

Lean Production: Re-Engineering Business, New business opportunities, Implications & Managerial Challenges

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Abstract: The essence of lean production revolves around creating new business opportunities for manufacturing and service firms by total elimination of waste and non-value adding activities. This research paper investigates the opportunities, implications and managerial challenges of implementing lean in manufacturing, service, and office environment. The results show that management behavior towards changes is a key factor in the success or failure of lean experience.

Key-Words: Lean production, Mass Production, waste, logistics, service.

1 Introduction

Lean Production (LP) is an integrated management system that focuses on the continuous elimination of waste and non-value adding activities. Waste means anything other than minimal resources, and working time that are crucial for production. Waste can be grouped into eight categories; over-production, waiting time, inventory, transportation, extra processing, motion, product defects, and under-utilized people. According to [1] most companies waste 70-90 percent of their resources and even lean manufacturers waste 30 percent.

According to [2] and [3] the idea of LP was born in the 1950s in Japanese manufacturing shop floor and was supported by the success of the Toyota Motor Corporation; therefore sometimes LP is called Toyota Production System, and was introduced to countries outside Japan by the 1990, the goal of LP is to get the right things to the right place at the right time, from the first time, while minimizing waste and being open to change, which provided an alternative to the traditional Mass Production systems (MP). [4] and [5] discussed the five principles of LP which are: First, **Value:** Specify precise values for products from the customer's point of view. Second, **Value Stream:** Identify the value-adding activities in the supply chain of the product and remove all the waste and non-value activities. Third, **Flow:** Move products along value stream without interruptions to achieve short lead time and low cost. Fourth, **Pull:** Produce goods and services only when customers pull and ask for them. and finally, **Perfection:** Aim for perfect products not only being better

than the competitors through the continuous improvement.

2 Lean vs. Mass Production

The globalization of markets and the increase of customer's expectations created a changing environment that forced organisations to re-think about its traditional processes and business strategies and introduced a new era of change in which LP operates against the traditional MP.

According to [6] and [7] MP is a management approach which was developed in the nineteenth century as a result of the Industrial Revolution (1770-1800), this approach is concerned about providing low cost and high volume of products to achieve economies of scale by searching for trade-offs between functional departments. The following points compare the main differences between LP and MP:

- **Business Strategy:** LP is customer focused system that strives for customer satisfaction through producing quality goods with minimum defects, while MP is product focused system that produces high volume goods at a certain level of quality.
- **Organization:** LP has a flat structure that encourages innovations and new ideas derived from organization's vision, while MP has a hierarchical structure that encourages following orders and directed supervisions.
- **Production:** LP produce certain amount of goods based on customer orders with minimum inventories and zero if possible, while MP produce massive

amount of goods which results in massive inventories.

- **External Relations:** LP develops long-term relations with its suppliers while MP uses price as the base of its relations with suppliers.

[8], [9] and [10] explained the main benefits of LP against MP, which are; production with less materials and fewer inputs, minimum defects, minimum inventories, reduced set-up times, greater schedule stability, increase workers and teams empowerment, and greater customer involvement in the product development and delivery process, which lead to better customer satisfaction and better market share. Recently, it appeared that there are some limitations and drawbacks for LP; because social and environmental conditions might not be fully taken into consideration when applying lean principles in organizations, and the greater need for better identification and understanding of customers.

[11] discussed the main drawbacks of LP regarding the external environment; the increase in traffic caused by the smaller and more frequent deliveries of materials to factories which increased the level of pollution and resulted in longer queues of vehicles on the main highways, another drawback is the public reaction towards the new products and variants in which customers become less attracted and more confused about the choices that are offered, and regarding the internal environment; there is a great concern about the employee's resistance to change about using LP tools because they might face difficulties in thinking in new ways about value-adding and waste, another drawback is the ageing population in lean organizations in which fewer young worker are employed and the exhausting and long working hours.

3 Implications & Managerial Challenges of implementing Lean in Logistics Environment

Recently, LP stepped into various industries such as automobiles, electronics and machinery which resulted in massive changes in the traditional logistics environment in these industries, [12] indicated that LP can reduce 50 percent of human effort, manufacturing space and product development time and can improve quality by 200-500 percent.

[12] defined logistics as a comprehensive process that include the management of the flow of materials and products from the origin point to the end consumers, and mentioned the implications of implementing lean in the logistics environment which can be categorized in the following areas:

1. **Production Systems:** unlike traditional systems LP focuses on small-lot production and just-in-time delivery with minimum inventories, reduced production cycle time and minimum defects.
2. **Distribution Systems:** LP effectively reduces storage area and eliminates the need for outside warehousing, which cuts down the cost of purchasing or renting warehouses, and results for a greater need for more frequent and rapid flow of information and products over the supply chain.
3. **Transportation Systems:** LP requires many small deliveries a day, this affect the decision about the suppliers, therefore suppliers with the nearest geographic location have advantage over distant suppliers.
4. **Customer-Supplier Relationships:** LP develop close coordination with suppliers and customers to achieve the best level of quality, and build partnership with suppliers in which they become more responsible for design, assembly and delivery.

Despite the fact that LP has positive impacts on organizations, managers might face different managerial challenges when implementing LP into the logistics environment; these challenges are summarized in the following points:

- **Employee Training:** The success of the implementation of LP relies on the high-skilled and well-trained employees, workers need to be trained on the skills of problem solving and critical thinking in order to rethink about the business from the basis of value and waste; therefore managers must focus on training to develop a multi-skilled workforce who are capable of adapting in a changing environment and handling the increased responsibilities [13].
- **Communication:** Is one of the major managerial challenges and it is a crucial factor in the success of any organization, specifically in lean organizations, where there is a need for communication between different departments, multiple shifts and between all value streams, moreover; efficient and wide connections for transmitting responses to problems is required between customers and suppliers [8].
- **Risk Management:** The flow of products, services, finances and information over the logistics activities, and the interaction between the organization, suppliers and customers generates risks which can be classified as; demand and supply risk, process risk, control risk and environmental risk, thus; management behavior towards risk is a critical element in the implementation of LP in which managers

must consider reducing the risks and their effects on the logistics operations [14].

- **Management Support:** Commitment and support from top management combined with the dedication of the executive management team is crucial in the success of implementing LP, since it generates an interest and motivation for employees to participate in LP activities [8].

4 Implications & Managerial Challenges of Implementing Lean in Service Environment

Recently LP was introduced into service industry after years of its successful use in the manufacturing industry as a result of the competitive global markets which created greater pressure on service organizations to utilize its assets by implementing new techniques and tools such as LP in order to react efficiently to these global changes, many services industry such as health care, insurance, telecommunication, internet service providers, satellite TV providers and education services, can benefit from LP in reducing costs, improving quality and increasing flexibility.

[2] provided an example of the implementation of LP in health care sector in Sweden, and explained that LP can be applicable and successful in health care industry although it might face some problems, [4] discussed the implementation of LP in telecommunication industry and indicated that there are some differences and problems that service industry might experience other than manufacturing industry.

There are some problems for implementing LP in service industry, which can be summarized in the following main points, [15], [16], [2] and [4]:

1. **Tracking the Flow:** LP requires the identification of a value stream in which products and processes will flow over in order to eliminate waste and non-value adding activities, unlike manufacturing industry where products and parts are easily tracked and defect parts are moved, service industry have a major problem in tracking the flow of processes and identifying the waste since there is no way to know where is a given piece of work at a certain point of time.
2. **Unpredictable Demand:** Some service industries such as health care have unpredictable volume of demand resulting from emergency patients, which creates problems for the implementation of LP to balance capacity with demand, reduce waiting time in order to eliminate waste,

and to deliver services on time as JIT techniques require that the demand should be predicted and planned.

3. **Complexity in Identifying Value:** In LP it is necessary to identify the value from the eyes of the customers to gain better customer satisfaction, customers of service industry such as; telecommunication and internet service providers are usually remote and not connected with the main organization to transfer their needs and responses, another example is the different groups of customers for health care services starting from the patient himself to his family which makes identifying the value from these different point of view more complicated.
4. **Nature of the Service:** It affects some principles of the LP such as reducing inventory and removing waste, for example communication services is distributed over massive geographic areas, which increase the complexity of applying the principles of continuous flow over the value stream without interruptions.
5. **Social Effects:** People consider some services as a basic need or necessity such as health care and education, which makes it complex to transfer these services from public- sector to market-oriented industry.

5 Implications & Managerial Challenges of Implementing Lean in Office Environment:

LP stepped into office environment as well as into logistics environment as a technique for improvement, [17] defined the main areas of waste in office that need to be improved such as:

- **Overproduction:** Printing paperwork before it is needed.
- **Inventory:** Boxes of papers and office supplies.
- **Waiting:** System downtime and multiple approvals from employees.
- **Extra Processing:** Re-entering data, extra copies and excessive reports.
- **Transportation:** Excessive email attachments and multiple approvals.
- **Underutilized People:** Limited employee authority for basic tasks.

However the implementation of LP in office environment has the following implications:

1. Increased overall productivity of the office relating to the LP principle of employee's empowerment and involvement in all activities of the organization.
2. The achievement of better customer satisfaction because the processes in the office will be defined and evaluated from the customer's point of view because LP improve the communication lines between the organization and customers.
3. The removal of redundant work processes and information inconsistency because LP requires the elimination of waste and non-value added processes.
4. Better integration between departments through the value stream as a result of better information sharing and retrieving.

Managers in office environment experience some of the traditional managerial challenges of implementing LP in logistics environment, which were discussed earlier in this research such as, employee training, communication, management support, moreover there are some additional challenges that occur in office environment such as:

- **Managing People:** [16] explained that managing machines is easier than managing people, where set-up times for machines can be easily specified, while it can be impossible to exactly specify the time that employees in the office should take to finish a certain activity, therefore managers face greater challenges because in office environment it is more likely that work is done by people rather than machines.
- **Political and Legal Issues:** In office environment some of the principles of LP can not be implemented in all aspects as they contradict with some political and legal issues, such as eliminating the waste; for example if the management defined a certain activity as a waste that should be eliminated which requires the removal of the employee who is responsible for this activity, in this situation the organization is acting against some workforce laws, that protect worker's rights to have secure jobs.
- **Managing Work Stress:** According to (Conti et al., 2006) and (Boyer, 1996) LP changes how employees work and sometimes how they think, therefore jobs under LP become more challenging and demanding as more responsibilities are assigned to the employees, and the intensity of jobs is increased due to the strive for production with minimum waste,

hence; workers find their jobs more stressful under LP and become more anxious about making costly mistakes, moreover management decisions relating to the implementation of LP can downsize the effects of work stress by developing an organizational stress coping skills and eliminating the sources of stress.

- **Resistance to Change:** Employees may resist the change to LP activities such as critical thinking and evaluating of value-adding and non-value adding processes and problem solving, especially if the majority of the workforce is old employees who are used to traditional and tedious style of work.

The reasons behind the differences between the managerial challenges that occur in implementing LP in office environment and logistics environment are; the nature of input and output in each environment; in offices basically it is information and reports while in logistics it is products and physical parts, another reason is the nature of workforce; while it is mostly people in office environment, it is machines in logistics environment.

6 Managing Change with Lean Implementation

The implementation of LP results in massive operational and strategic changes in the organization, [18] and [19] addressed these changes such as; The creation of flatter organization structure, The need for innovation in adjusting the processes regarding waste removal, The creation of new cultural changes based on employees involvement and participation in LP activities, The need for better management support and commitment, and reduced inventory levels to the minimum.

[20] and [21] indicated that managing change under LP is a critical factor for the success of the organization, and summarized the best managerial behavior to overcome these changes in the following points:

- Identification of the need for change over the organization's levels and highlighting these changes.
- Full understanding of LP principles combined with understanding of the organization's processes and strategies to develop a change vision.
- Aligning organizational changes and management development together as one activity based on the current and future vision of the company.
- Creating lean culture by empowering and involving all workers in the LP activities and enhancing communication lines in both ways to attain true feedback.

- Communication and periodic meeting between executive managers and workforce teams to manage the risk and reduce the side effects of stress that LP might cause.

According to [22] Continuous Improvement (CI) is a culture of incremental changes aiming for removing wastes from all the processes in the organization to attain competitive advantage, [23] discussed Kaizen as one of CI techniques, which is an old Japanese technique for small and incremental changes that involves the participation of everyone in the organization to achieve better customer satisfaction by changing business methods within realistic constraints, through empowering and motivating employees to turn their ideas into the success of the company, Kaizen can be used as a tool for creating change culture through the organization and help in downsizing the effects of changes on the employees.

7 Conclusion

Through years Lean Production proofed to be a great opportunity of improvement for different manufacturing and service organizations, through the elimination of waste and non-value adding activities, however there are some arguments regarding the implications, managerial challenges, and the management of change, which occur when implementing LP in organizations, and the management behavior towards LP which affect the success or failure of LP in the organization.

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