000). Tersine (1994) states that one of the key functions of inventory management is to minimize the amount of inventory held by the company in terms of materials, work-in-process and finished goods. Hence, inventory needs to be managed effectively and efficiently. Effective inventory management reduces the overall production costs drastically along with maintaining inventory at the most desired level. It also ensures smooth flow of production activities, reduces delivery time and reduces price fluctuations.

In Japan, inventory management has been seen as strategic, an essential part of the complete range of capabilities that will enable the firm to out-compete other players in the market. In recent years, many Western firms have tried to emulate some of the Japanese practices that have underpinned Japan’s success in many industries, and have tended to view inventory management as a tactical activity.

Quality has a key role to play in inventory management. Quality ensures defect-free products and reduces work-in-process (WIP) inventory drastically. It reduces inspection costs, which has a direct impact on production cost. It also reduces lead time and ensures speedy delivery of products to a customer. Singh (2007) has stated the importance of quality in world class manufacturing.

Supply chain management (SCM) is closely linked to inventory management. The important components of supply chain management include all management functions that are related to the flow of materials from the company’s
direct suppliers to its direct customers (Handfield and Nichols 1999; Christopher, 2001). SCM focuses on integrating the information and materials flow within the supply chain network starting from product design to delivery (Verwijmeren, 2004) in order to make it quick responsive to customer needs while lowering the total costs (Russell and Taylor, 2006). The central idea of supply chain management is to apply a total system approach to managing the flow of information, materials and services from raw material suppliers through factories and warehouses to the customers. Good supply chain management can be a competitive advantage for a firm (Blanchard, 1998; Chopra and Meindl, 2009). World-class companies see supply chain management as a key element in capturing increased shares of world market (Burt et al., 2009). Jarillo and Stevenson (1991) and Nishiguchi (1994) found the competitive advantages gained through better supplier networks in automotive industry. Competitive advantage is increasingly a function of supply chain efficiency and effectiveness. Integration of related activities of a production system facilitates smooth flow of materials within the system, thereby cutting the level of in-process inventory drastically. As a result of effective supply chain management, right product is made available at right time to the customer, which is mainly due to reduced cycle times because of simplified and accelerated operations (O’Brien, 2003; Oz Effy, 1999). Many researchers discussed different mechanisms for integrating supply chains (Lee et al., 1997; Vereecke and Muylle, 2006).

Supplier selection and management are important issues in supply chain management, and is the key to the success of a modern strategic management plant (Burt, 1989). Although price is important, delivery schedules, product quality and mutual trust and cooperation become the primary basis for supplier selection. Connecting with reliable and trustworthy suppliers has become a key factor for successful organizations. Japan’s success in automobile industries is because of the stringent follow up of quality-standard parameters and the continuous process of improving the inputs from the suppliers. That became possible because of strong manufacturer-supplier relationships. A good supplier has the ability to make the organization agile, that is, the organization becomes able to switch frequently from
one market-driven objective to another (Kidd, 1994). JIT requires a company to have a few reliable suppliers, those that it can work with closely and who are able to change their schedules and technologies quickly to meet the company’s changing needs (Chase et al., 2014). Therefore, supplier decisions are important but also difficult due to the challenges firms are facing in today’s dynamic business environment (Hartley and Choi, 1996; Juettner, 2005; Hill, 2007). The assessment of supply risks is particularly important in two cases; one when the supplier is new and the firm has not sourced from it before or when evaluating suppliers that deliver critical inbound supplies (Matook et al., 2009). The objective of risk management in the supply chain is to protect organizations from unpredictable events and their adverse effects (Gaudenzi and Borghesi, 2006). The risk management in the supply chain and the supplier risk management are receiving greater attention in today’s uncertain business environment (Spekman and Davis, 2004; Ritchie and Brindley, 2007; Blackhurst et al., 2008). Managing supply chain risk is important because of the increasing number of potential suppliers involved in globalized sourcing and the multiplicity of possible evaluation criteria (Wagner and Bode, 2006).

The suppliers’ proximity to the buyer’s plants contributes to achieving the objective of small but frequent deliveries of inventories. Also, it removes uncertainty and risks involved in the supply chain. Wafa et al. (1996) has shown the impact of nearby suppliers on JIT. Stevenson and Spring (2009) state that acquiring local suppliers can facilitate JIT delivery and increase the ability of the supply chain to respond to rapid change, and hence the objectives of a JIT system can be effectively met. Distantly located suppliers result in more uncertainty for the buyer because of problems associated with transportation system or environment. At the same time, products will take more time to reach, hence forcing the organization to keep large inventory (Buffa and Sarin, 2000). Hence, one way to reduce delivery randomness and inventories is to keep suppliers near to their major buyers.

The supplier-manufacturer relationship is critical so that the two entities can closely work with each other. Successful inventory management owes much to the
people skills in forming alliances with other partners, and is not just dependent upon
the sophistication of computerized monitoring and controlling system
(Lamming, 1993). The nature of relationship between the two is gradually shifting
from being adversarial to being cooperative. Now they are in partnership with each
other. Cooperation rather than confrontation in the supply chains is the business
model that is bringing results in industries as diverse as aerospace and grocery
retailing (Christopher, 2001). The strong relationships with a few suppliers help to
ensure reliable delivery with uniform and consistent quality in supplies with less
chance of defects in the materials by deeply engaging with the buyer and agreeing to
meet the customer’s quality standards and services. Supplier involvement in product
design can increase supply chain flexibility in terms of more modular products.
Suppliers that are allowed to be involved in the design of their customer’s products
can often modify the designs so that components will be easier to produce, with more
consistent quality and lower cost. For example, Rockwell International, one of
Honda’s suppliers, redesigned the Accord’s rear cargo area to add more space. The
result came in the form of money saving to Honda and a better car to Honda’s
customers (Martinich, 2005). Stertz (1992) reported that Chrysler cut its late
engineering design changes for one model from 1000 to 300, and by doing so it
saved $ 156 million through its suppliers’ suggestions.

The buyer-supplier relationship is also vital to innovation, and the major car
manufacturers depend on suppliers for innovation. Much innovation in the car
industry today originated from supplier. For example, developments such as
anti-braking systems (ABS), engine management systems and improved suspension
systems have come in large part from suppliers to the auto industry. By bringing
these suppliers more closely into the new product development process, it has been
found that not only innovation can be continually embodied in new products but also
simpler, more cost-effective designs can be created (Juettner, 2005). In a study, it is
reported that involving suppliers in product development process can cut the costs of
purchased parts and services by 30% (Templin and Cole, 1994). An organization
armed with a good product development process will be in a better position to bring
new products and services to the market ahead of its competitors. Chrysler’s purchasing department received thousands of cost-saving ideas since launching its SCORE (supplier cost reduction effort) supplier programme. It resulted in reduced operating costs by $325 million with supplier participation up from 13% in 1994 to 26.6% in 1996 (Ward’s Automotive Yearbook, 1998).

Hence, during emphasizing the close relationship, suppliers need to be viewed as critical strategic alliances, not as replaceable component vendors (Narasimhan et al., 2003). Viewed as a resource, suppliers can solve problems with product design and manufacturing performance. Japanese companies have strong relationships with their suppliers and they call these relationships subcontractor network, and refer suppliers as co-producers (Gaither and Frazier, 2004). They seem to depend more heavily on suppliers than U.S. manufacturers, especially in the automobile industry. For example, Toyota’s purchased materials account for nearly 80 percent of its sales dollar compared to less than 50 percent for General Motors, 60 percent for Ford and 71 percent for Chrysler (Abernathy et al., 1981; Business Week, 1983). The present aim is to manage suppliers to get the lowest overall costs, and not simply getting a low initial procurement price. Honda’s designers work closely with suppliers to ensure that parts are manufacturable. Carbone (1996) stated that Honda of America had a 200-member department that worked closely with suppliers to help them improve quality. The extent of collaboration and integration between buyer and supplier is important in determining the flexibility of the existing structure and the ease with which the supply chain can be re-configured (Stevenson and Spring, 2009). The close relationships provide a greater willingness on the part of the suppliers to cope with change. JIT users include their suppliers in the early phases of product design to avoid problems after production has begun.

A supply chain network is greatly facilitated by an information system and the tools of information technology to share information. Information sharing is the sharing of knowledge among the business partners at different levels regarding the
production status, the planning process, the changes in the business environment and the goals of the companies, so as to serve the customers effectively and efficiently (Vanpoucke et al., 2009). The information system consists of computer hardware, communication technology and software designed to handle information related to business functions, and to smooth many organizational functions (Flowers, 1996). Chopra and Meindle (2009) stressed on the need of flexibility, information sharing, visibility of effort and performance of each party and fairness in profit sharing while discussing coordination in the supply chain. An effective information management system coupled with proper manufacturing planning will significantly reduce piling of stocks and lead time, and ensure timely delivery of quality products to the customer. It provides high quality, relevant and timely information flow that effectively supports decision-making for inventory replenishment, capacity activation, and for synchronizing material flows at all tiers within the supply chain (Soroor et al., 2009). Information system is like a nerve system for supply chain management (Yamaya et al., 2002). Information sharing and collaboration with trading partners is considered as a company’s top logistic challenge, and forms an important part of supply chain management (Chen and Paulraj, 2004; Carr and Kaynak, 2007). Many users of JIT systems make such cooperation and technology transfer an explicit part of their contracts with suppliers. It is more important to look at the quality of information sharing and the systems that are used to share information, rather than the extent to which information is shared between the partners. Ketzenberg et al. (2007) found that although technology has made the sharing of information easier, managers should not assume that more information automatically implies better performance.

Hence, development and use of effective information system for supply chain management is of utmost importance. A supply chain network can fail in the absence of an effective information system. The ‘bullwhip effect’ is the most important effect caused due to inefficient supply chain network. It describes the propagation and amplification of orders from one reordering system to another upstream in a supply chain. This effect causes uncertainty in the supply chain
management leading to increased on-costs as organizations in the supply pipeline mitigate against the potential risks in customer service levels by, say, increasing available capacity or increasing stock holding (Metters, 1997). The tools of information technology provide effective and quick means to send information anywhere required, and help manage inventory in the most effective manner. Boynton (1993) stated that information technology takes care of the dynamic stability of the supply chain. The use of telecommunication based networks such as Internet, Intranet, Extranet and EDI (Electronic data interchange) helps to gain competitive advantage for the organization. EDI has eliminated the need of printing, mailing, checking and handling by employees of numerous multiple-copy forms of business documents (Soroor et al., 2009). The purpose of EDI is to make information transactions digital rather than paper-based. It makes inventory control online, and sharing of forecasting information relating to customer’s demand becomes quite smoother, thus leading to cut the lead time almost half (Stein, 1996). The Internet has made sharing of information much easier and faster, and organizations using Internet have grown faster in a very short interval of time through better inventory management. As the Internet has grown and evolved, more and more companies have become involved in e-business, sometimes called e-commerce. One of the most important impacts of the Internet and e-business in supply chain management is the availability of instantaneous information. Managers can immediately obtain information such as pricing, location of materials, status of shipments and availability of parts throughout the supply chain, and this helps in coordinating materials management activities in the supply chain, thereby reducing the operating costs significantly.

Mazda (2000) states that there are two systems that are usually used to control the flow of materials in a manufacturing unit: one is material requirements planning (MRP) and another is just-in-time (JIT). MRP is used mostly by conventional plants for ordering and scheduling materials that are needed in production, but is being gradually replaced by JIT (Miltonburg, 1997; Aggarwal, 1985). JIT is an active system as compared to passive nature of MRP as
the former tries to achieve two equally important goals of maximizing production and making improvements in the production system (Zipkin, 2000; Narasimhan et al., 2003). The production is maximized because of drastic reduction in in-process (WIP) inventories, and the production system is improved because of reduction in setup times, queue times, breakdown rates, repair times, scrap rates and so on. New models are being used successfully particularly in manufacturing where alternative basic strategies are in the process of being adopted (Bartezzaghi and Turco, 1989).

JIT is commonly viewed as a Japanese innovation, because Toyota popularized this approach, and was formalized into a management system when Toyota was looking for meeting the precise demand of customers for its automobile products without making any delay (Hartley, 1981). Japanese firms presently make much heavier use of JIT than manufacturers in other parts of the world. Khanna and Shankar (2008) have discussed the gradually increasing use of JIT systems at Toyota. Singh (2009) has discussed the role of JIT in achieving manufacturing competitiveness.

JIT is based on the simple principle that right part should be at right place at the right time, and calls for delivering raw materials just when needed and producing products just when needed. The objectives of JIT are to eliminate waste, to improve quality, to minimize lead times, to reduce costs and to improve productivity (Narasimhan et al., 2003). Hence, JIT can be considered as a philosophy of waste reduction as well as a set of techniques for reduction of inventory and waste. The focus is on minimizing raw materials, work-in-process (WIP) and finished goods inventory with a view to cutting inventory costs, and also helping to explore other more serious inefficiencies in the manufacturing cycles (Vuppalapati et al., 1995). JIT inventory management eliminates waste through simplification of manufacturing processes (Schonberger, 1986; Harmon and Peterson, 1990). It strikes a balance between optimum inventory quantity and its holding cost. It has been emphasized that JIT must be implemented as a total system and that implementation of any part
of it without the rest will be unsuccessful (Billesbach, 1991). An isolated approach can reduce its effect and organizational competitiveness (Billesbach and Schnierderjans, 1989).

The just-in-time objectives are typically achieved through several physical system changes. One of the useful changes is setup time reduction and a drive towards lot sizes that are constantly smaller. Several authors (Tersine and Schwarzkopt, 1989; Tersine and Barman, 1991; Tersine et al., 1992; Tersine and Barman, 1995) have presented many modified lot sizing models to incorporate increasing complexity in the production system. They emphasized on small lot sizes. With large lots, a few defective units cause few problems because they may be placed aside and the next unit may be used. However, in case of small lot size, a defective unit will cause disruption in the production process. This discovery is advantageous and allows problems to be solved, because production stops until the defective unit is eliminated. Hence, JIT is a system of enforced problem solving which emphasizes on the use of small lot size so as to meet quick customer requirements. Suppliers are expected to deliver their supplies in small batches more frequently than before. If the supplier is local, daily batches may be appropriate (Narasimhan et al., 2003). In order to ensure that the supplier may deliver in a JIT manner, a firm should have a requirements schedule that is relatively certain for some period into the future.

Manufacturing environment plays a critical role in the successful implementation of JIT. It offers right kind of production atmosphere needed to produce right product at right time and in right quantity. Singh (2008) has discussed the effect of manufacturing environment on JIT implementation. A few dominating components of manufacturing environment include preventive maintenance, design of the production process, plant layout, Kanban, and the quality improving measures. Regular preventive maintenance measures tend to smooth a production system by avoiding breakdowns.
The product design and process design, and the plant layout are critical components for ease of flow in a JIT environment. Computer-aided design (CAD) has profoundly affected the design process. It has offered increased flexibility with shorter design time, which in turn, has made the speed of new product development faster, and has also resulted in reducing manufacturing costs. Several common techniques such as group technology (GT) and dedicated lines are used to allow uninterrupted product flow (Narasimhan et al., 2003). Cellular manufacturing is an application of group technology (GT), which is being increasingly used for small batch production to gain economic advantages similar to mass production while retaining the flexibility of the job shop (Gaither et al., 1990; Rajamani et al., 1996). Frazier and Mark (1996) have listed several advantages of cellular manufacturing over job shop production. The layout of the equipment is made to minimize both travel distances and inventories between the machines. Cells are typically U-shaped to increase worker interactions and to reduce material handling.

At the core of JIT manufacturing at Toyota is Kanban (Monden, 1981), an amazingly simple system of planning and controlling production. It is a signaling device that signals to the upstream workstation that the downstream workstation is ready for the upstream station to produce another batch of parts. The kanban system can not only be used within a manufacturing facility but also between manufacturers and external suppliers. JIT therefore not only reduces in-process inventories by using kanban, but raw-materials are also reduced by applying the same principles to suppliers.

Another programme associated with JIT has been the pursuit of improved quality through continuous process improvement. Providing suppliers with information relating to customer’s requirements and training them in quality control and manufacturing techniques are becoming more common. Quality improvement through process improvement is necessary so that there are no interruptions in the flow due to defective materials. Most JIT firms have engaged in programmes of quality awareness and statistical process control (SPC). There are few safety factors in JIT.
Every material is expected to meet quality standards, every part is expected to arrive exactly at the time promised and precisely at the place it is supposed to be, every worker is expected to work productively and every machine is expected to function as intended without breakdowns (Gaither and Frazier, 2004). Japanese manufacturers have long practiced what they called ‘kaizen’, the goal of continuous improvement in every phase of manufacturing. The integration of kaizen with JIT makes JIT implementation easier (Imai, 1986). The role of quality management in JIT implementation has been discussed by Singh (2009). JIT manufacturing greatly depends on a system of total quality management (TQM). Successful JIT manufacturing goes hand-in-hand with an organization-wide TQM culture. Just as everyone has to be involved in JIT, so also must everyone be involved in TQM. To ensure that materials from suppliers are of the highest quality, suppliers must be brought into a company’s TQM programme. Ford Motor Company is a good example of how this should work. The role of quality circles in improving product quality is in maximum use in Japanese firms.

Flexibility is essential today to survive in the most changing and turbulent environment, especially in the global changing international trade scenario and competitiveness in the world market. Flexibility has got an in-built mechanism to think of new approaches in managing an organization. It creates a freedom in the work environment and gets the best out of people. JIT is an innovative approach and flexibility caters for its need. Flexibility allows operations to maintain and improve performance in spite of variety, uncertainty and ignorance (Slack, 1991). Hayes and Wheelwright (1984) were among the first to advocate flexibility as one of the primary dimensions of a competitive strategy for a manufacturing business, along with cost, quality and dependability. Shewchuk and Moodie (2000) considered flexibility as a principle mechanism for surviving in the new manufacturing environment. Hayes and Pisano (1994) stressed upon the competitive and strategic importance of flexibility. Flexibility is required at various levels such as flexible people, flexible work, flexible thinking, flexible management, flexible organization, flexible technology, and flexible manufacturing. All these
components can be broadly classified under organizational and manufacturing flexibilities. Many researchers (Browne et al., 1984; Garwin, 1987; Gupta and Goyal, 1989; Sethi and Sethi, 1990; Gupta and Goyal, 1992) have reported on different types of system-level flexibility. Nilsson and Nordahl (1995a, 1995b) developed a framework for practitioners to follow to enhanced flexibility for competitive advantage. His approach is pragmatic and therefore useful as it focuses on a process for analyzing and developing flexibility instead of defining a general classification of different types of flexibility.

Upton (1995a) found that the flexibility of the plants depended more on people than on technical factors. A number of empirical studies exist, where researchers have attempted to correlate flexibilities attributes with organizational performance (Upton, 1995a; Upton, 1995b; Upton, 1997; Lau, 1999; Zhang et al., 2003; Salvador et al., 2007). Garwin (1993) while emphasizing the contribution of flexibility for improving competitiveness found that the organizational performance depends upon the organization’s ability to match the appropriate type of flexibility coming in its way with the corresponding type of environmental uncertainty confronting the organization. Hence it is more important to determine which dimension of flexibility should be increased to improve the business performance. Schmenner and Tatikonda (2005) validated Garwin’s model of manufacturing, and found that flexibility related operational capabilities are explicit resources and competencies of the firm and that companies should consider these operational capabilities in their strategic process. The organizational flexibility offers many benefits such as delegation, job enrichment, relationship development, inspiring teaming and group participation, cultural change, and provides facilities and amenities to create employee delight to take initiative, and so on.

Manufacturing flexibility, on the other hand, provides an organization the ability to almost instantly change what it can offer to its customers. Flexibility in manufacturing system ensures improved product quality and mass customization. Increased global competition, demand for an increased variety of products, reduced
product life-cycles, and an early entry to the market are forcing the organization to adopt new strategy. The mass production is being replaced by mass customization of goods and services (Pine, 1993). Meeting the precise requirements of customers is the ultimate goal of JIT, as they are the end users. Singh (2008) has discussed the role of manufacturing flexibility in JIT implementation. Lau (1999) identified five elements to produce manufacturing flexibility such as workforce anatomy, communication, interdepartmental relationships, supplier flexibility, and technology. The reduction of setup time is crucial for reaching high levels of product flexibility (Garwin, 1982; Browne et al., 1984). Reduction in setup times allows increased frequency of set up as well as reducing internal lead times, thereby increasing capacity utilization and reducing inventory level.

The recent trend towards JIT management system and the ever increasing pressure to reduce in-process inventories while simultaneously increasing quality has forced companies to install flexible manufacturing system (FMS). FMS is a computer-controlled configuration of semi-dependent workstations and material-handling systems designed to efficiently manufacture low-to-medium volumes of various job types (Gamila and Motavalli, 2003). It is an innovative approach to ensure variety in a production system resulting in product flexibility with additional benefits of reduced material handling, reduced in-process inventory, reduced setup time and manufacturing lead time, and simplified planning, routing and scheduling activities (Black, 1983, Akturk and Turkcan, 2000). Many manufacturing businesses are investing heavily in FMS to compete in markets characterized by mass customization, shortened product life cycles, stringent product specifications, and global supply and distribution (Wang et al., 2009). The emergence of FMS has brought innovative changes in the manufacturing system. The move towards flexible manufacturing was one of the major competitive advantages of Japanese car manufacturing that latter appeared in Western manufacturing. But in order to realize the full potentials and benefits of FMS, it is necessary to use the cutting tools judiciously and rightly to make it truly flexible. Crama and Kluvert (1999) have given an overview of tool management approaches.
Manufacturing as well as organizational flexibilities both accelerate JIT implementation equally, and no one can be considered less important. The former provides improved manufacturing environment and work methods, whereas the latter provides atmosphere conducive to work freely and enthusiastically.

Managing within a just-in-time (JIT) environment is challenging for any organization as JIT requires many changes at the organizational levels which are not easy to incorporate as it demands a heavy commitment of time and imposes a rigorous discipline upon the organization. This is especially likely to be the case in situations where this type of change involves people and in which personal relationships and emotional responses are predominant (McCalman and Paton, 1992). Further, for managers to change their subordinates, they must often change themselves first. The organization’s structures, processes and culture are key leverage points for determining how well or how poorly a manufacturing system functions. Different organizational structures and cultures cause employees to behave in different ways. A right organizational set-up and innovative culture will facilitate JIT implementation by providing right kind of work atmosphere, whereas a wrong set-up will hinder JIT implementation. Shingo (1981) stated that it took 20 years for the Toyota Motor Company to implement the JIT system.

Changing technologies and competitive environments are forcing a change in the way organizations are perceived (Lawler, 1994). In the traditional hierarchical structure of the organization, command pass down the chain from superior to subordinate while information on task progress flows upwards. Top-down change in organization is driven by the organization’s senior management, and this approach is needed to bring about radical changes in the organization. It gives a clear, sustained direction that is well resourced and coordinated (Mabey and Salaman, 1995; Wendell, 1998). However, this approach is associated with transformational approach to change, and is likely to affect many aspects of an organization and levels within it. It will require the creation of new mission and future direction, alterations to the dominant values, beliefs and perceptions in the organization with the
fundamental implications for the organizational paradigm and distribution of power, new structures and methods of working. Beer et al. (1984) are critical about this approach and have raised serious doubts about its effectiveness. They do not believe that intended change will be generated simply by changing organizational structures and imposing new systems. But the authoritarian management and inflexible bureaucracy of the organization are serious impediments in bringing quick changes that are required to overcome problems. Large scale changes in the organizational systems can only be achieved by doing away with the hierarchy and formal management systems. Organizations are dynamic feedback systems that need to be creative if they are to survive (Stacey, 1993). In the changing environment, hierarchies are disappearing, horizontal communication is replacing the traditional flow of information and command up and down the organization, alliances are being formed with other companies and with suppliers and customers, and they frequently operate as part of the formal organization (Gross et al., 1993; Gretton, 1993). Formal control mechanisms between managers and subordinates are rapidly disappearing (Simons, 1995). More transparency and a greater sense of participative decision making at different levels of management are vital. An organization must aspire to move along a path from closed system to open system. While secrecy breeds gossip, mistrust, feelings of being alienated and devalued, organizational transparency ensures the trust and support of all concerned. The reliance of JIT on a participative management style implies a higher level of employee involvement and empowerment than would have been seen in traditional organization (Lau, 2000). Koufteros et al. (1998) have found that employee involvement is an essential element for pull production system, which is a major characteristic of a JIT system.

People inputs are vital for both initial ideas and the extent to which implementation and management of process and product technologies will be successful (Wheelwright and Clark, 1992). Delegating as much responsibility to the workers as possible, allowing wide participation in important decisions affecting the works and the workforce, welcoming better information and decisions from involved, committed workers and managers are useful in making an effective
management teams. Properly functioning self-directed teams are usually 30 to 50 percent more productive than conventionally organized work groups (Wheelen and Hunger, 2002). Productivity gains of this magnitude would give the company a competitive advantage over its rivals. The concept of ‘quality circles’ introduced by Ishikawa (1972) is the best examples of self-directed teams. Toyota Motor Company used quality circles as employee participation programmes to identify the variations in quality, and as manufacturing programmes to eliminate sources of these variations. People, suppliers, workers, managers and customers must all be motivated and committed to teamwork for JIT manufacturing to be effective. Self-management, often in teams, makes the practice of supervision by managers a redundant requirement (Brown, 1996). Establishing and sustaining employee motivation is important for JIT to implement it successfully, because of the clear advantages a motivated workforce yields like increased productivity, less supervision, lower levels of absenteeism and so on. Part of the reason behind the Japanese plants’ accumulation of skills is due to the ongoing investment in training and the other factor is learning gained within teamwork approaches (Gowen and Pecenka, 1992).

Organizational culture is the shared values, principles, traditions and ways of doing things that influence the way organizational members interact with each other and with suppliers, customers and other people outside the organization. In most organizations, these important shared values and practices have evolved over time and determine, in large degree, what employees perceive about their organizational experiences and how they behave in the organization (Smircich, 1983; Hatch, 1993; Shadur and Kienzle, 1999). An organization’s culture can affect people’s desire to be innovative. A culture that is based on entrepreneurial norms and values is more likely to encourage innovation than a culture that is conservative and bureaucratic, because entrepreneurial values encourage people to learn how to respond and adapt to a changing situation (Wheelen and Hunger, 2002). The ability of companies to compete successfully in today’s competitive environment is increasingly a function of how well they innovate and how quickly they can
introduce new products and processes (Trott, 2000; Jones, 2000). Major innovating firms have cultures that encourage ideas for innovation. Different organizational structures and cultures cause employees to behave in different ways. For successful implementation of JIT, a change in corporate culture has been regarded as one of the major common infrastructural supports (Bright and Cooper, 1993; Glover, 1993; Morris, 1994; Emery et al., 1996). Harber et al. (1989) have stressed on the need for open management and an ability to accept comments and criticisms from employees, as well as, a need to move away from adversarial roles to a sharing of information and goals for successful implementation of JIT. Decision made with an open mind (without any presumptions or constraints) eliminates many problems of the organization. One of the important factors which Monden (1983) considered essential for effective implementation of JIT included respect for humanity that emphasizes employee involvement, cross training, job design, empowerment and communication. Shingo (1981) sought balanced JIT techniques with equal emphasis on respect for humanity to generate sense of ownership and pride of work.

Many researchers have emphasized on the critical role of Japanese culture in the successful implementation of JIT (Mussel White, 1987; Gettel-Riehl and Kleiner, 1987; Manoochehri, 1988). William Ouchi (1981) has listed the distinguishing features of Japanese organizations such as lifetime employment, collective decision making, collective responsibility and holistic concern for employees. Adam and Ebert (2003) state that Japan’s manufacturing success is due to culture, environment, management skills and beliefs about people. Japanese culture inspires and encourages the individual to achieve a goal which is within reach. Sakurai and Huang (1984) have reported about some of the US companies which adopted the Japanese culture approach to implement JIT and reported success. More and more companies are changing their work atmosphere and getting inspired by the Japanese culture.
Hence, an open organizational structure that results in participative management, teamwork, empowerment of workers, and trusting culture make the organization to work in the unified direction to achieve the goals of JIT manufacturing.

Manufacturing organizations do not just offer products, and service organizations do not just offer services. Both types of organizations normally provide a package of good and services. Manufacturing deals with tangible goods, whereas services cover intangible products in the form of ideas, skill, knowledge and information. JIT manufacturing is largely confined to inventory management. Any chaos, disorder, stoppage in the production line will adversely affect production schedule, resulting in inventory pile-up, thus reducing the pace of JIT manufacturing (Meredith and Shafer, 2015). But for JIT service, inventory management is less meaningful as it deals with little inventory. However, factors such as response time, customization, customer contact and proximity to customer are more dominant for services than manufacturing. Also, the demand pattern and work scheduling for services are not stable and predictable. Scheduling service operations poses a challenge because many of these operations serve customers six or seven days a week (Narasimhan et al., 2003). Quality of a product is easy to measure by its defect-free nature. On the other hand, service quality is of highly customized nature, as it may vary from customer to customer (Krajewski and Ritzman, 2000), and hence is difficult to measure. Techniques such as mistake-proofing, housekeeping rules, standard work methods, and flexible workers are helpful in achieving the objectives of JIT service. By understanding them, organizations can better select the appropriate mix of goods and services to meet customer needs and create the most effective operating systems to produce and deliver those goods and services.

Organizational environment and organizational implementation issues related to supply chain and JIT manufacturing have put a lot of challenges before Indian industries. Hence, a thorough understanding of the industrial environment is required.
In the light of above discussion and keeping in mind the importance of JIT in inventory management and its various implementation issues such as supply chain management, the effects of tools of information technology in supply chain management and the supplier-manufacturer relationships in the supply chain, the role of organizational and manufacturing flexibilities, the contribution of organizational factors, etc., an empirical study of the manufacturing environment prevailing in Indian industries and the scope of JIT implementation in these industries is conducted and examined thoroughly on the basis of analysis of the data collected through a well-designed questionnaire that consisted of questions on various aspects of JIT and the important factors that tend to affect it during its implementation, and the direct interview with the representatives of the industries.

The results of the findings and the analytical discussions of the present study are expected to help in improving the manufacturing environments of Indian industries. Industries would be encouraged to make JIT an important tool to manage their inventories in a manner that will result in reducing the costs of production, and help them to achieve the goals of world-class manufacturing.