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Lean supply chain management

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ABSTRACT

Globalization, uncertainty and volatility of the environment are forcing organizations to use new concepts that support the effective organization management, including supply chain management. The aim of the article is to answer what is supply chain management and lean management and if the lean management tools may be applied in the supply chain optimization. Critical analysis of literature indicates that value stream mapping is a useful tool in optimization of supply chain. It is observed that the term lean supply chain emerges. However, it is a need to seek new solutions in the field of logistics and the emergence of the agile concept and later a resilient supply chain.

Keywords: supply chain, supply chain management, lean management, value stream mapping

1. INTRODUCTION

Supply chain management is a rapidly growing management concept that refers not only to one organization but also to the whole group. Currently, only organizations that are skillfully organized and have optimized business processes, can meet the requirements of the market and stand up to the competition. Despite the fact that logistics has a whole range of instruments in order to achieve multiple benefits in the process of supply chain management, it is necessary to search for new ideas about how to solve problems in handling procurement, transportation, inventory control, customer service and optimization of logistics processes

(Ciesielski, 2009). In recent years, in the field of quality a variety of systems, concepts and techniques to improve logistic operations has been developed (Łunarski, 2012). These methods can be used to solve logistic problems, eliminate waste, minimize inventory levels, synchronize activities of individual entities involved in the process. In this article lean management concept will be described and the value stream mapping as a method of supply chain optimization.

2. SUPPLY CHAIN MANAGEMENT

The supply chain is defined as a network of organizations involved, through linkages with suppliers and customers in a variety of processes and activities that create value in the form of products and services supplied to the final consumers (Christopher, 1998). Another definition of the supply chain says that it consists of a network of plants and contractors who provide raw materials and components, then reprocess them into semi-finished products and components, then produce final product, and then allow their consumption by the final consumer (Bagchi, 2000).

Supply chain management treats the chain and organizations around it as a whole (Kot, Starostka-Patyk and Krzywda, 2009). But there is no unanimity when it comes to the definition of value chain management (Koulikoff-Souvion and Harrison, 2000). In connection with the assumption that in a modern economy, the supply chains, which are the result of cooperation of business entities, compete with each other (Kot, Starostka-Patyk and Krzywda, 2009) the most appropriate seems to be the definition of Christopher saying that the supply chain management is managing relationships with suppliers, recipients and customers, and delivering the highest value to the customer at a lower cost for the entire supply chain (Christopher, 1998). In supply chain management important is an approach that eliminates barriers between the links in the chain, thus coordinates the movement of products throughout the chain. This means that supply chain management is being oriented on the processes. Carbonara writes that supply chain management is the integrated management oriented on the process flow of goods and information throughout the chain from the sources of raw materials to the final consumer. The aim is to create value for the customer by increasing the quality of customer service and costs reduction (Carbonara, Giannoccaro and Pontrandolfo, 2000).

Setting up the supply chain means shaping the links in the network of companies in which are carried out material and information flows. The structure of the supply chain is a network of interdependencies and processes carried out between the cells (Kruczek and Żebrucki, 2011). An example of the structure of the supply chain is shown in Figure 1. In many cases, the suppliers involved in the supply chains generate a significant part of the overall costs associated with manufacturing and delivery of products (Kruczek and Żebrucki, 2011).

The concept of the supply chain contains the philosophy of tight co-operation with suppliers and customers in order to provide additional benefits and to gain the market advantage (Kisperska-Moroń, 2003). Quality assurance is one of the most important conditions for the smooth functioning of the supply chain. Designing the supply chain and logistics management must take into account the issue of quality. One of the ways to ensure this quality is to apply the concept of lean management.

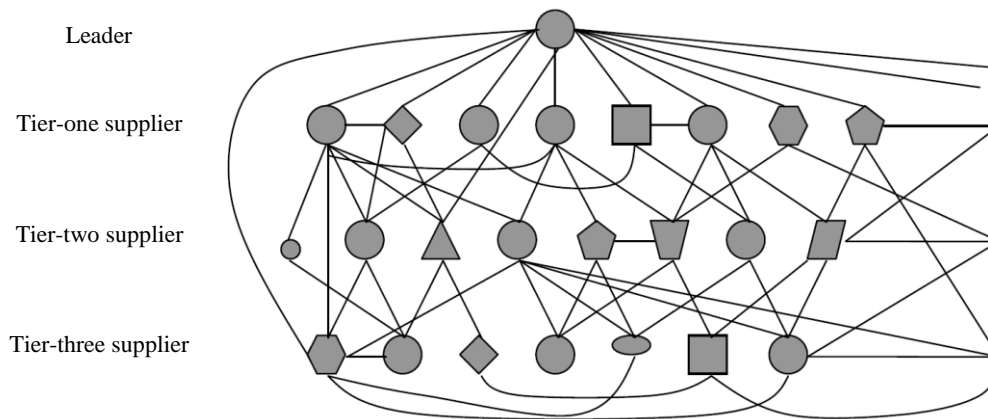


Figure 1. Supply chain structure

Source: Kruczek M., Żebrucki Z., 2011, Doskonalenie struktury łańcucha dostaw z wykorzystaniem koncepcji lean, *Logistyka*, 2/2011, s. 355-362.

3. LEAN MANAGEMENT

Lean management is a concept aimed at improving processes in the organization through a gradual and continuous improvement. Lean methodology is based on reducing costs while increasing throughput and efficiency of the production process. Its main objective is to improve the productivity of processes and focus on the products complying with the requirements of the customer (Zimon, 2012). This concept comes from Japan. Its foundation is the idea of continuous improvement, through the elimination of waste. Its purpose is to build a good quality of work in the manufacturing process while reducing the foundation costs. Perfect manufacturing process focuses on activities bringing value to the customer, and on eliminating those activities that from the perspective of the client are not necessary. In other words, the aim is to create value for the customer, for which he or she is willing to pay. The value is determined by the willingness of the customer to pay for the product. The more the customer is willing to pay, the more value delivers the product. Defining the added value from the customer's perspective is characteristic mainly for logistics (Witkowski, 2003).

Stages to reduce the causes of ineffective and inefficient processes can be described as a continuous execution of five steps, which leads to a gradual process improvements (Kruczek, Żebrucki 2008):

1. Identification of the problem
2. Analysis of the problem
3. Removal of the causes
4. Check remedies
5. Standardization of solutions.

The way to optimize processes is to identify the value stream, and therefore all actions taken in order to provide the customer with products or services, both value-adding and non-value-adding (Trojanowska, Kolińska and Koliński, 2011). Waste elimination from the

process is possible thanks to value stream mapping. The lean concept implies the elimination of all waste from the processes (Ciurla and Hopej, 1996). Waste is for example excessive inventory, too many machines and devices, unnecessary movement or transport, untapped potential of machines and people.

Map of the current state is made on the basis of physical observation of the process flow. While this observation, the execution time of each activity is determined, as well as the waiting time between steps. The mapping process is carried out by a team, which then collects ideas for possible improvements optimized process. The key step in the value stream mapping is creation of the future state map, so it is possible to make a comparison with the current state and identify possible improvements in order to create a plan for their implementation (Rother and Shook, 2003). After selecting the best ideas arise future state map. In the new process, depicted by the map of the future state is estimated time required to perform the operations and possible waiting time if it is necessary after the planned improvements. In the next step the times obtained by using appropriately selected metrics and indicators are verified. Implementation of the new optimized process does not stop work on value stream mapping. The idea of continuous improvement is that the obtained results should be the starting point for further improvement of the organization (Kruczek and Żebrucki, 2008).

4. LEAN MANAGEMENT IN SUPPLY CHAIN

Supply chains are now a fast growing concept of business management. The concept of lean, which underlies the development of lean supply chains to lead to such a supply chain structure, which results in tightening relations between the chain links in order to provide the value to the final customer. The aim of the organization is to implement the strategy in which the client wins. It means that the product is delivered to the customer at the lowest cost, highest quality and in the shortest time (Kruczek and Żebrucki, 2011). Supply chain optimization is a difficult task due to the involvement of many organizations (suppliers, buyers at various levels), often with divergent objectives. The use of lean concept means that the process is organized in a way to be able to achieve an optimal flow of materials and information at minimal. In the literature exist the term lean supply chain (Bozarth and Handfield, 2007; Wincel, 2004). Lean supply chain aims to strengthen the relationship between the chain links and the focus of all participants on providing value to the final customer.

Supply chain management according to the concept of lean management consists of the following stages (Ciesielski and Długosz, 2010) (Sołtysik, 2003):

- The choice of the supply chain, which will be optimized, as well as setting goals and indicators in the process, defining supplier of first and second tier, and the recipients of the first and n-th tiers;
- Assessment of the current state of the supply chain, creation of the current state map, the evaluation of all suppliers, buyers and leader by means of earlier chosen measures;
- Creation of the future state map;
- Creation of an action plan needed to achieve the desired future state, such decisions should be taken in agreement with all participants of the supply chain;

- Implementation of changes, documentation of the results, verification of measures.

Implementation of the lean concept in supply chain management focuses primarily on arranging the structure of the supply chain and continuous improvement by improving its flow through all participant of the supply chain. The use of lean is not about introducing some methods and tools in some participants of the supply chain but to develop and use comprehensive approach to the optimization of the entire supply chain (Kruczek and Żebrucki, 2011).

Continuous improvement in supply chain management is a continuous verification of the actions performed by each participants represent a value for the final customer. The use of lean management is not only the use of improvements at various stages of the process, but on a holistic, comprehensive approach. The method to assess the current state and identify wastes in the process is value stream mapping, both streams of material and information through all of the organizations involved. Value stream mapping should be done in the correct order. First, select a product family and the supply chain. Then identification of all the steps through which a family of products go and related information at each stage. The map is created by the observation of the analyzed process.

The verification of process carried out in the chain leads to improved efficiency. This is possible thanks to implemented improvements and results in improved flow of materials, better communication and purchasing, manufacturing, transport, storage and sale in each participant of supply chain.

By using the concept of lean management in the supply chain it is possible to achieve such objectives as:

- Consolidation and restructuring of suppliers and recipients;
- Sharing information;
- Reducing inventory levels and the introduction of just-in-time system;
- The introduction of common solutions to problems and reduction of related costs;
- Implementation of the requirements of the customer associated with the ordered product.

The lean concept saves a considerable amount of logistics costs. However, it should be noted that this concept works very well in a stable environment, which nowadays is unattainable (Christopher, 2000). This fact has raised the need to seek for new solutions in the field of logistics and the emergence of the agile concept, and later a resilient supply chain (Lenort and Wicher, 2012).

5. CONCLUSIONS

Lean management and its tools can be applied in supply chain management. The use of the quality management in logistics helps to precisely define the parameters of quality with regard to customer requirements. In conclusion, it should be emphasized the special role of quality in modern logistics. Lean management can be a great support for the realization of logistics processes. One of the useful method in optimization of processes and waste identification is value stream mapping. It is worth to stress that the use of lean management is

not only about improvements at various stages of the process, but it is a holistic, comprehensive approach. However, it is observed that lean management is just one of the many existing concepts of quality management and process improvement. It is suggested to do further research on how the lean management and agile methods could be connected and how they interact in supply chain management.

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