WAYS OF COOPERATION WITHIN SUPPLY CHAIN IN METALLURGY FROM THE POINT OF VIEW OF COMPANY PROCESSING STEEL COILS

VLCKOVA Vladimira

University of Pardubice, Pardubice, Czech Republic, EU, vladimira.vlckova@upce.cz

Abstract

This paper is dedicated to the problems of cooperation of supply chain members aiming to make use of synergic effects resulting in a number of benefits, e.g. lower costs, improved customer services, increased negotiation power, enhanced performance, or maximization of the value perceived by the customer. The paper aims to describe, analyse, and evaluate the methods of cooperation of the members of supply chains in metallurgy from the point of view of a particular company processing steel coils which is selling their products on B2C market. The analysis was based on the method of a comparison of outcomes acquired through the method of in-depth interviews conducted with managers of the given enterprise in accordance with a questioning scenario with the outcomes of the performed scientific literature research, which focuses on forms, prerequisites, benefits, and risks of cooperation within supply systems with respect to their characteristics and structure.

Keywords: supply chain, metallurgy, cooperation in supply chain, company processing steel coils

1. INTRODUCTION

Creation of supply systems within which enterprises cooperate mainly on the basis of partnerships is their response to turbulent changes in the current business environment. These have mainly resulted from globalization and dynamic development in the area of information and communication technologies, and they significantly affect the character of business. Financial stability and competitiveness of economic entities is, in the present demanding conditions of the knowledge economy, determined by the ability and possibility of becoming involved in strategic partnerships, which brings a number of financial and non-financial effects and represents a significant competitive advantage [1]. Multiparty collaboration is critical to the effective solution of complex problems and continuous adaptation to changing environments [2]. Individual economic entities connect and form supply chains (SC) to make use of synergic effects. The value is generated and also shared within the entire SC structure. The transition from competition of separate enterprises to competition of the whole supply chains requires that enterprises change from relations of mutual competition to relations of mutual cooperation. Networks are creating of interdependent partners that are working extremely closely together to fulfil a common goal of customer satisfaction [3]. Nowadays, we even talk about partnership management [4]. But in metallurgical supply chain, cooperation is still at a low level, in relation to other areas [5].

On the basis of the outcomes of the performed scientific literature research focussed on the features and structures of supply systems and especially on the possibilities, advantages, and risks of cooperation of individual members, the paper thereafter analyses particular methods of cooperation between the members of this SC from the point of view of the given enterprise.

Targeted literature search in scientific literature, one-to-one interviews with managers of this company, and experiences from other supply systems studies were used as research methods and sources.

2. THEROETICAL BACKGROUND

The traditional form of business transactions was based on a single transaction and limited sharing of information among the transaction participants. These arm's-length relations, which are characterized by distrust and mutual competition, an effort to make profit from any transaction, lead to uncertainty about the volume of orders, continuous changes of suppliers and customers, changes in transaction terms and conditions, etc., which is one of the reasons for high costs and an unstable level of customer services [6]. Therefore, these relations have been replaced by durable arm's-length relations, which are based on cooperation and information exchange among the members of the business transaction [7]. As early as in 1964, Haskett mentioned the need to manage material flows from primary suppliers to final customers [8]. Within the terms of logistics, it meant to synchronize individual logistics activities (chains) within the enterprise with logistics activities of other companies participating in material flows from primary suppliers to final customers. If a supply system consists of a number independent enterprises sharing minimum information only, it results, besides other things, in an undesirable effect described by Forrester. The core of this effect is that information about a small change in the consumer demand gradually strengthens in the supply system as a result of independent stock management systems in each segment, which secure themselves against demand fluctuations, distort the current market requirements and provide their suppliers with inaccurate information [9]. To decrease this effect, it is essential for individual SC members to make relationships of mutual cooperation and to share information.

2.1. Ways of cooperation within supply chain

A relationship of mutual cooperation is based on creation of a strategic partnership between two or more enterprises (partners). It may have the following forms:

- vertical integration, where economic entities on different levels of processing connect with the preceding or subsequent activities,

- horizontal integration – interconnection of economic entities on the same level of processing,

- conglomerate integration – across branches of business [10].

In view of the fact that most enterprises did not use to be willing share information, in view of the distrust between enterprises, traditionally competitive relations to the other members of the supply system, and at the same time of the existence of the problem of different corporate cultures, management systems, or any other obstacles that were not possible to overcome [11], enterprises saw the best form of coordination of activities within the supply system in cooperation based on mergers, acquisitions, or on joint ownership. A survey performed by the network of KPMG consulting firms in 2012 showed that as many as 90% of enterprises planned to be involved in a merger or an acquisition in the following two years, i.e. 2013 and 2014. In Europe, the respondents would rather see themselves in the role of sellers (52%), while most American companies plan to be in the role of buyers (48%). Companies use mostly internal information sources: review of organization-specific reports, audits, but barely use regular interviews or questionnaires filled by managers, consumers, workers or members of local communities. EU reports, national or regional data sources are used marginally [12].

If all the entities involved in the activities defined in the supply chain are owned by one enterprise, the supply system is vertically integrated [13]. Waters considers vertical integration as the highest possible form of integration, where one enterprise buys another enterprise within the supply system to decrease costs and to improve the level of customer services [6]. In the recent years, vertical integration belonged to the most popular ways of cooperation as enterprises were hereby able to obtain certain advantages, e.g. better control over the performance and costs. However, the practice showed that it is beneficial to each company to focus on the key processes only and to outsource all the other activities to external suppliers [9].

Therefore, enterprises also started to direct their attention to cooperation that is not based on joint ownership.

Strategic alliances of this type are characterized by cooperation of entities, which is either formal, or informal. This results in establishment of long-term relationships between partners using synergies. This form of cooperation leads to an increase in outsourcing. For individual SC segments, this represents taking Make or Buy decisions. A special case is then cooperation with a Third-Party Logistics provider (3PL), 4PL, etc. A substantial condition of its application is creation of a mutual relationship of cooperation and trust between the partners. This form of cooperation mainly results in a more efficient SC, and the other effects including any benefits relating to outsourcing, i.e. the possibility of focussing on the key activities only, utilization of better knowledge and more advanced technologies of the suppliers, decreased capital, reduced stocks and costs, etc. On the other hand, potential disadvantages can be seen in e.g. the risk relating to interruption of supplies, the possibility of threatening the business secret, a loss of control over the production process, the quality, and the costs relating to cooperation with the supplier [14]. An enterprise using outsourcing for all its activities to the maximum possible extent is called a “virtual enterprise”. In such a form of cooperation, a virtual enterprise “only” coordinates activities of other companies [13]. Virtual integration is to use technology and information to blur the traditional boundaries among suppliers, manufacturers, distributors, and end users in SC. Data, information, and knowledge are shared across cultural-boundaries, time-boundaries, and space-boundaries. It offers the advantage of tightly coordinated SC that has traditionally come through vertical integration. Today, the virtual corporation of various firms in SC is a reality with suppliers and customer trading over the Internet in real-time to create maximum value [15].

2.2. Tools and methods of cooperation in supply chain

To ensure permanent improvements in material flow management throughout the SC, it is possible to apply a number of continuously developing methods based on cooperation in the SC. The aim is to achieve effective material flow management with focus on satisfying the end users’ requirements and wishes. They are based, above all, on the principle of common information sharing and replacing stocks by information through modern ICT. This involves methods of approaches like Quick Response (QR), Efficient Customer Response (ECR), Continuous Replenishment Program (CRP), Vendor Managed Inventory (VMI) and Collaborative Planning Forecasting and Replenishment (CPFR). They are all focussed on strengthening partnerships between SC members in the interest of improving of intercompany material flow management [16].

QR is a method based on application and further development of JIT. While JIT was mainly focussed on management of material flows between neighbouring members of the SC, QR enables synchronized material flow management throughout the SC. QR is built on a fast transfer of information about the stocks, issued orders, and performed sales across all SC members. Its application is mainly possible thanks to development of technologies for electronic identification of movement of goods (barcodes and RFID) and electronic communication [17].

ECR method can be characterized as a common initiative of SC members, whose aim is to achieve more flexible response to customer requirements, elimination of activities that did not bring a value, maximization of the efficiency of the product movement throughout the SC as far as the final customer. It covers the following three areas of activity [17]:

- segmentation of products and services according to the customers’ requirements and creation of specialized distribution systems for them,
- effective management of promotion activities, based on their common planning, determination of the date of commencement, the total period, and localization of the venues,
- coordination of activities connected with launching new products. See more in e.g. [17].

CRP method changes the traditional supply process to a process of mutual cooperation, where the supply requirements are specified on the basis of information from the customer by the supplier [18].

CRP system is connected to VMI system, whose essence consists in the fact that the supplier takes an active part in maintaining the required optimal level of stock in the customer's premises. Distributors regularly provide their suppliers with information about the current level of stock, about sales, prepared action sales, etc. It is the supplier who is responsible for replenishment of the customer's stocks. Application of CRP is an important step towards SC simplification and efficiency improvement in its distribution part [18]. For comparing the efficiency is possible to apply Data Envelopment Analysis (DEA), which is a non-parametric method based on production theory and the principles of linear programming [19]. It was use for example for comparing the efficiency of sector manufacturing base metal in 25 European countries [19] ore for the evaluation of efficiency of the mining and quarrying sector in European countries in 2011 [20].

These methods have resulted in a system of integrated, dynamic planning of requirements based on demand forecasting, i.e. in the system of CPFR. It is the mechanism to realize value – added activities in SC [15]. The method is based on a higher and more complex form of cooperation, and when it is being implemented, it is essential to define:

- who will manufacture (and also when, where, with what technology, through what activities, and for whom), i.e. to draw up a cooperation agreement,
- common objective for all parties involved, and
- common system of demand forecasting, both on the strategic and on the operational levels [17].

Application of CPFR should result in transition to target chains with a synchronous flow with a significant reduction, or even elimination, of the chain effect. The information flow in the SC is parallel with the material flow, which is completely smooth and balanced there. This arrangement is only possible if coordination and synchronization of all the activities defined in the SC are on a high level.

3. COOPERATION FROM THE POINT OF VIEW OF COMPANY PROCESSING STEEL COILS

The level collaboration in SC is closely associated too with the product clock-speed. Fig.1 integrates the concept of efficient SC and responsive SC view, the clock-speed view, and the level of supplier's collaboration [16].

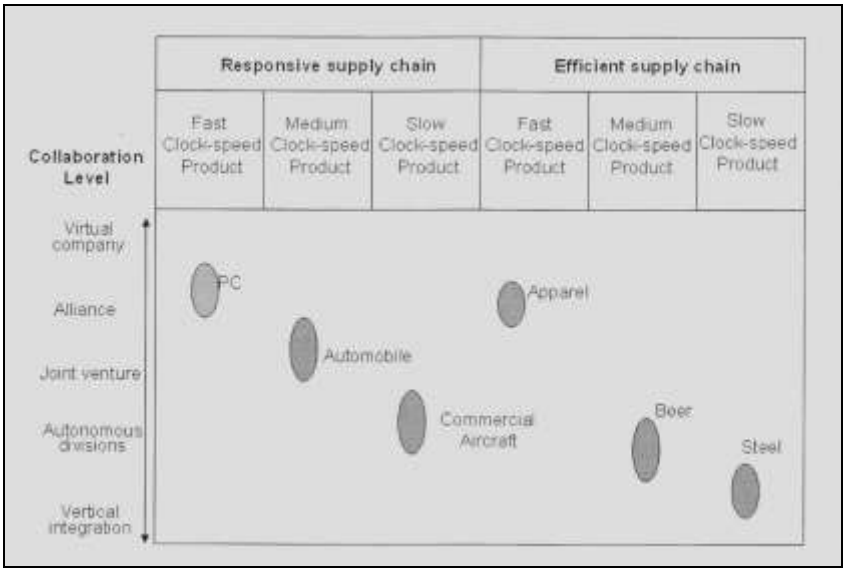

Fig. 1 Collaboration level and product clock-speed [16]

The steel industry is a slow – clock industry. The capital intensive steel plant is estimated to have a life cycle 20-30 years. As such efficient SC is a well- accepted business model for steel industry. Location of steel company in the right-bottom part of the Fig. 1 indicates vertical integration companies which manage almost everything in-house from raw material production to the distribution channel and to the final users.

In this paper cooperation within the SC is monitored from the point of view of a manufacturer of more than 600 kinds of metal products for a so-called hobby programme is in this research. The core products are racking systems. It is a modular programme, which enables custom-made production and delivery, including designing a suitable racking system. There is a strong competition in this area of processing. However, the company has a unique manufacturing technology and its own development and engineering departments. This makes it possible for this company, together with effective cooperation within the SC, to respond to the customers' requirements very flexibly and keep competitive prices at the same time. The company mostly supplies its products to central distribution warehouses of retail chains (90% of the production), who also sell them under their private brand name. It is the last manufacturing segment of the given SC.

What is typical for metallurgy is vertical integration of companies, which forms a strong group with a very strong negotiation position in the given SC. In view of relatively small purchases of steel coils, the company does not deal directly with the primary producers, but it is forced to use intermediaries. These are big trading companies dealing with purchase, storing, modification, and sale of metallurgical products and the like on the basis of wholesale. They set the main conditions of cooperation. They also arrange direct deliveries to the company. It results in keeping stocks of strategic raw materials for about 30 days of manufacturing in the company warehouses. Orders of deliveries have to be sent 2 months in advance and despite this fact there is relatively high variability both in delivery times and volumes from the side of the supplier. These conditions of cooperation were set up with respect to the maximum use of the capacity of trucks transporting the goods and the suppliers' planning systems. The company had to adapt to these conditions of cooperation in view of the supplier's strong position even though it means for the company to maintain extensive stocks of steel coils on input.

The company has entered into a long-term cooperation contract with a supplier of powder coating materials. There are no problems with competitors as painting shops have different technologies and cooperate with each other in the interest of quick fulfilment of their customers' requirements, they help each other e.g. in the case of a temporary lack of a shade, which affects efficiency of the entire SC.

The company is an important customer of a chipboard supplier with respect to the purchased quantity. That is why favourable conditions of JIT delivery are set up in the way to be optimal from the points of view of flexibility and costs. The company can see a certain risk in the possibility of leakage of its know-how through these suppliers. According to a worker responsible for logistics, the set conditions are very serious for both parties. These suppliers, as well as the suppliers of packaging materials, are from the Czech Republic, which has positive impacts both on shipping costs, and on quick response.

As for deliveries of supplementary material, e.g. wheels for manual handling technology, they cooperate with one central supplier from Asia, who supplies them with 1 container per month of all necessary types of wheels on the basis of an order. There are no problems with fulfilment of their orders or in their mutual relations, which is also given by relatively low costs of keeping these stocks.

Most orders are implemented through distribution centres of retail chains, which require the company's high adaptability to the changing demand. Here, cooperation is on different levels, both with respect to a particular retail chain, and with respect to the place of delivery. The goods are delivered to the domestic market, and to the EU countries, Canada, and the USA. The company makes it maximum efforts to seize eastern markets. The delivery conditions are, mainly in view of a very strong position of chains and their entrepreneurial culture in the area of the Czech Republic, different from the conditions with even the same chain abroad. The general contract on deliveries stipulates strict criteria, e.g. settlement of orders within 24 hours in the

Czech Republic, within 48 hours in Slovakia, quick response, and ensuring perfect deliveries for promotion events, practically impermissible communication, and mainly the risk of extensive sanctions in the case of any failure. That is why these orders are always preferred to any other orders, which might go to the same chain abroad, where it is, for example, possible to agree on the day and hour of delivery operatively in accordance with the current situation, and it is possible to communicate with them and agree on an earlier or later arrival of a consignment, etc.

In view of the unbalanced cooperation with the customers, it is essential for the company to have a very flexible logistics chain. Manufacturing runs on the principle of pull, the point of disconnection by an order is in the place of the warehouse of steel coils, material and information flow management is supported by the ERP system. The company has built another painting line to eliminate the bottleneck in its logistics chain. They use outsourcing for transport to the customers for full-truck deliveries. Although they cooperate with stable and reliable forwarders, with whom they have set up a serious level of cooperation that is favourable for both parties, the company has been forced to extend its product distribution as far as individual markets, so-called pallet shipments. Therefore, the company has entered into an agreement with company PPL, which ensures this distribution continuously all around Europe. Another step in the process of adaptation to the set conditions of cooperation with the customers was construction of a new distribution warehouse to achieve higher flexibility in deliveries. Most recently, the company is building cooperation with an administrator of internet pages to be able to sell on the internet, where the company provides the highest possible level of customer services from a design according to customer specified requirements to the entire implementation of a supply.

CONCLUSION

A relationship of mutual cooperation is based on creation of a strategic partnership between two or more partners which can have forms of vertical, horizontal or conglomerate integration. For the steel industry as a slow – clock product, vertical integration and efficient SC is well- accepted business model. This forms a strong group with a very strong negotiation position in the given SC. But as a supplier of raw material for company processing steel can be a member of responsible supply chain e.g. automobile and PC industry or hobby program as was analysed in this work. Thus from the point of view of these companies they are involved in collaboration on various levels from Joint venture, Alliances to virtual company. Enterprises direct their attention also to cooperation that is not based on joint ownership nowadays as was shown in the analysed SC. Strategic alliances of this type are characterized by cooperation of entities, which is either formal, or informal. It results in establishment of long-term relationships between partners using synergies and an increase in outsourcing. This paper gives evidence that within SC in metallurgy various ways and methods of cooperation can be applied depending on the industrial sector of end processor of steel and on the negotiation position of individual members in the given SC.

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