

THE LEAN PRODUCTION AND AGILE MANUFACTURING CONCEPTS WITHIN SUPPLY CHAINS

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Abstract

Since the last post-war period, some innovative forms of production organization have arisen, most of them from the experience of some successful Japanese industrial firms. After having achieved a certain size, such systems have presented a considerable increasing on complexity to operate properly their manufacturing area under the paradigm of mass production. At the very end, firms generally have been guided by market requirements, and nowadays characteristics of customers certainly need to be viewed as the most important factors to be considered when establishing what kind of operations strategy will be the most effective under certain type of competition. This paper aims to present some tendencies of supply chains with a systematic and cohesive emphasis, considering cause-effects issues presented by lean production and agile manufacturing applications.

Key Word: Lean Production and Agile Manufacturing, Supply Chain, Lean Supply, Productivity.

1. Introduction

Before any type of analysis, is necessary to examine and understand the evolution path of cumulative strategic needs as a result of changes of paradigm along the time Figure 1 shows approximately when the productive and organizational systems become more relevant for the lean production and agile manufacturing.

The picture shows the evolution of competitive forces and the increasing towards a reexamination of the importance of process productivity along with sustained growth more and more focusing on social development. This is the background or scenario behind the apex and adoption of lean production and flexible production concepts by Western firms during the 1980's. During this period, increasing on exchange ratio of the Yen brought a general decrease on the domestic demand level and the consequent lack of interest of young Japanese regarding industrial jobs due the excessive amount of work. As a result, it has forced firms to support a variety of techniques, such as Kaizen teams, aiming to improve their manufacturing performance and productivity, which resulted in a new phase of lean production.

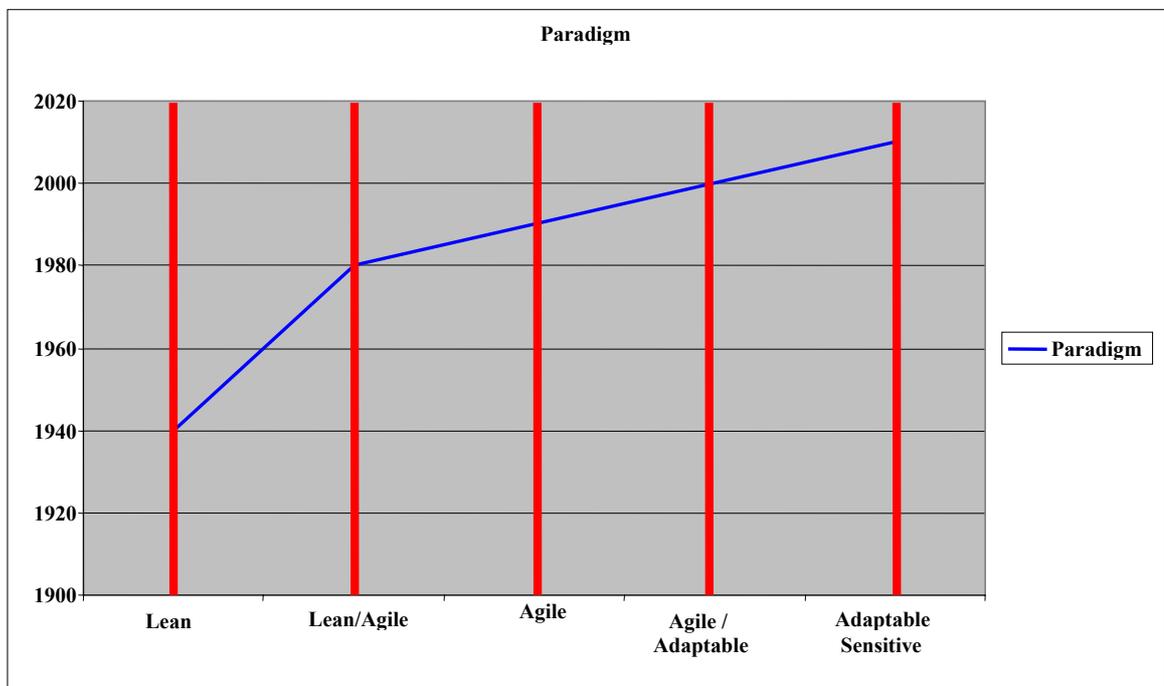


Figure 1. - Evolution of paradigms

Source: BENNET (2002)

2. Backgrounds

2.1. A brief review of literature

Bennett (2002) addressed that “the need to adjust the performance of cost structure as to respond to the demand lead the organizations to search for inherent ability of efficient use of resources”. In the 90’s, the uncertainties because the Asian crises also helped and push firms to operate under a continuous changes of production paradigm. Figure 2 shows that such continuous adjustment needs to be done considering the evolution of demand level and the correspondent cost level. Under the same market requirements and beyond certain point or demand level, it becomes more attractive to operate using more sophisticated systems, in terms of cost-benefits reasons.

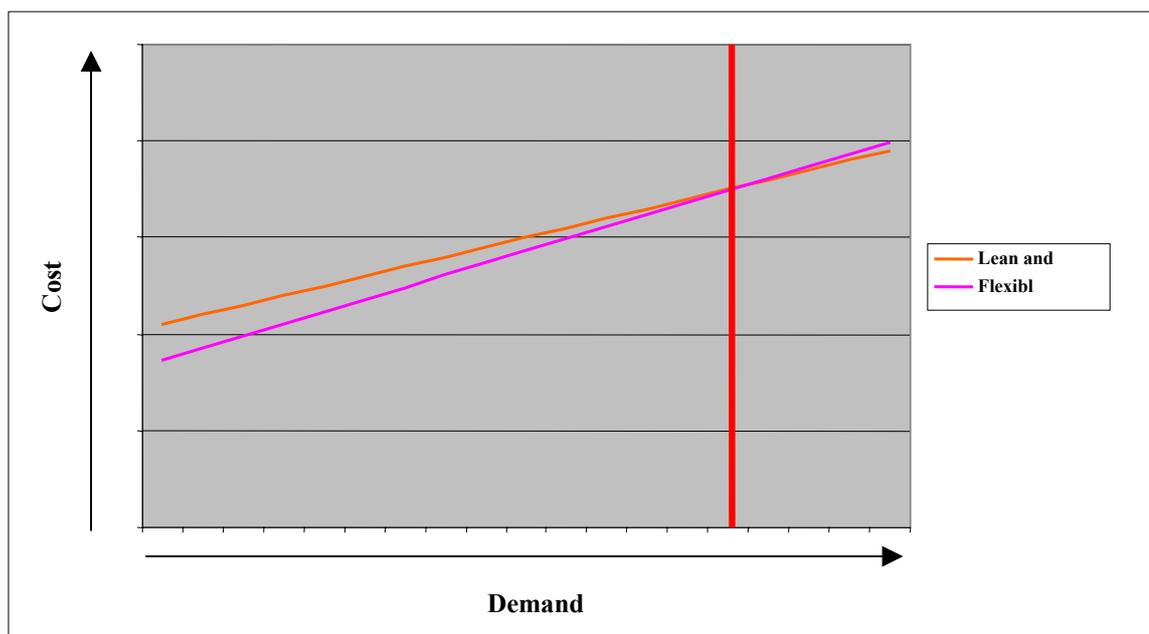


Figure 2 – Demand x Cost level

Source: BENNET (2002)

It is through this evolutionary process that the variables: price, quality, quantity, distribution and specification have been highlighted at the companies’ strategies and thus assuring:

1. Value of the client assistance
2. Evaluation of human knowledge
3. Partnerships
4. Openness to changes

The influence of the so-called Keiretsu chains must be considered in this scenario as well, for they lead to attain sustained or sensitive chains according to changes on market requirements depending on the moment, or external pressures such as the globalization effect.

Figure 3 shows the flow of activities involved in the process of analysis of manufacturing cycle to obtain a “survival” strategy (Bennett, 2002) for one firm. Based on the JIT philosophy, all those activities that mean motion time (such as materials handling, transportation, preparing, counting, and others) need to be eliminated, as they (in theory) are wasteful. On the other hand, other activities (such as fabrication and assembly) meaning effective work time and addition of real value to the product need to be emphasized. In terms of production itself, it is important to pay attention to these activities, because they actually make the product worth according to consumer’s preferences.

Natarajan (1990) poses that “companies using JIT must look beyond the production and purchasing areas and examine the potential use of JIT within their overall marketing strategies”. For instance, in a manufacturing process, a full operational JIT system involves the movement of (raw and semi-finished) goods along a production sequence or process. Because a distribution channel basically represents the movement of (finished) products along a delivery sequence, one can examine the implementation of JIT in the distribution function of the marketing mix. In the same way, JIT represents a philosophy of viewing the distribution network from a systemic perspective. It instills a problem-solving process to analyze the entire system and eliminates inefficient components as well.

As widely recognized, one of the central functions of the distribution process is related to physical supply, storage, and transportation of commodities. In cases when JIT is in use, these tasks are generally emphasized, because the tenets of the process are based on “zero inventory.” Even though this implies a lack of a buffer stock, in a full JIT system, to keep the production going on in a safely manner, the use of a safety stock is required. This stock should be maintained at a minimum level, so that inventory carrying costs should be minimized, decreasing sharply lead time requirements.

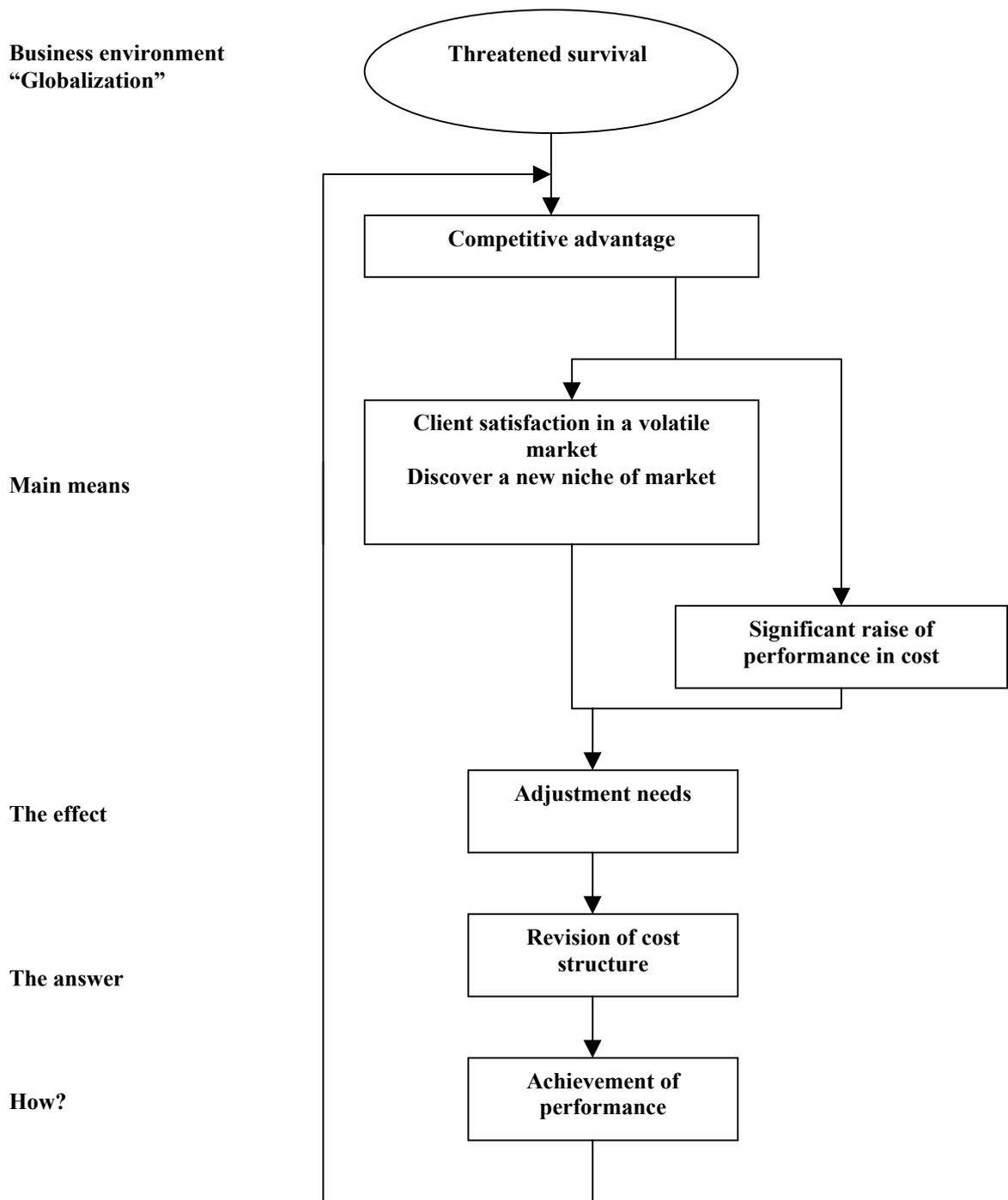


Figure 3 – The survival strategy in the manufacturing cycle.

Source: BENNET (2002)

When one firm uses JIT system to organize its production processes and manufacturing area, its purchasing routines need to be adjusted. The firm should need to examine numerous practical concerns before switching completely towards the adoption of a JIT system, from a traditional model such as economic order quantity (EOQ). A full and safely JIT implementation strategy requires a multi-phase project plan, which includes issues such as layout design, lead time reduction, supplier integration, system stability, a “pull” system and others. One needs to ensure that purchasing and accounting personnel realize the rewards of the JIT purchasing philosophy along with the details of “day-to-day” routines, so that they do not oppose the decision to switch to JIT.

2.2. Performance results of Japanese firms

It is important to show that the stunning performance results of Japanese firms on domestic sales at a world level range within 8 million per year, and thus corresponding to $\frac{1}{4}$ of world sales, also exerts a crucial influence in this evolutionary process. In this context it can be considered that three key areas (or dimensions) of susceptibility are;

- a) Economical growth and equity;
- b) Natural resources and environment preservation;
- c) Social development.

The managing of international manufacturing is directly related to changes in the manufacture strategy philosophy, according to circumstances of economy and business. During the 90's the emphasis of lean production was to attain cost minimization and lead time. Nowadays, the structure of manufacturing costs and social development is both factors of real importance in this process. The agile supply chain rises from the necessity of chain projects able to respond more and more quickly to changes on marketing requirements. The adaptive supply chain concepts try to emphasize the cost structure and sustainability along with balanced growth, aiming to assure social growth (figure 4).

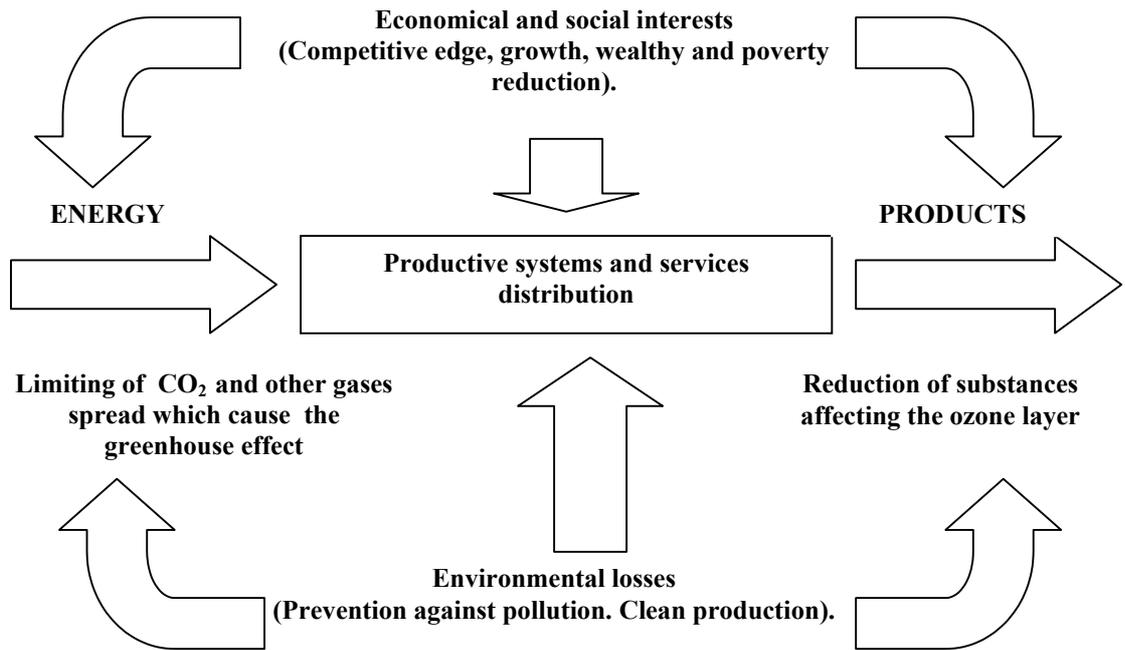


Figure 4 – The diary of sustainability and its influences on the manufacturing chains
Source: BENNET (2002)

3. Conclusion

As stated earlier, distribution represents a flow network, not unlike a production process. The main purpose of a JIT system in a distribution chain should be to deliver to retailers (i.e., end distributors such as mill supply house, VAR, service centers, etc.) the proper amount of finished goods from manufacturers, while minimizing inventory requirements and maintaining channel satisfaction levels. To do this properly, the basic activities involving in this process can be summarized as follows:

- a) Forecasting retailer demand for goods;
- b) Coordinating manufacturer's production schedules with retailer's demand schedules;
- c) Maintaining accurate and timely information flows from retailers;
- d) Performing the delivery of products to retailers just in time to eliminate the excess inventory.

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