IMPACT OF LEAN IN I.T. INDUSTRY

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Abstract
In this paper, the implication of lean manufacturing used in information technology explored. Does the information tech. facilitate the implementation of just in time (Jit) production systems or can it serve as a substitute for JIT? The effect on supply chains, production planning, prods. Scheduling, inventory control, procurement, quality improvement and the labour force are some of the issues addressed. Some examples of use of the information technology for these purposes are presented. Various points on the use of web to foster towards lean are discussed and proposed for integrating the information technology into production systems.

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Introduction:

Lean is concerned with delivering more value for the business and its customers by increasing the velocity of throughput and minimizing wasteful practices by balancing process flow.

Lean is not merely a business improvement tool. It is a philosophy which needs to be driven from the top team down if it is to generate required levels of understanding and belief. Securing such widespread commitment is difficult, takes valuable time and as a result many organizations end up launching their lean program without due diligence as ‘just another quick fix initiative’ to address the same fundamental business performance problems they rarely succeed. [3]

In 1990 many manufacturing firms around the world adopted lean production as a strategy to increase their global competitiveness. Some firms have made much progress in implementing lean production in their factories while others have found it to be very difficult and are still struggling with implementation or in some cases given up attempt. The business culture must back up statements of commitment lean with the right day-to-day behaviors and decisions or improvements are unlikely to be sustained. Lean must align seamlessly with organizational structures, culture and management performance reporting systems for it to deliver long term results. [15] Lean is focused on value, more than on cost, and seeks to remove all non-value adding components and (especially) processes whilst improving those that add value. It aims to define value in customer terms, identifying key points in the development and production process where that value can be added or enhanced. The goal is a seamless integrated process (value stream) wherein products ‘flow’ from one value adding step to another, all driven by the ‘pull’ of the customer. [6]

Since, the advent of the concept of lean production. Which itself is derived from JIT system developed by Toyota beginning back in 1960s. It is argued that lean prod. Emphasized reducing varieties and flexibility to achieve greater efficiency where as one of the benefit of i.t. is its ability to provide more flexibility and product variety. Also...
many admirer of lean production believe simple visual system (KANBAN) are sufficient to control a pull system and that computer system tends to shift production control from a line to a shift function that is undesirable in lean thinking. To begin it is useful to outline the characteristics of a lean production system; there is a strong emphasis on reducing the use of all resources in a firm, Labour, Capital, Material, Space, and Time. Lean enterprise always looking for ways to cut the use of any of these resources anywhere in the firms. JIT method is at the heart of these efforts and includes,

1: pull approach and kanban production system

2: inventory reduction

3: quality at the source

4: quick setup and orders.

Literature survey

[Womack et al., 1990] have carried out the study and suggested, the Lean production is lean because it uses less of everything compared to mass production – Half the human effort in the factory, half the manufacturing space, half the inventory in tools required, Half the Engg. Hours required developing a new product in half the time, also it requires keeping for less than half the inventory needed at site result in many fewer defects, and produces a greater and ever growing variety of products. Farzad Behrauzi and Kuan Yew Wong et al.,(2010) have studied the concept of lean and Lean Manufacturing which is originated from Toyota Japanese automaker that has been thriving in the global competition for decades. In 1988 Ohno Introduce the Toyota Production system (TPS) which was developed in this company to overcome difficult times since World War II. In view of though financial crisis. TPS was developed to survive with the minimum amount of resources. TPS was forced to choose the waste reduction policy as a strategic goal to achieve. The study on lean quantitative model to measure the lean performance. It is finally calculated to give managers and decision makers a real insight in to the lean performance level and to further improve it by taking appropriate action. M. Eswaramoorthi et al., (2011) have been pronounced the core motivation
of lean manufacturing is that the practices which we use can work synergistically to produce finished product at the pace of customer demand with little or no waste. Jayanth Srinivasaraghavan and Venkat Allada et al.,(2006) have studied and propose a complementary methodology to assist contemporary lean assessment tools that will provide a quantitative measure of leaness by benchmarking over exemplar lean industries along with specific pointers for improvements based on cost considerations. Xiaofeng Wang et al.,(2012) have carried out the study since the Agile Manifesto emerged in early 2001 as a response to the inefficiency of existing software development methods in rapidly changing environment. In recent years however the agile community has started to look towards lean software development approaches. Emerging lean conferences show that lean adoption is spreading. Lean approaches are claimed to be “the next wave of software process”.

Design development

The information Technology is a facilitator to the implementation of lean production and lean organization and in fact, a synergy exists between the two. In other words, if appropriately applied, the internet can help to make business leaner, and even more significantly, make the entire supply chain leaner. In Section 1. The principles of lean production will be the implementation of these principles. In Section 2. effectiveness is discussed. Section 3. examines some of the barriers to integration of the Internet into lean, core-lean as it has been called. (Piszczalski, 2000).

1. How lean production systems use the Information Technology

To identify ways in which the Internet might be useful to firms using lean production approaches, it is helpful to first define what a lean production system is and its key
characteristics. The term lean production was used by the authors of the International Motor Vehicle Project carried out by MIT in the 1980s to describe the approach originally developed in the Japanese auto manufacturing industry which is contrasted with the mass production approach common in the United States and Europe at the time. This approach is often called JIT but the authors (Womack, Jones, and Roos) of The Machine That Changed the World, which popularized the term lean production, believe that leanness goes beyond JIT and more accurately describes the production system used in the Japanese auto industry at the time (and now in much of the world). Their definition: “Lean production is ‘lean’ because it uses less of everything compared to mass production—half the human effort in the factory, half the manufacturing space, half the investment in tools, half the engineering hours to develop a new product in half the time. Also, it requires keeping far less than half the needed inventory on site, results in many fewer defects, and produces a greater and ever growing variety of products” (Womack et al., 1990). In examining this definition, one can see that there is a strong emphasis on reducing the use of all resources, not only in the factory but also in activities extending beyond the shop floor such as product development and supplier relations. They subsequently expanded the concept of lean production to consider the lean enterprise and efforts to apply lean thinking throughout all enterprise activities (Womack and Jones, 1996). Although many use the terms JIT and lean production interchangeably, Womack, Jones, and Roos clearly believed that leanness is more descriptive of how pervasive the organizational change must be to fully benefit from a JIT approach. The key parameters are the same in the two concepts but lean systems apply them more comprehensively throughout the firm to activities beyond the factory floor (some have called lean production big JIT) and in relationships with suppliers, customers and other important partners. While e-business, understood as trade over the Internet, is growing at an impressive overall rate, there now appears to be a slowing in the Business-to-Consumer (B2C) growth rate.
and acceleration the Business-to-Business (B2B) area (Amit and Zott, 2001). Furthermore, B2B e-business is predicted to reach $2.7 trillion in 2004 representing more than 17% of the total Web trade, while online retail is expected to represent less than 7% of total trade at that time. In fact, the greatest potential for the Internet to lean enterprises is that it will allow leanness to be applied throughout the supply chain in a way that could not have been conceived of 10 years ago. In this section we will examine that potential.

To begin, it is useful to outline the characteristics of a lean production system. As the definition presented above indicates, there is a strong emphasis on reducing the use of all resources in a firm—labor, capital, materials, space, and time. Lean enterprises are always looking for ways to cut the use of any of these resources anywhere in the firm. JIT methods are at the heart of these efforts which includes, pull approach and kanban inventory reduction quick setups and orders quality at the source suppliers network teamwork and participation continuous improvement the Internet will allow firms to achieve greater coordination and collaboration in their supply chain resulting in substantial inventory reduction. Another benefit is that mass customization will become feasible for some products and services as the supply chain becomes shorter and faster. Dell Computer Corp. is a good example of a firm that makes most of its products to customer specification resulting in little or no finished goods inventories. To be able to deliver mass customization of a service or product, the supply chain must be very fast and responsive. This requires quick setups for production and rapid turnaround on orders to suppliers. The Internet will facilitate this aspect of JIT as well. As lot and order sizes come down due to the closer coordination of production schedules, firms will be forced to develop faster and more efficient ways of setting up runs of products and order delivery to customers. The Internet, by allowing closer coordination of production schedules and faster adjustment to changes in demand, will facilitate information transmittal internally within the firm, and externally throughout the supply chain. The ongoing trend towards outsourcing of manufacture and service
activities that are not considered core competencies also is facilitated by the Internet. Outsourcing requires close cooperation and intensive information sharing among supply chain participants, and this aspect the Internet can facilitate. In a few cases, supply chains are moving towards becoming a virtual corporation where all the participants are so closely linked that they, in effect, operate as one entity. Cisco Systems is an example of a firm that is moving strongly in that direction. Cisco receives 80% of its orders from customers over the Internet and contracts out most of their manufacturing activities to Celestica, Sol ectron, and other ESM (Electronic Service Manufacturers). In many cases from order to delivery, Cisco employees never physically touch the product. There are many benefits to virtual manufacturing, but it would not be practical without the Internet to link the supply chain together. Another key JIT principle is judoka, or quality at the source. The Internet can aid in the implementation of quality improvement in a lean enterprise in several ways. First, internally, it can allow rapid transmittal of quality problems throughout the firm, such as when line or machine stoppages occur. A feature of judoka that makes it effective is the highlighting of quality deficiencies so that everyone is aware of them and deals with them. Only a few firms have fully realized the potential to become e-lean and even fewer have begun implementing it, but there are a few examples of firms moving in that direction. In the next section, we will discuss in depth, three of these companies: Dell Computer Corporation, Cisco Systems Corporation and par filters pvt. Ltd. In India, also briefly describe the efforts of several other firms using the Internet to become e-lean.

2. How firms are using the Information technology to become Leaner

Not many firms have yet learned how to use the Internet in implementing lean production principles, but a few examples will be discussed to illustrate successful applications. Three such examples are Dell Computer Corporation, Cisco Systems, and par filters pvt. Ltd in India, which have widely deployed the Internet in managing their supply chains. We will also cite several
more specialized applications by other firms.

a) Dell Computer Corporation is the largest direct seller of PCs in the world. Dell’s sales, profits, and share prices have all increased at astounding rates in the last few years, and much of the firm’s success can be explained by its effective use of the Internet to manage its supply chain. Dell has a short supply chain comprised of only three levels: consumers, Dell itself and suppliers. Even though short, it is a complex network involving millions of individual consumers and companies buying its products around the world, five manufacturing facilities in Texas, Brazil, China, Ireland and Malaysia, and hundreds of supplier companies Dell is much closer to its customers than other PC makers and can quickly identify, adjust to, changing customer demand. It is better able to forecast future demand and plan production schedules accordingly. Dell ships its computers directly to its customers by small package delivery companies such as UPS and FedEx assuring prompt delivery and eliminating the inventory at the wholesale and retail levels. For some monitors from Sony, Dell carries no inventory at all notifying Sony’s plant in Mexico when an order is received, and Sony ships directly, also via FedEx or UPS, coordinating delivery to the customer. Linking Sony’s logistics system into Dell’s over the Internet makes this possible.

b) Cisco Systems, the leading manufacturer of network routers, is probably the best example available of a virtual manufacturer. More than half of its production is carried out by Celestica, Solectron, Jabil, Flextronics and other ESMs. More than 80% of Cisco orders come via the Internet. This results in fast response to orders. The Internet linkages allow Cisco to coordinate its global supply chain and to rapidly adjust to demand changes. The virtual manufacturing model allows Cisco to benefit from the process expertise of the ESMs whose core competency is flexible, efficient, and high-quality manufacture. It perhaps is not too surprising that Cisco Systems is an innovator in the use of the Internet to coordinate their supply chain since they are a major provider of hardware and software to make such linkages possible. Cisco has achieved many tangible benefits in terms of reduced capital costs, improved financial
performance, and high levels of customer satisfaction. Ansley (2000),

c) Par filters pvt. ltd (India)

The basis of their business is filter manufacturing, for account only 25% of the value added in filter production, it is mainly used in chemical industry. Until 2006, a manual system for all 50 sales clerks would take calls from workshops, which wanted to place orders for parts or to ask for information or advice on a specific job. Each sales clerk would use a collection of catalogues (occupying about three meters of shelf space) to answer queries—a very time consuming process. The catalogues were supplier-specific. This meant that to fill a single order, sales clerks would typically have to use several catalogues, and in addition, the process resulted in problems making activity. Each sales clerk had up-to-date catalogues and access to information about parts on stock, etc. Finally, the process provided no assistance for warehouse management, control of delivery time, etc. Since 2007, an electronic catalogue management system has been developed in industry resulting in a much higher growth rate of sales. The system includes all product data in one catalogue and better integration of order fulfillment and management of warehouses. A major advantage is the improved product selection process, As a result the sales staff was cut by 50% and people were reallocated and trained in new areas, e.g. as consultants.

d) Other firms

A few other firms that are using the Internet to make their operations leaner can be cited to illustrate the potential applications. Much of the publicity about B2B Internet applications has been in the procurement area, particularly online auctions. But this is only one of the many applications that are possible. Below we will discuss applications in project collaboration by General Electric, logistics in the food industry, production scheduling and inventory management in the clothing industry, performance data sharing by Chrysler, Stelton’s new product development and prototyping process, and supply chain management.
by Harley-Davidson. General Electric Co.’s Power Systems division manufactures electric turbines used in power generation facilities around the globe. To improve effectiveness of their logistics systems, several large food manufacturers and distributors have banded together to coordinate over the Internet procurement and shipping information. Called UCCnet it is designed to be open to all supply chain participants allowing them to link to their internal Enterprise Resource Planning (ERP) and EDI systems. Among the companies involved are Proctor & Gamble, Supervalu, RalstonPurina, and PepsiCo. (Messmer, 2000). Virtual private integrated supply chain called The Thread has been developed. Participating firms, who pay a fee to use The Thread, can query their supply chain partners over the Internet about design changes and availability of fabrics, dyes and other materials. The virtual system links to the partners internal production planning and inventory systems. Companies expect to reduce cycle times significantly and simplify and expedite communication with their global suppliers by replacing the current FAX and phone linkages (King, 2000). Stelton, a Danish company specializing in high quality design product in stainless steel New product development capabilities are key and take place in close cooperation with industrial designers. As a special feature, the process of prototyping has increased performance considerably by means of the Internet; e.g. specifications are laid down in a CAD system and directly transmitted via the Internet to a company in Germany, and the physical item is delivered the next day (Bruun and Christiansen, 2001).

e) Problems and hurdles to e-leanness

The above are the firms using the Internet to become leaner are illustrative of the possibilities of the Web. However, there remain many potential obstacles and constraints to achieving e-leanness. One common problem in linking to supply chain partners is the incompatibility of internal computer systems with other firms’ systems and the Internet. Many companies in recent years have implemented ERP
systems to coordinate internal financial, marketing, and human resource data. However, most ERP systems are not linked to shop floor production scheduling inventory, and quality control data (Vijayan, 2000).

Until supply chain software is compatible with XML, the efficient processing of the huge amounts of order, schedule, inventory, and related supply chain data necessary to fully utilize the Internet in supply chains will be constrained. Other problems include finding personnel such as Web site developers and training of the employees involved in implementing and operating the Internet systems. However, as the potential of the Internet to increase the efficiency and efficacy of the supply chain and allow more make-to-order processing, firms will likely find the resources and the willingness to overcome these constraints and obstacles.

f) A model for lean integration

The aims of the lean principles are “to get more out of less.” The contributions of the Internet to lean manufacturing principles as seen from the cases may be summarized as seen in Table 1. Internet to support the overall picture shows that the Internet in the three cases supports the lean manufacturing principles. But in addition to this we see that the use of the Internet in supporting the lean principles results in a self-reinforcing development of broader business processes like procurement, after-sale service, invoicing and payments, and even the adoption of virtual enterprises. Michael Hammer has written that now that companies have cut waste in their internal operations they need to look beyond the walls of the organization to streamline the processes shared with other firms (Hammer, 2001). Therefore, can we model the situation and add to the theoretical development of the lean supply chain? The inherent strength of the Internet for supply chain integration is the external communication it facilitates. In our case studies, we found that the Internet contributes to the overall business processes becoming leaner. Therefore, elements like New Product Development, Order fulfillment, Logistics, Customization, etc. have been included in the model. This level will represent the lean
Enterprise. The outer level of table 1 represents external

Conclusions:

As per the discussion, there are many reasons why the Internet can facilitate the movement to lean production systems, and a few firms have made tentative efforts in that direction. Lean thinking has slowly spread from the factory floor (lean production) to activities such as order processing, billing, and product development (the lean enterprise). Now some firms are thinking of the virtual corporation where many of their processes are linked to their customers and suppliers. Once they begin thinking in this way, they soon understand that to fully realize leanness they will need to apply the concept of pull production to their customers and suppliers in one virtual supply chain (lean supply chain). The Internet is a perfect tool for accomplishing the lean supply chain with its open, easy, and cheap access. Although nothing can substitute for face-to-face contact for many types of business dealings, the Internet can supplement direct with virtual contacts allowing much more information transmittal globally, in real time. Another force that will drive the movement to an Internet-linked supply chain is the increasing globalization of business. There is huge potential to benefit from being e-lean in global supply chains.

References


