

## **LEAN SUPPLY CHAINS IN ENGINEERING, METALLURGY AND KEY PRINCIPLES OF THEIR MANAGEMENT**

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### **Abstract**

Companies' effort to work effectively, associated with the implementation of lean philosophy principles has changed significantly all companies processes within last decade. There has been a huge progress since the day when principles of lean manufacturing were introduced by Toyota. The change is visible not only in the number of companies' departments where these principles may be implemented, but also in the number of companies adopting them in any of them. In the very beginning lean processes were associated to automotive mainly, but today we can see an acceptance of these principles also in the other industries. Main focus of the article is on comparison of differences in management of company's procurement in three companies. Data about supplies' management and processes in automotive companies will be compared to the data from company operating in engineering, metallurgy. This comparison can contribute to advocate two statements. First of them is that not only production but also all companies' processes are lean nowadays. Second is that the principle of being lean within whole supply chain management has been accepted also by companies in other industries, including suppliers of metal products. Article describes key elements of lean supply chains and identifies how far are the companies, including company from metallurgy, with their implementation.

**Keywords:** Lean, supply chain, procurement, efficiency, metallurgy

### **1. INTRODUCTION**

We can see a significant change in companies' approach to efficiency within last decade. Dynamic and competitive environment on all markets worldwide brings new requirements on managers and forms new organizational structures [1].

Many years have passed since the idea of lean management was introduced by Toyota [2]. In spite of the fact that the main principles and ideas remain to be unchanged, there is a new view on the whole concept. In the very beginning lean management was associated with automotive industry and companies tried to decrease costs and increase efficiency of production processes [3]. A lot of methods and tools have been developed and thanks to them, companies have succeeded in the practical implementation of the theory. Lean management in practice saves companies' money by reduction of wasting of time, resources and energy [1]. As a side effect, companies are becoming more stable as the whole organization of the business is being constantly improved [4]. All related benefits have apparently motivated companies to conceive and develop the theory in a broader sense. The new approach is focused not only on lean production, but it emphasizes the need to be lean in all company's processes and the need to utilize the whole concept also in other industries [5].

### **2. LEAN SUPPLY CHAINS**

Focus on efficiency in the process antecedent to production has been linked to procurement and the logistic system as a whole. There are different principles that can be implemented in order to increase efficiency and reduce logistics and purchasing costs [6]. All principles can be divided into three categories - new company's perception of logistics and procurement, suppliers management and alternative sourcing [4].

#### **2.1. Perception of purchasing**

First category may be described as a move of managerial activities to a different executive level. Purchasing processes are newly considered as a strategic and in accordance with that, management is focused on particular areas more deeply [7]. Not only all defined targets and strategies must be based on the whole company's plans, but also the approach of employees and managers has to be changed. Activities should be centralized in one place enabling better coordination and direct focus on inventories and employees management [4]. Orientation on total cost of inventories ownership, benchmarking, regular evaluation of best market practice, risk management and employees training are considered as the most important areas [1]. First of all managers however have to understand the most important rule: each system is built and formed by people - without the acceptance, participation and support of everyone involved the probability of successful implementation rapidly decreases.

## **2.2. Suppliers management**

Second area is related to supplier management. The acknowledgement of importance of purchasing has opened the discussion about the optimal supplier base. The main idea is to find balance between the immediate availability of goods and the cost associated with their ownership [7]. Company can influence both factors to a certain level. Availability of goods depends on the level of inventories that can decrease securely thanks to the mutual trust with particular suppliers [8]. But for sure it is not possible to develop closer relationship with all suppliers or to apply only one general strategy for all supplies. Two indicators can influence company's approach - importance of goods supplied and the number of suppliers available on the market [9]. With this knowledge it is easier to choose a partner for closer cooperation in order to build a strong and stable relationship. Current trend is to rationalize supplier base: 1. Standardize components to lower complexity of supplies, 2. Consolidate purchases and size of supplies [10].

Optimizing of supplier base enables stronger focus on particular suppliers and partnership development. Suppliers may be motivated either by the size of individual supplies or by the length of cooperation accompanied by variety of incentives, leading to deeper supplier's integration into the company's processes [4].

End customers are more sophisticated nowadays and expect more in the terms of quality and flexibility [11]. Flexibility means the ability to react quickly on the market changes and innovate product based on different customers' needs and wants. Companies offer wide range of product customization by the optional scale of shapes, colors, materials, features and functionality. They are trying to shorten delivery time, improve customer care and sell goods for reasonable price [12]. This concept can't be implemented without the change of supply chains management and supplier involvement. Shared information systems or physical presence of supplier's employee in a customer's premises are quite common nowadays to ensure real time information exchange and effective communication [13]. Suppliers can either directly manage all supplies based on the real consumption or cooperate on product development. This enables further adjustments and enhancements in the whole production process of goods supplied [1].

## **2.3. Alternative sourcing**

Third area may be described as an alternative sourcing as traditional sourcing is being modified in the last decade. As mentioned above, it is quite common that suppliers by themselves manage either whole sourcing process or its particular parts. Companies are moving to big industrial parks to enable suppliers deliver goods directly to the production lines [14]. As companies tend to minimize stock, all current supplies are more or less managed on just-in-time principle. In addition, companies tend to pull the point, where the ownership and responsibility for the goods is transferred as close as possible to the manufacturing process. It might be at supplier's premises, on the way or directly next to the production line [6]. There are hybrid alternatives such as consignment, where goods still owned and managed by supplier are stored in the company's warehouse. In the same time companies tend to get rid of stock management. They are supporting supplier's activities and they are trying to improve efficiency and quality of the whole supply chain by sharing know-how, physical

resources or by direct financial incentives. Higher efficiency, reduction of costs and wasting in all processes finally lead to formation of lean supply chains [13].

#### 2.4. Lean supply chains in metallurgy

Since the theory of lean production and complex lean supply chains was firstly introduced by Toyota, the most significant progress in this area might be expected mainly in the companies operating within automotive industry [2]. Being proved by the evaluation and comparison of purchasing processes of companies operating in automotive and metallurgy (see **Table 1**), not only automotive companies tend to be lean nowadays. Two medium automotive businesses and one metallurgy business were interviewed to demonstrate this fact.

**Table 1** Lean supply chains - selected criteria (Procurement Managers, personal communication, March, 2015)

Criteria	Company 1	Company 2	Company 3
Industry	Automotive	Automotive	Metallurgy
Type of production	Batch	Batch	Batch
Number of employees	500 - 1000	1000 - 1500	500 - 1000
Operational purchase	Local	Local	Local
Strategic purchase	Centralized	Centralized	Local
Central coordination	Yes	Yes	Yes
Purchasing strategy	Sole sourcing	Sole sourcing	Not defined
Standardization	Yes	Yes	Yes
Consolidation	Yes	Yes	Yes
Supplier development	Yes	Yes	Yes
Information exchange	Advanced	Advanced	Limited
Information system	SAP	SAP	MRP system
EDI	Yes	Yes	No
Consignation	Yes	Yes	No

The first above-mentioned area is related to general thinking about the company procurement. **Table 3** shows that all interviewed companies have already realized the importance of strategic approach, however companies operating in automotive industry seem to be more advanced in the terms of centralization than the one operating in metallurgy. All strategic activities are centralized in Mother Company. That enables bigger efficiency in particular purchasing processes - sharing of data and suppliers, consolidation of purchases, etc. There is even a mechanism in one of the companies that monitors on the global level whether the immediate stock in branches doesn't exceed predefined level. If so, specific actions have to be done to prevent penalization by Mother Company. Automotive companies seem to be also one step ahead in terms of purchasing portfolio analysis as they handle each supplier in a special way based on the results of advanced analysis. In metallurgy company there is more simple portfolio analysis done as it is based on the monetary value of purchased material only.

The big difference might be seen in the number of suppliers and in relationship with them. Companies in automotive are focused on sole sourcing strategy being proved also by the value of current stock. In spite of the fact that the scope of business is almost the same, the value of company's stock in metallurgy is two times bigger compared to the stock level of companies in automotive. The company in metallurgy has however already started with standardization and consolidation. This can suggest that there is a perceivable tendency to reduce supplier base also in the metallurgy industry. Automotive companies are still more advanced in the terms of the real time information sharing with the suppliers, compared to the metallurgy one. Both companies

are using SAP as a main information system. In spite of the fact they don't share information system within the supply chain at all, they use EDI as a standard protocol for communication with suppliers. They also have online system for data sharing enabling quick and effective exchange of information. Company operating in metallurgy uses just simple MRP system and the amount of information shared with suppliers is minimized. However there is an intention to implement online system enabling effective and quick information exchange in the near future.

There is also a difference in supply chain management of interviewed companies. Automotive companies are more oriented on JIT supplies. They are using consignment and they are trying to develop relationships with carefully preselected amount of suppliers. Company operating in metallurgy tends to change the stock management system towards the lean production too. Kanban system, one of the JIT methods, had already been implemented and helped decrease stock level of 15% in the last year. Company is also working on suppliers' performance improvement. Despite the fact that company is trying to improve production efficiency, it unfortunately doesn't focus on the suppliers with the evaluated best performance to further strengthen the cooperation. Company focuses only on suppliers evaluated as the worst from the perspective of quality of supplied goods and on suppliers chosen by the Procurement Manager according to the subjective criteria.

### 3. CONCLUSION

No similar article focusing on implementation of lean procurement principles in company from metallurgy industry has been found. Therefore the main goal of the article is to describe, how companies' processes has changed and how lean management of supplies can increase efficiency even in companies in metallurgy. Interviews with the Procurement Managers revealed that there is a trend to adopt as much similar principles of lean management as possible even in other industries. In spite of the fact that implementation of lean concept seems to be more advanced in the automotive industry, there is a significant change and progress in approach to lean management in metallurgy too. Focus on efficiency and lean approach even in procurement processes seems to be also really important for all companies searching for cost efficiency and flexibility.

Article is focused on description of lean procurement processes adoption and deep analysis of purchasing process in one company from metallurgy. This article can serve as a base for further research focused on deeper analysis of more companies' purchasing processes.

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