CONSIGNMENT STOCKING OF METALLURGICAL MATERIALS - A TOOL TO BUILD PARTNERSHIPS IN THE CHAIN

PECINOVA Zuzana, BRANSKA Lenka, VAVRA Jan

University of Pardubice, Faculty of Chemical technology, Pardubice, Czech Republic, EU,
jan.vavra@upce.cz

Abstract

Processors of materials supplied by business of the metallurgical industry often seek to stabilize supplier-customer relationships with those suppliers who are able to supply metallurgical materials in a constant technical quality. This creates scope for finding an appropriate replenishment system for buyers of metallurgical materials. However, if the demand in a given chain is highly variable and unpredictable in essence, we cannot successfully implement modern methods used to control material flow in the chain, such as Quick Response, CPFR and other methods. It is necessary to look for alternative solutions, which is advantageous for both sides though - it suits customers, especially in terms of their requirements for readiness of inventory for their own production processes, and it also suits suppliers - especially in terms of the specifics of their own production processes. Consignment stocking appears to be a suitable solution in chains with products in the metallurgical industry. Its application taking into account the needs of both suppliers and buyers can be instrumental in building partnerships. The paper presents the results of qualitative research, implemented in 2015 in a company purchasing metallurgical materials, which applies consignment stocking in cooperation with the supplier. It presents a method to apply consignment stocking, its advantages and disadvantages while evaluating it with respect to its role in building partnerships in chains with metallurgical materials.

Keywords: Supply chain, supplier, consignment, stocking, metallurgy

1. INTRODUCTION

Currently, the situation in the metallurgical products market is particularly difficult. Metallurgical companies stand at the beginnings of supply chains, where there is excess of supply over demand and the market is basically divided. This greatly limits the room for manoeuvre of the metallurgical companies in the field of customer relationship management. They have a very limited choice of customers, and must therefore endeavour to retain the existing ones. They are forced to be subject to the pressure of their own customers, who keep on increasing it as they try to retain their own customers and margins. The result is a reduction of margins at all levels of the supply chain, which in turn leads to a deterioration of the economic situation of enterprises in these chains. As market competition becomes more intense, firms are turning their attention more towards cost reduction, instead of focusing solely on revenue generation [1].

The only way out of this situation is the development of cooperation. Strong interaction and reliable collaboration between suppliers and customers have emerged as strategic issues and powerful instruments for maintaining or acquiring competitive advantages in a dynamic and selective market [2]. But cooperation in metallurgical supply chain is still at a low level, in relation to other areas [3]. Developing cooperation should be the main concern of metallurgical companies, which must produce in an economical way to be able to cover its own costs by moderate margins. However, metallurgical companies do not usually have sufficient bargaining power and they are usually forced to accede to solutions required by the purchasers, but they must create value for customers effectively [4]. Customers are often the initiators of changes in ways of service, since on the one hand, it allows them to survive under the pressure of their own customers and on the other hand it allows maintaining desirable suppliers, i.e. suppliers who are able to consistently deliver high-quality materials.

Changes in customer service are often directed to the search for a suitable system of replenishment of metallurgical materials. For many industries, a major source of cost is supply chain inventory [1]. Some of the best practices for reducing inventory costs include those improving the accuracy of demand forecasts [5] and 'shifting inventory ownership to suppliers', i.e. consignment [1]. It seems to be an appropriate solution especially in a situation where demand in the chain is highly variable and hard to predict. It is because this nature of demand makes worse successful implementation of modern techniques to control material flow, such as Quick Response, CPFR and other methods.

Consignment stocking policy is one of numerous policies for efficiently operating a supply chain system [6]. It is a kind of joint vendor and buyer policy to the management of inventories in supply chains [7], which is based on an improved collaboration between the company and its suppliers [2]. Its application taking into account the needs of both suppliers and customers can be instrumental in building partnerships, especially if it is carried out under conditions that satisfy both parties - the customer, especially its demands for readiness of supplies for their own production processes, and at the same time, the supplier - especially the specifics of its production processes. Even authors that argue that consignment stocking may be harmful for the supplier from a purely economic point of view, recognise the strategic importance of the relational rents stemming from it since it creates a renewed and reinforced link between the company and its supplier [2].

Properly applied consignment stocking could be used as an instrument to develop cooperation also in chains with metallurgical products. However, it must be organized so that it is beneficial to both sides. Whether this is the case in consignment stocking of metallurgical materials for the selected customer became the subject of a primary qualitative research conducted in 2015. The research was conducted in an engineering enterprise that processes metallurgical material. The aim of the research was to determine how the consignment stocking takes place, whether and to what extent information is shared allowing inventory optimization and what are the economic impacts and benefits of consignment stocking to the development of cooperation. The primary research was carried out using personal interviews. The respondent in the manufacturing company was Logistics Director. The information obtained was processed using content analysis, confronted with theoretical bases and, on the basis thereof, the benefits of consignment stocking for the development of cooperation within the chain were assessed.

2. THEORETICAL BACKGROUND - CONSIGNMENT STOCKING

The APICS Dictionary defines consignment as "the process of a supplier placing goods at a customer location without receiving payment until after the goods are used or sold" [8]. In a consignment transaction, there are typically two parties. The consignor retains ownership of the inventory and the consignee maintains physical possession of the goods until used or sold [6]. Owner of goods, the 'consignor', delivers goods to the 'consignee', for use or sale, with the proceeds of the sale being sent to the consignor only after the actual use or sale [9].

Therefore, a characteristic feature of consignment stock is that they are stored with the customers (downstream companies), but owned by an upstream supplying company. The customer must manage this stock in its system, separately from the rest of its stock. A specific feature of consignment stock is also time of their payment - after use or sale. Usually, the customer may also at any time return the unused consignment stock to the supplier. [6]

An important factor that influences the form of cooperation between the partners is the level of mutual trust and the associated willingness to share customer information needed for effective inventory management in the chain. Consignment stocking requires continuous and immediate information exchange between the vendor and the buyer [7], where the necessary scope of information shared depends on the agreed conditions of the consignment. The form of cooperation and therefore the agreed parameters of the consignment agreement and the distribution of benefits among partners are also largely dependent on the economic strength of the business partners [10].

An important decision that affects the possibilities of coordination in the supply chain is the choice of a partner who decides on the amount and timing of replenishment. The inventory decision may be made by the upstream supplier(s) or the downstream retailer(s) [11]. The first arrangement is referred to as Vendor Managed Consignment Inventory (VMCI) [1] or vendor-managed inventory (VMI) [e.g. 11], the other as Retailer Managed Consignment Inventory (RMCI) [1] or retailer-managed inventory (RMI) [e.g. 11]. In practice, both arrangements are used, but the trend is that the downstream customer allows the upstream supplier to choose the inventory level [1], as this is advantageous both in terms of the supply chain channel performance as well as individual firms' performances [1,12]. According to Braglia *et al.*, it should be the supplier, who in consignment stocking autonomously manages the stock of its own items at the customer warehouse and both decides the dimension of the batches and the time of delivery, because only supplier manages operatively, in an integrated and optimized fashion, the whole stock level of the considered product within the supply chain [13]. Under RMCI, the retailer tends to choose too high an inventory (or customer service) level for the channel, ignoring the negative effect of overstocked inventory on channel and supplier's performance [1].

Another important prerequisite for the efficient realization of the consignment policy is maintaining the right level of inventory at the customers [14]. The object of the agreement is therefore setting a minimum and maximum guaranteed amount of inventory in the consignment [2], which will protect the buyer against stock-out [7]. In the case of supplier-managed inventory, we also need to determine penalties for under-stocking and over-stocking [15]. A substantial part of the agreement is a method of paying for inventory consumed - hypothetically up to a daily frequency, so that the information concerning the consumption trend is also constantly refreshed and immediately transferred to the supplier [2].

The form of consignment storage agreement affects the amount and cost structure of the cooperating partners. According to Hariga and Al-Ahmari the cost structure changes from one party to another as a result of changes in decision making processes and responsibility of the participating parties [16]. Valentini and Zavanella indicated that inventory carrying costs comprise two main components, an operational component and a financial one [2]. The operational component relates to the storage and warehouse space [2], i. e. physical storage costs such as rent, electricity and material handling costs [15], an important part is the insurance, or impacts of obsolescence and shrinkage [2]. The financial component includes the opportunity costs incurred by a firm while investing capital in producing a good, and taxes paid on unsold items [2, 9]. The customer carries the storage cost but does not yet sustain the financial cost, which is transferred to the manufacturer [2, 9]. In the event that the amount and terms of the replenishment are fully the responsibility of the supplier, the costs associated with demand fluctuations and eventual stock-out may also be debited to the supplier, by means of contract penalties [2].

Consignment stocking brings benefits to both parties, even though particularly manufacturers are not very certain about these potential benefits and tend to accept consignment as a necessity owing to intense global competition [17]. Evidence exists that each firm can reduce its annual inventory carrying costs under a consignment program [18]. Main customer benefits arise from the nature of the consignment stocking - they always have material available and pay for raw material consumption only when the items are drawn on for use [2], which brings savings in inventory costs, improves cash flow [6] and increases profits [9]. In case that the consignor arranges replenishment, the consignee can actually save ordering and shipment time by not waiting for new inventory every time [6]. In addition to reducing the operating component of the inventory costs, the main advantage of consignment stocking for the supplier can also be seen in improving production and marketing efficiency [19]. Better perception of his customer's requirements allows to manage better own production also with respect to eventual third parties, save administrative cost for placing an order and to reduce stock-out risk. This reduces the average quantity of the material stored in own inventories and consequently space is available to allocate other items, the supplier may manage his production plan more flexibly as it is not constrained by closed-orders. [2] The fact that the supplier gains access to customers and transfers the responsibility and the cost of stocking could potentially increase sales volume and profits [11]. On the other hand, the consignor's cash flow may suffer as more money is spent on manufacturing the goods,

while cash coming in may be too slow to cover subsequent production runs. Also, higher product returns from the consignees after a long time allow the goods to rot or become damaged in warehouses [6]. According to Valentini and Zavanella consignment stocking has also other intangible advantages, such as a higher degree of flexibility, an increased service level in turbulent environments, a reinforced and reliable relationship between partners [2].

3. PRIMARY RESEACH - CONSIGNMENT STOCKING IN AN ENTERPRISE PURCHASING METALLURGICAL MATERIALS

The task of the enterprise, in which the primary qualitative research was conducted, is to produce products as requested by the parent company, in the required time and quality, at a reasonable price and then deliver them the central store. The enterprise does not know the end customers, and the parent company does not provide any market information. Production plans are only of a framework nature, being based on the plans of the parent company's sales units. Sales units make plans for 12 months ahead, compare the customer requirements with the production capacity and set the enterprise a production plan. Operational production plans are drawn up on the updated requirements of the parent company. Tasks arrive electronically via EDI and are automatically transferred to the manufacturer's information system. Currently, the company delivers products within 24 hours of receiving a request, which is, however, sent by the parent company with respect to production times of individual products. The company focuses all efforts on flexible production, for which it needs a permanent sufficiency of materials.

Therefore, the enterprise aims to conclude consignment agreements with their suppliers, who are the manufacturers. It does not make use of any distribution intermediaries. It has concluded consignment agreements with all suppliers (except one) with which it is interested in developing this form of cooperation. Approximately 85 % of the material for further manufacturing is in consignment. The consignment stock also includes supporting and overhead materials, including office supplies. The company is not interested in consignment stocking of items that are purchased in very small volumes and the frequency of purchases is low. In the case of large volume purchases, it may take years to negotiating the conditions and conclude the consignment stocking agreement.

3.1. Results of Research

An impetus to negotiate consignment stocking in the examined chain is given by the customer. It allows him not only to perform his own flexible production, but also achieve a very significant reduction in working capital. Pursuant to the agreement, the supplier undertakes to set up a store in the premises of the customer while the customer is responsible for the stored items, and bears the risk of loss resulting from improper storage and theft. The agreement also regulates the method of replenishment, timing and way of informing the supplier about the volume of items in the consignment, billing, claims and the related arrangements for the supply of replacement material to the store.

The storage costs are borne by the purchaser, who ensures the acceptance, storage, handling, entry attests, etc. The purchaser also bears the costs of storage and labour costs associated. Also, insurance of the store and consignment inventory is paid by the purchaser. Suppliers bear losses of locked-up capital and pay the transport costs, but these are generally negligible due to the value of the material delivered.

The customer executes consignment stocking in a common store; however, there are 10 - 15 virtual consignment stores created therein. The consignment store replenishment mode depends on the significance of the item to the buyer. Important items are replenished according to mutual agreement, and in principle decision about it are made by customer. Uninteresting items (e.g. office supplies) are automatically replenished by the supplier - the impetus for replenishment to the agreed quantity is achieving the minimum stock levels.

The agreement on replenishment of significant items respects the needs of both sides. The customer takes into account the expected demand. This enables to regulate the level of individual inventory items with regard

to the expected consumption better than in the case of automatic replenishment, which would depend on the actual current consumption without respecting the expected changes in demand. However, the customer respects the supplier's production capacities, knowing its production plan. It allows the customer to conjugate the orders so that the supplier is able to execute them. With special items, the customer must notify of the requirement well in advance and build up higher stocks, because their production takes place at longer intervals after requests by a number of customers are merged.

When ordering, the customer does not utilize an electronic order form, and information systems of the supplier and the customer are not linked. The requirement to replenish is based on a comparison of the quantity of the material in the consignment store and the purchaser's production plan subscribers.

Physical distribution to the consignment store is usually provided by the supplier, which also bears the costs. Most of the material is transported from the supplier's enterprise directly to the customer by rail. Approximately 15 % of the material is delivered by road. The taking delivery and other activities related to the receipt and storage are provided by the customer. The delivery also includes a pro forma invoice (invoicing, however, takes place on the basis of actual consumption).

The customer uses an information system that enables to monitor individual virtual consignment stores separately from the company's property. The moment the material is removed from the consignment store; it is transferred into the assets of the customer. Twice a month, the purchaser informs the supplier about each item of the consignment material (stating the initial/final level, additions and disposals). On the basis of these documents, the supplier issues the invoice.

Too high level of stock in the consignment store is not beneficial either for the supplier or for the customer. The customer does not have sufficient storage space and the supplier bears high losses from capital liability in inventories. Therefore, the supplier regularly monitors the inventory turnover and he asks for solutions with low-turnover items. According to the oral agreement, in case of storage periods longer than two to three months (depending on the item), the customer addresses the situation, for example by giving priority to the material in the consumption (e.g. even at the expense of another supplier). The transfer of expensive items into the purchaser's property is an extreme solution to long-term storage.

The customer considers the consignment stocking system to be very satisfactory, but nevertheless they face certain problems. Approximately once a week, materials needed for production are not available. The main reasons are the surge in demand and possible complaints. Regarding the increase in demand, these are cases of an unexpected requirement by the parent company. This does not stop production and usually the manufacture of another product is commenced. Therefore, the costs of a lack are considered low and are not counted. As for key materials, however, there are no problems with their availability. There is no significant number of complaints. The way of their solution depends on the nature of the problem. If the problem can be solved by the customer, it is a win for both sides. The customer makes adjustments to the claimed material at the supplier's expense, while saving him transportation costs associated with the replacement of the material. However, if such a solution is not possible, the material is returned to the supplier at its expense.

Consignment stocking is so important for the customer that it includes the provision thereof in the supplier evaluation criteria, together with the evaluation of the technical quality, reliability of supply, price levels, maturity periods of invoices and certification according to ISO 9000 series.

3.2. Evaluation of the Research Results

Comparison of theoretical approaches to consignment stocking with the results of the primary research shows that the surveyed consignment agreements show some notable differences as against the efficient processes as recommended by theory, namely:

- There is essentially no information exchange between the supplier and the customer that would allow optimizing the consignment stocking. The purchaser cannot provide forecasts of demand, as it does not

have the information either. However, it does not even provide the information it has, i.e. information about current orders, plans for production or up-to-date consumption of materials in its own production processes.

- Replenishment in the consignment store is managed by the purchaser - he determines the size of order and time of delivery, in accordance with his own purchasing policy, but with regard to the production capabilities of the supplier.
- No quantity range for the stored items has been set as given by the minimum and maximum inventory. The supplier has only a limited scope to influence the consignment inventory level.
- There is no way for the customer to return unused products to the supplier.
- Costs of a lack are borne by the purchaser. However, they deemed the mount to be insignificant. A lack of supply does not halt the production. If the required material is not in stock, other products are operatively produced.
- Loses due to deterioration of long or improperly stored materials do not occur (which results from the nature of metallurgical materials).
- Information on real consumption is given by the customer to the supplier only twice a month. This is disadvantageous for the supplier in two ways - they have information only on the accumulated material consumption and receive cash for products long after they are consumed. If the information is provided daily, the supplier could better anticipate incoming orders from the customer while making its own estimates of future consumption of material from the consignment store. It would also have a positive impact on the supplier's cash flow.

Despite the differences identified, it can be stated that the consignment stocking examined is a tool for building partnerships since it brings benefits to both partners. The most important benefits for the suppliers may be seen in: the ability to optimize their own production (realized in series); the release of storage capacities in their own company; reducing storage costs; providing better service both to the partner and other customers; increasing the efficiency of service to other customers; increasing their own performance; strengthening and stabilizing relationships with customers; realizing higher revenues from sales. The customer benefits, especially in that it has a ready supply, achieves better prices due to large volume purchases from a single supplier; stabilizes the technical quality of purchased materials; gains time on the technical quality control of materials upon entering the production process; makes payments relatively long after consumption; minimizes losses from the capital locked-up in stocks; improves cash flow; increases profits; stabilizes and strengthens the relationship with the supplier.

4. CONCLUSION

The problem of the investigated consignment stocking is the imbalance of benefits it brings to the partners involved. From the supplier's perspective, it is fundamentally a service it provides to the customer who gains greater advantages as it has a higher economic and thus also negotiating power. If there should be further deepening of partnership-based cooperation, it would be desirable to match the total size of the perceived benefits (including financial and intangible benefits).

Many of these problems could be solved by sharing information more extensively and by transferring responsibility for replenishing the consignment stocks to the supplier, as recommended in the literature. This also creates a prerequisite for implementation of modern methods of material flow management in the supply chain, such as Quick Response or CPFR. If both parties are interested in implementing the methods concerned, surely they can find such a form of information and material flow management that will take into account the specifics of the chain and the companies involved namely the difficult demand forecasting and the nature of production processes in the metallurgical industry.

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