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Managing international supply: the balance between total costs and customer service

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Biography

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Abstract

Many trading companies have taken a global approach to their supply markets, sourcing from low-cost foreign countries in order to achieve cost reductions. There remains, however, a lack of evidence that sourcing internationally actually leads to improved economic performance. This can be explained by two key challenges in terms of how to achieve a balance between: (1) purchasing and logistics costs; and (2) total costs and customer service. The purpose of this paper is to examine the organisation and management of international supply from a total cost perspective, taking into account both purchasing and logistics costs, as well as customer service and agility. Previous research into a number of Norwegian companies that have sourced from China has identified four configurations for managing international supply. This paper utilises the supply management literature and an example of a Norwegian retail and wholesale company to analyse and discuss these configurations and their effects on total costs and customer service. The paper's theoretical contribution is the conceptualisation of a total cost perspective on international supply management and the discussion of such costs in relation to customer service. This contribution may, in turn, aid companies that source from foreign, low-cost countries.

Keywords: international supply management, total costs, customer service, configurations

Managing International Supply: the Balance Between Total Costs and Customer Service

Introduction

The present business landscape is characterised by global competition and high cost pressures, both of which have motivated companies to take a global approach to their supply markets. The last few decades have seen a dramatic increase in foreign sourcing, which has been made possible by changes in global economic policy and technological revolutions in transport and telecommunication (Trent & Monczka, 2003; Skjøtt-Larsen, Schary, Mikkola & Kotzab, 2007). Sourcing in low-cost countries such as China has created the opportunity for cost reductions due to fewer regulatory controls and significantly lower wages (Christopher, Peck & Towill, 2006; Nassimbeni & Sartor, 2007). However, companies that source in such countries face several challenges relating to the organisation and management of supply. Despite lower purchasing prices, sourcing in these countries often implies that while logistics costs, such as inventory and transport costs, may increase the ability to react to changes in customer demands – that is, a company's agility – may decrease due to longer lead times and uncertainty in supply (Trent & Monczka, 2003).

The purpose of this paper is to examine different ways to organise and manage international supply. The basic assumption that underpins the paper is that obtaining the benefits from sourcing in low-cost countries presupposes an organisation of supply operations that considers the logistics costs and also ensures agility and quick response to changes in customer demands. The paper analyses and discusses four international supply management configurations, which have been identified in prior research on Norwegian companies that have purchased from China. As an example, the paper uses a Norwegian retail and wholesale company that uses all four configurations based on different considerations. The four configurations are distinguished according to how the supply operations are organised in terms of the structure and interdependencies between the logistics activities and resources involved, and how the different actors relate to each other. The configurations are discussed in terms of their subsequent results for logistics costs and customer service level.

The paper is structured as follows: Section 2 provides the theoretical basis for an understanding of international supply management, based on the literature of supply management and strategies; Section 3 uses the theoretical discussion to analyse and discuss the four different international supply configurations, using the retail and wholesale company as an example; Section 4 outlines the main theoretical and practical implications of the

discussion and the paper concludes by identifying the limitations of the paper and proposing suggestions for future research.

Theoretical basis

International purchasing and global sourcing

The last two decades have seen a dramatic increase in the globalisation of supply markets. In their study of changes and trends in purchasing and sourcing in the United States, Trent and Monczka (1998) found that purchases from foreign sources increased from 9 percent of total purchases to 27 percent during the 1990s, with the increase expected to continue in the following years. The respondents (US executive managers from a broad range of industries and geographic locations) reported that the main reasons for this trend were cost reduction pressures and the need to gain exposure to worldwide processes and product technology.

Unit price reduction is the key driving force that leads Western companies to source from the emerging economies (Trent & Monczka, 2003). China in particular has become one of the most attractive sourcing basins since its entrance into the WTO in 2001 and its subsequent liberalisation of trade and opening up to foreign investment (Nassimbeni & Sartor, 2007). Wal-Mart, for example, sourced products worth 15 billion USD from China in 2003 (Skjøtt-Larsen et al., 2007). Cost reductions are possible in China and similar countries due to fewer regulatory controls and significantly lower wages (Christopher, Peck & Towill, 2006). In addition, technological and organisational advances facilitate sourcing in these countries. As Skjøtt-Larsen et al. (2007, p. 18) suggest, “The development of new information and telecommunication technologies combined with efficient, fast and relatively cheap global transportation systems opens new possibilities. This enables enterprises to reach beyond their own organisational and geographical boundaries to coordinate operations and management through the entire supply chain, without the investment and problems of direct ownership”. Nevertheless, there is still a lack of evidence that global sourcing actually leads to better economic performance (Gelderman & Semeijn, 2006). Despite the recognised advances in technology, logistics still pose a significant barrier and companies underestimate the true costs of international purchasing when searching for the least expensive sources of supply. One-quarter of the unit cost savings from worldwide purchasing activities are lost when the total cost of purchase ownership is estimated (Trent & Monczka, 2003). This is due to the hidden costs associated with longer lead times and increased administrative and budget costs incurred in global strategy development and execution. Studies of the UK retail garment industry

suggest that, in some cases, the move to offshore sourcing can quadruple the time from order to delivery (Christopher et al., 2006). Longer transport distances, increased lead times and uncertainty in supply, often accompanied by additional inventory across extended material pipelines, increases the total logistics costs and the supply risk (Trent & Monczka, 2003). As Christopher et al. (2006, p. 278) remarked, “The paradox is that supposedly low-cost offshore sourcing strategies can end up as high-cost supply chain outcomes”.

According to Stock & Lambert (2001), the key supply management function and competence is the ability to analyse the total costs of a particular supply chain. Supply managers must take the total costs of logistics into consideration and balance these costs in relation to marketing objectives and customer service. Figure 1 illustrates the trade-offs between different costs in marketing and logistics.

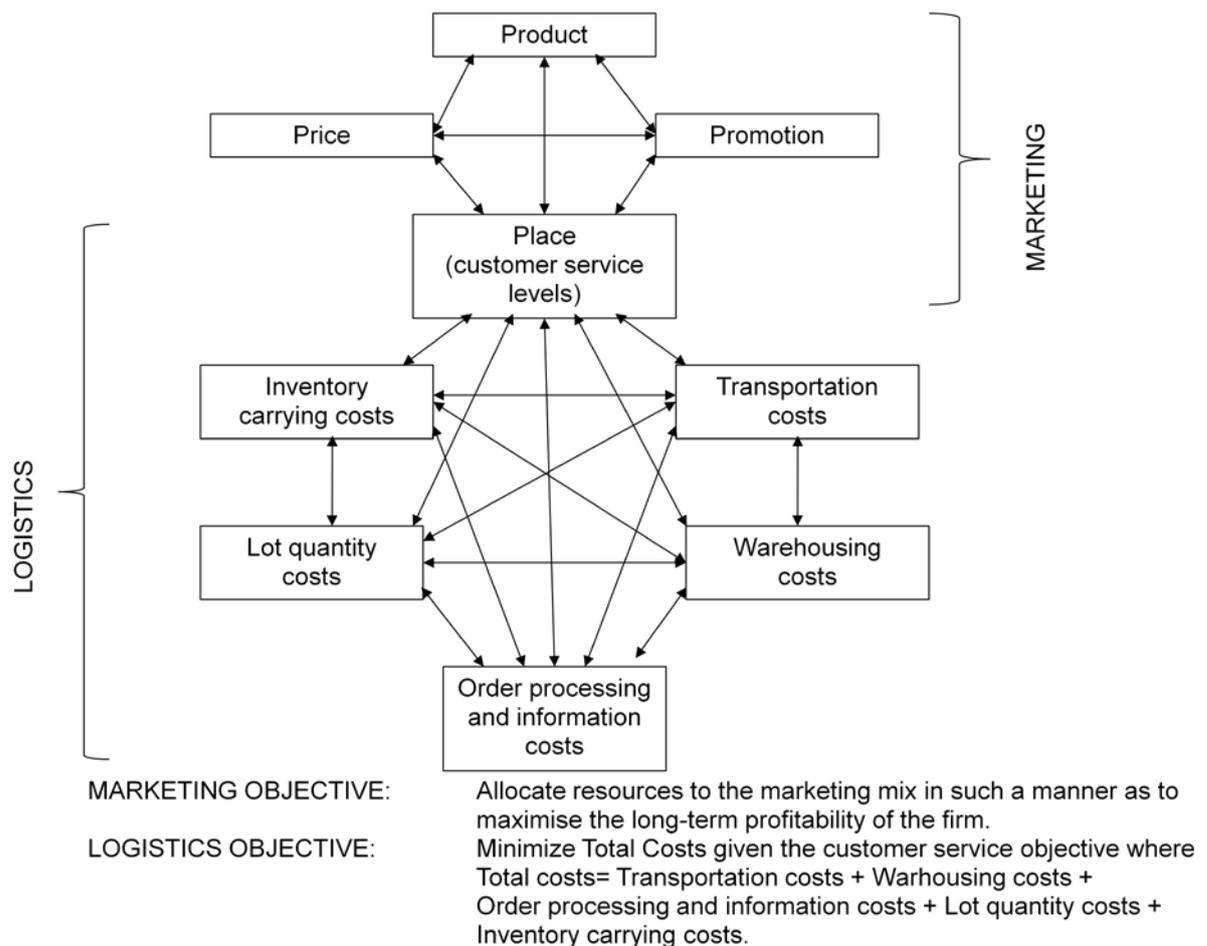


Figure 1: Cost trade-offs required in marketing and logistics

Source: Stock and Lambert (2001, p. 86). © Douglas M. Lambert. Used with permission, all rights reserved.

The model illustrates that, at a given level of customer service, management should minimise the total costs of logistics rather than the individual costs, because a decrease in one is likely to lead to an increase in another. For example, reducing inventory costs by keeping little stock will often require more frequent deliveries and increased transportation costs. The total costs of logistics include inventory carrying costs, lot quantity costs, transportation costs, warehousing costs and order processing and information costs. Furthermore, these must be related to the marketing variables of price, product, place and promotion or, in other words, ensuring that customer service is maintained and the goods are delivered on time and are accessible when needed and that flexibility is inherent in the chosen solutions. According to Lee (2004), many companies tend to emphasise efficiency and cost reductions when building their supply chains at the expense of agility, which refers to a company's ability to react quickly to changes in customer demands. A typical example is a company that delivers only full container loads to customers in order to reduce transportation time and costs. When customer demands fluctuate, the company is unable to react, which results in stock-outs in store and lost sales. The question, therefore, is how to strategise so as to achieve the potential benefits of cost reductions while also ensuring adequate customer service.

Global sourcing strategies

A sourcing strategy on a global scale must overcome many barriers that prevent its successful execution. The ability to source globally is a critical competence (Kotabe & Murray, 2004; Gelderman & Semeijn, 2006) and “may well be one of the last untapped areas that offers the kinds of performance breakthroughs required to remain successful in highly competitive markets” (Trent & Monczka, 2003, p. 627). The question is whether organisations have the resources and capabilities they need to coordinate worldwide purchasing activities; in other words, the appropriate management practices to overcome these barriers and reap the benefits of global sourcing.

Several models and taxonomies for global sourcing strategies have been developed. In a study of Italian companies operating in China, Nassimbeni and Sartor (2007) identified three different sourcing types: (1) imposed sourcing – client and local government regulations require companies to use local Chinese suppliers; (2) intermediary sourcing – a professional third party mediates the transaction between the buyer and the Chinese supplier; and (3) direct sourcing – buying companies pursue either pure market-based transactions or collaborative relationships with Chinese suppliers. The sourcing types depend on contextual factors such as

the size of the buying company, the complexity of the product and the complexity of the industrial market. Nassimbeni and Sartor (2010) also argued that, when sourcing in China, it is important to consider the task distribution between the different actors – that is, the buying company, the supplier and potential intermediaries – in addition to considering cultural aspects. Having a local partner or establishing a purchasing office in China with knowledgeable staff may help companies overcome this barrier. Trent & Monczka (2003) argued that global sourcing implies a more strategic orientation than international purchasing and involves the coordination and integration of items, processes, functions and suppliers across worldwide purchasing, engineering and operating locations. They identified the eight following factors as being critical to global sourcing success and, subsequently, as important constituents in a global sourcing strategy: (1) personnel with the required knowledge, skills and abilities, particularly with cost-analysis skills; (2) availability of required information, facilitated by internal databases; (3) awareness of potential global suppliers, enabled by databases of supplier characteristics; (4) time for personnel to develop global strategies: for example, by appointing a full-time analyst; (5) availability of suppliers with global capabilities/suppliers interested in global contracts; (6) ability to identify common requirements across buying units, enabled by, for example, a common part or coding scheme; (7) operations and manufacturing support/internal customer buy-in by involving users; and (8) direct site visits to suppliers in order to evaluate supplier capabilities and performance. In line with Trent & Monzka (2003), Kotabe and Murray (2004) considered logistics management and the integration of R&D, manufacturing and marketing as the key factors in a global sourcing strategy. At the core of such a strategy is the ability to balance the often contradictory needs of inventing new products, lowering manufacturing costs and responding to ever-changing customer needs. As Kotabe and Murray (2004, p. 14) noted, “Globally operating companies need to be in constant search of methods to ‘kill two birds with one stone,’ or meeting supply-side and demand-side counteracting forces head-on for their sustainable competitive advantage”.

Christopher et al. (2006) developed a taxonomy for global supply strategies based on a similar argument that consists of three main variables: (1) type of product (standard or special); (2) demand (stable or volatile); and (3) replenishment lead-times (short or long). The choice of strategy is a question of differentiation in which supply characteristics determine whether a company should pursue cost-efficiency and lean supply or agility. Depending on the supply characteristics, Christopher et al. suggested strategies that focus on lean, agile or ‘leagile’ strategies. While lean strategies focus on efficiency and work in predictable and stable

environments, agility is primarily concerned with responsiveness and flexibility in order to meet changes in customer demands. The concept of 'leagility' is used to describe hybrid situations in which both lean and agile strategies are used simultaneously. To balance these various objectives, Persson and Virum (2006) suggested that there is a need for management and combination of the organisational structure, planning and control systems, and the physical flow of goods.

Managing global supplier relationships

A global sourcing strategy is related to the way in which a company can exploit its own and its suppliers' competitive advantages and the locational advantages of various countries in global competition (Kotabe & Murray, 2004). Improving global supply base performance involves proper management and the establishment of strategic partnerships with suppliers. Several factors have been found to be significant in the creation of positive global supplier relationships. For example, Handfield and Nichols (2004) identified several "human factors" that are likely to influence global supply performance. These include trust, information sharing, involvement, open communication and personal relationships. Cultural competence is also considered important in cross-border buyer-seller relationships. When sourcing in China, for example, knowledge of Chinese culture and of the local relational system is fundamental for managing the supply, particularly an understanding of *guanxi*, a type of interpersonal relationship characterised by reciprocal help and the exchange of favours (Nassimbeni & Sartor, 2007).

Despite these important findings, the management of supplier relationships has not yet achieved the same level of interest in the global supply management literature as it has in the more general supply management literature (Handfield & Nichols, 2004). However, the general literature has long acknowledged the benefits of establishing close and long-term relationships with suppliers (e.g. Håkansson & Snehota, 1995).

Suppliers play a significant role both in terms of process and product/service improvements (Trent & Monczka, 1998). This is related to the fact that shorter life cycles and a broader assortment create a growing need to coordinate activities across firm boundaries in order to avoid obsolete products, large inventories and long throughput times and lead-times. In addition, suppliers are increasingly being recognized as important contributors to technical development, presupposing collaborative arrangements (Persson & Håkansson, 2007). The creation of connections between customers and suppliers and their respective activities and

resources allows interdependencies to be exploited and greater benefits to be achieved (Håkansson & Snehota, 1995).

The conventional supply management literature has viewed collaboration with suppliers as important only for strategic products (e.g. Kraijlic, 1985). The portfolio models have been criticised, however, for not being dynamic enough or for not taking different dependencies into account (Dubois & Pedersen, 2002). It has also been argued that collaboration can provide opportunities to gain economies in most types of product groups, depending on the types of interdependencies that exist between parties. Persson and Håkansson (2007) referred to Thompson's (1967) dependence typology and stated that in situations where there are pooled interdependencies (which means that two activities are indirectly related through a third activity or the sharing of a common resource), distributive collaboration enables economies of scale and scope. This means that a supplier is given responsibility for a larger volume, which allows for the optimisation of transactions and production, and as such, lowering costs for commodity products. In situations where there are sequential interdependencies, the output of one activity is the input to another. Functional collaboration allows for economies of integration through better coordination and planning of the sequences. The third method of collaboration is systemic collaboration, in which efforts are directed towards exploiting reciprocal interdependencies. This means that there is a mutual exchange of inputs and outputs between two parties, which provides opportunities for innovation, as well as agility in terms of quick responses to changes in demand. Systemic collaboration is an option related to components (or services) that play a significant role in differentiating the final product.

Such interdependencies can also be exploited and economies of innovation and agility can be achieved by encouraging adjustments and collaboration between suppliers in the broader supply network (Håkansson & Persson, 2004). According to Persson & Håkansson (2007), the different collaboration types relate to the different management focus. While the first type of collaboration requires standardisation and specialisation to gain the benefits, coordination and mutual adaptation are required for the two latter types.

A review of the literature on supply management has revealed some key issues that need to be considered when organising and managing international supply. The literature on international supply management recommends paying attention to the total costs of international sourcing. The growing interest in buying from foreign, low-cost countries offers the potential to reduce purchasing costs. The problem is that these reductions are often offset by increased logistics costs and low customer service levels caused by increased uncertainty.

The combination of this knowledge and the general literature suggests that companies should differentiate and seek to exploit interdependencies between different actors and their activities and resources to reduce their total costs. This means not only ensuring the efficiency and cost effectiveness of the operations, but also of sustaining agility and customer service (Figure 2).

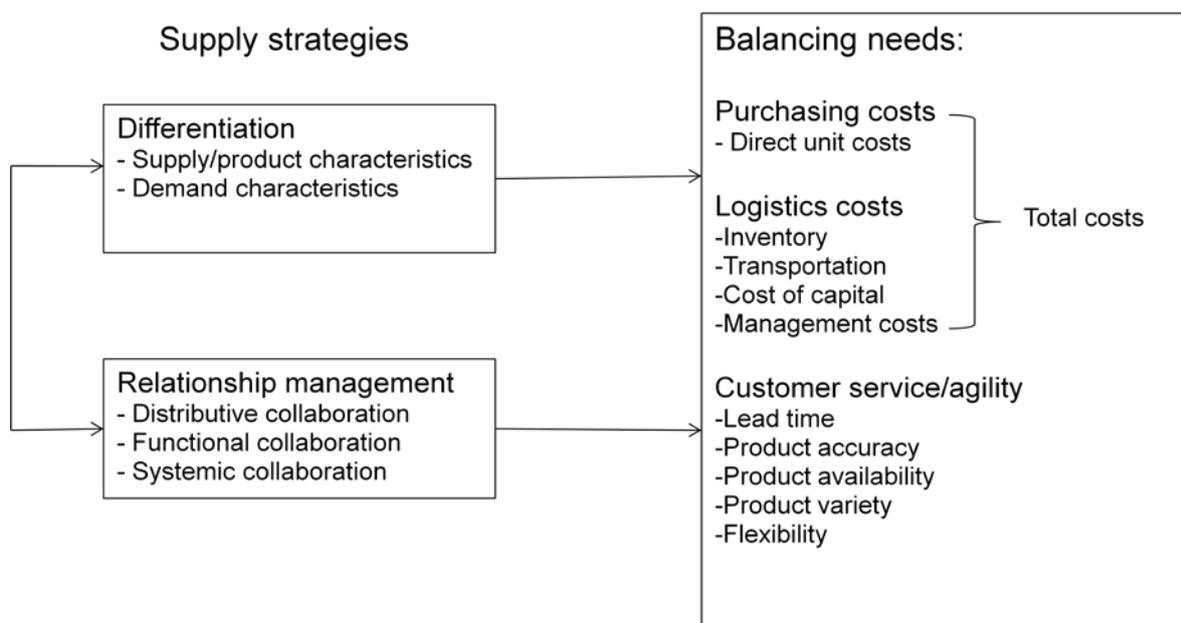


Figure 2: Summary of key aspects from the literature

Managing international supply configurations

Background and empirical setting

Based on several years as consultants and researchers on issues related to the sourcing strategies of companies, the authors of this paper have observed that international supply is handled in different ways. The setting for these observations has been Norwegian companies from various industries, including construction, marine and retail/wholesale, that have sourced from China. For the last three years, China has been Norway's third most significant import trade partner (Statistics Norway, 2009). Large order quantities are typical for imports to Norway from China so as to ensure the lowest possible price and priority from suppliers. Approximately 70 percent of imports to Norway come through the Oslo area (Statistics Norway, 2009). In order to meet the challenges of increased growth, as well as long and often uncertain delivery times, central warehouses have been built to meet the Norwegian customers' demand for service. For example, Norwegian importers traditionally require that the retailers pre-order so as to spread the risk. Due to the uncertainty, it is quite common to

order extra quantities. The goods are distributed from the central warehouses to retailers in Norway, mostly by trucks. This solution is expensive in terms of inventory costs, including capital costs and obsolescence, as well as physical warehouse costs and extra transportation costs. Local transport costs in Norway are sometimes higher than the costs of transportation from China to Oslo. Besides, those solutions that rely heavily on distribution by truck are not environmentally friendly. Given this situation, the Government and the companies themselves both feel the need to develop new and more flexible solutions.

The next section presents four different ways in which Norwegian companies organise and manage international supply. The implications of each of these configurations are discussed in terms of logistics costs and customer service, based on the theoretical framework presented earlier. To keep things simple, a leading “hard-discount” retail and wholesale company in Norway was chosen to illustrate and discuss the implications of the four configurations. The company offers both food and non-food products, including hygiene products, gifts, tools, toys, clothing, music and games. Its business logic is centred on low prices and high volumes of commodity products. Like many similar European companies, it purchases many of these products from China to achieve cost reductions. It uses different supply configurations based on criteria relating to volume and value. The company is a relatively small customer and thus receiving priority treatment from Chinese suppliers is a challenge, especially as it is competing with large retail and wholesale companies such as Wal-Mart. The company has its own wholesale function and many retail stores, most of which are owned by the company. The term “wholesaler” is used here in reference to the central wholesale function of the company and “retail store” is used in reference to shops that are also the final customers in these examples (consumers are not considered in this context)(Figure 3).

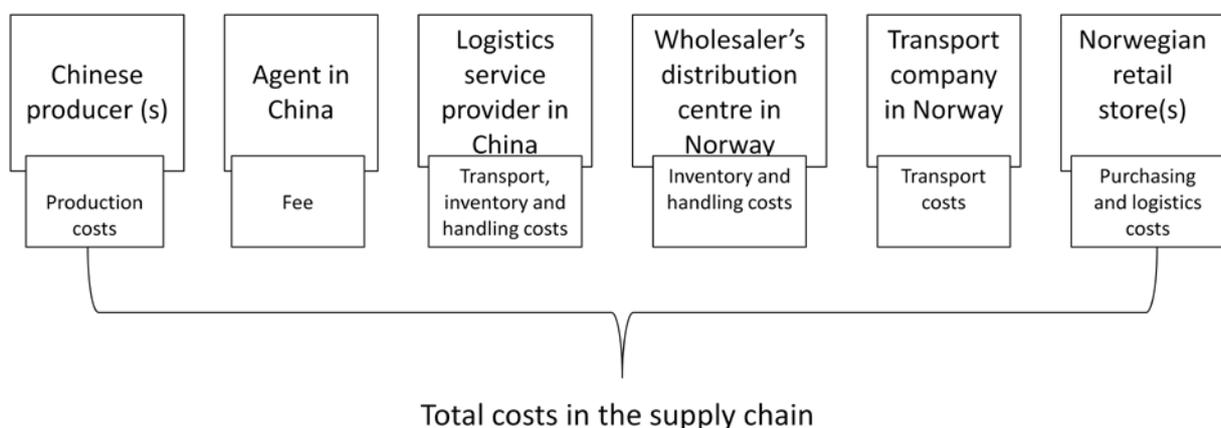


Figure 3: Actors and total costs involved in the example of the Norwegian retail and wholesale company.

Configuration 1: Deliveries between individual producers and retail stores

Description

The first configuration refers to supply situations that involve direct shipments from individual producers in the supply country to individual retail stores in the end markets. For the example company in this paper, this represents situations where retail stores in Norway order from individual suppliers in China. The orders are primarily handled by the wholesaler and given to an agent in China, who communicates the order to the specific producer. Although the information flow is coordinated by the wholesaler, it is based on an individual store's requirements. This might be a single transaction but often involves repeat transactions of a specific high-volume product. The distribution is typically based on container units, with one or more per shipments, which are then shipped and trans-shipped directly to the retail stores. Typically, the activities that the supplier performs are limited to packing the shipments into the container and, depending on the delivery terms, being responsible for the transportation documents. Normally, one or more transport companies handle the container units all the way to the final recipient. The only consolidation that takes place during the transportation phase is to consolidate the container units with other container units at certain stages of the transportation chain. However, consolidation within each container is also provided by the agreed shipment sizes between the supplier and the customer.

Analysis

The activities in Configuration 1 are, primarily, organised sequentially from the producer's production facilities and warehouse, via the transport company's logistics facilities in China and Norway to the retail store. The flow of goods depends on the proper distribution of information and the competencies of the respective parties. The volumes must be high in order to reduce the total costs in this configuration and ensure full container loads. Otherwise, the transportation costs are likely to outweigh the purchasing costs. However, this implies that the retail store will take on a high degree of risk due to the need for storage capacity and capital binding. Because of the high inventory costs in Western countries such as Norway, it is not cost efficient to maintain a high inventory level. There is also a risk of obsolete products. Given these conditions, the retail company in this example uses this configuration primarily for items that are high volume but low value; for example, in relation to a promotional campaign for a specific product. Due to long lead times and limited consolidation

potential, the company may have limited agility in terms of meeting changes in customer demands, except for the last part of the chain (local distribution in Norway).

The potential benefits of this configuration include opportunities to strengthen the one-to-one relationship between the supplier and the specific retail store, by such means as creating loyalties and exit barriers in the relationship. This presupposes that there are repeated transactions. There is also the potential to gain economies through collaboration and integration; these could include adaptations in administrative routines such as time scheduling. Increased customer service is also possible because direct customer input in conjunction with the supplier's product knowledge can enable new and customised supply solutions, as well as customised products.

Configuration 2: Consolidation of shipments in the customer country

Description

The second configuration is similar to the first one, except for an important difference in the distribution activities that are performed in the customer country. This is the configuration that the example company uses most commonly. Instead of being shipped directly to an individual retail store in Norway, the items from China are shipped to the wholesaler's distribution centre in Norway (DCN), which handles and consolidates the shipments to different retail stores. Typically, the first part of the supply chain in this model is based on container units – one or more per shipment – which are filled by the supplier in China. The container is shipped and trans-shipped to the DCN. The activities performed by the supplier are limited to packing the shipments into the containers and, depending on the delivery terms, being responsible for the transportation documents. One or more transporters will then usually handle the units all the way to the final recipient. The only consolidation that takes place during this part of the transport chain is that the container units are consolidated with other container units on parts of the transport route. However, consolidation also occurs within each container due to the agreed shipment sizes between the supplier and the customer. In this configuration, the DCN handles the activities directed towards stores in Norway, including control, container stripping, storage, labelling, final order handling, picking and local distribution. In this way, the local deliveries are consolidated with other shipments to the same stores, which provides greater potential for consolidation in local transportation.

Analysis

The sequential features of the activities in Configuration 2 are the same as those in Configuration 1, in which the various supply operations act as inputs to the next operation.

They also involve similar resources. The main difference is the role of the DCN. Consolidating different products to different retail stores makes it possible to exploit pooled interdependencies. When different retail stores share the resources provided by the DCN and its competencies, this leads to important cost reductions. The local distribution costs in Norway are a significant part of the total supply chain cost. Consolidation in this final part of the supply chain is likely to provide economies of scale and of scope. This is expected to provide a relatively better cost position than Configuration 1. Nevertheless, it also requires that the total demand of the product in Norway is high enough to ensure multiple, full container loads from China, while the product can still be consolidated with other products in the containers to the individual retail stores. Although this reduces transportation costs, it does incur high inventory costs for the DCN.

In terms of customer service, consolidation with other deliveries to the same retail store would normally provide for a better delivery frequency than Configuration 1 and, accordingly, somewhat higher responsiveness and agility in responding to customer demands.

Configuration 3: Consolidation of shipments in the supplier country

Description

The third configuration refers to supply situations in which the shipments are sent from different suppliers to a distribution centre in the supply country that is controlled by a professional service provider. In the example, shipments from Chinese producers are delivered to a distribution centre in China (DCC), which is owned and operated by a third party logistics provider (3PL). This DCC then performs several tasks, including control, container stripping, storage, labelling, final order handling, picking and local distribution. Final delivery units to the individual retail stores are consolidated, prepared and labelled for delivery directly to each store. Deliveries to the same stores from several suppliers are consolidated into container units following preparation, such as cross-docking and then sent directly to the stores in Norway.

Analysis

Like Configuration 2, this configuration exploits both sequential and pooled interdependencies in order to achieve various economic benefits. There is huge potential for economies of scale through consolidation of the transportation from the DCC to the stores, which exploits the DCC's resources. At the same time, transportation from suppliers to the DCC can also be consolidated across different suppliers, thereby achieving reductions in transportation costs in China. Furthermore, coordination of deliveries from several suppliers

allows for economies of scope by utilising pooled interdependencies. This configuration is likely to incur lower inventory costs than Configuration 2. Such costs are considerably lower in China, primarily due to the lower labour costs. These factors mean that this configuration is the most cost efficient for shipments that contain various products to the final customer that do not, by themselves, constitute full container loads. As a result, this often involves lower volumes of medium value products.

In this configuration, the adjustments to customer requirements are made at the DCC or in the interface between the DCC and suppliers. Consequently, the lead times for responding to changes are often quite long and, therefore, this model has limited agility, which, in turn, will have a negative influence on customer service.

Configuration 4: Consolidation in both countries

Description

The final configuration refers to situations in which there is a DC in the supplier country and in the customer country (China and Norway, respectively, in the example). The shipments are sent from the producers to a DCC where they are consolidated for delivery to the same DCN, although it is not yet customer-specific. This method allows consolidation in the main transport route between China and Norway. At the DCN, the containers are stripped and, depending on the delivery situation, either stored or sent directly to the stores through a cross-docking process. The DCN is responsible for activities such as packing, labelling and consolidating products for the next level in the supply chain. The deliveries from various suppliers in China are then sent as consolidated shipments to the retail stores in Norway.

Analysis

This final configuration exploits both sequential and pooled interdependencies by using the various resources identified in the previous configurations. This configuration is the most cost efficient for products that constitute less than full container loads to the individual retail stores but which can be combined with other shipments to the DCN. This method makes it possible to achieve consolidation in transportation between China and Norway and, in turn, lower transportation costs. The products would be consolidated at the DCN. This configuration is most appropriate for high-value products of lower volume.

Even if this configuration has merits in terms of economies of both scale and scope, shifting the manpower-intensive activities from China to Norway makes it less attractive than Configuration 3. However, in comparison with Configuration 3, moving activities that require

flexibility to customers' changes closer to the customer will enhance lead-time reductions and increase agility, which will improve customer service.

Summing up the analysis of the four configurations

As the preceding sections have explained, the four configurations can be described according to a division of activities and use of resources among the various actors, exploited dependencies and implications for logistics costs and customer service. Table 1 summarises the four different configurations.

Table 1: Content of the four international management configurations

Configuration	Actors	Activities	Resources	Interdependencies
Alternative 1	One producer, transport companies, wholesaler and one retail store	Ordering and handling of shipments from individual suppliers to individual stores	The actors' physical resources and competencies	Primarily sequential
Alternative 2	Several producers, transport companies, DCN and several retail stores	Consolidation of shipments from several producers to individual stores at the DCN	The actors' physical resources and competencies, particularly the DCC's	Both sequential and pooled
Alternative 3	Several producers, transport companies, the DCC and several retail stores	Consolidation of shipments from several producers to individual stores at the DCC	The actors' physical resources and competencies, particularly the DCC's	Both sequential and pooled
Alternative 4	Several producers, transport companies, DCC, DCN and several retail stores	Consolidation of shipments from several producers at the DCC to the DCN, which further consolidates shipments to individual stores	The actors' physical resources and competencies, particularly the DCC's	Both sequential and pooled

The four configurations differ in terms of whether the orders from Norway to the Chinese suppliers are based on the retail stores' actual orders and demands, or on a forecast from the wholesaler that consolidates the shipments in a DC in either Norway, China, or in both countries. The first configuration involves a direct shipment from an individual supplier and an individual retail store. In the other configurations, goods are stored at a DC, where they are

handled and ordered by a third party. Table 2 illustrates the economic implications of the four configurations.

Table 2: Implications for logistics costs and customer service

Configurations	Logistics costs	Customer service
Alternative 1	High transportation costs. High inventory costs and risk of obsolescence for customer/retail store.	Long lead times result in low supply chain agility. However, the one-to-one relationship between producer and retail store enables customisation.
Alternative 2	Lower transportation costs in Norway because of consolidation but high inventory costs at the DCN and risk of obsolescence.	Agility in the supply chain due to the role of the DCN, enabling quick responses to customer demands.
Alternative 3	Low transportation costs in the route from China to Norway because of consolidation at the DCC. Low inventory costs because of consolidation at the DCC.	Long lead times result in low supply chain agility.
Alternative 4	Lower transportation costs in the overall supply chain. High inventory costs because the final and most labour-intensive consolidation takes place at the DCN.	Agility in the supply chain due to the role of the DCN, enabling quick responses to customer demands.

All of the configurations typically involve a trade-off between various logistics costs, particularly in relation to transportation and inventory. Focusing solely on reducing transportation costs will increase inventory costs and vice versa. Configuration 1 requires large-volume orders to fill a container and therefore reduces transportation costs because there is no consolidation of shipments. However, full container loads result in large stock holdings in Norway, which incurs high inventory costs and the risk of obsolescence. In Configuration 1, the retail stores must bear these costs, while in Configuration 2, they are borne by the DC in Norway. In Configurations 3 and 4, consolidation in China will lead to greater transportation

efficiency since it allows for full container loads that contain different products from different suppliers. Configuration 3 involves pre-orders from the store and no inventory in Norway, while in Configuration 4, orders to the supplier are based on a forecast from the wholesaler (based on prior demands from the retail store) and the items are stored at the DC in Norway. Initially, Configuration 3 appears to be the most beneficial in terms of reducing the total costs, since it allows for reduced transportation costs while also keeping the inventory costs down by using a DC in China only. As this paper has shown, the four configurations differ according to whether the store, the wholesaler or third parties at either of the two DCs must carry the risk of obsolescence and the resulting costs. This also relates to who assumes the responsibility and ownership of the products at which point in the chain.

However, reducing the total costs is not the only concern for companies. Even if a company sources from China; for example, by using Configuration 3, which allows for cost reductions that may ultimately benefit the customer in terms of reduced unit prices, longer lead times increase supply uncertainty and risk. The key issues for most companies are offering customers a broad range of product variants, delivering the products on time with the right amount and quality and being flexible to respond quickly to changes in demands and thereby sustaining appropriate service levels.

In line with many similar European companies, the example company in this paper buys low-cost standardised items from China. Such products do not induce a great deal of loyalty from the final customer. Hence, if a retail store runs out of such items, there is an increased risk of lost sales. Similarly, many of the products that are imported from China are seasonal products or used in marketing campaigns. Fireworks are usually of little use for most European customers in January; these products must be available before New Year's Eve. Therefore, companies must differentiate across different products to ensure that a focus on the costs is accompanied by proper consideration of customer service levels. The example retail and wholesale company differentiates according to volume demand and product value. Nevertheless, Configuration 2 is the most commonly applied solution, regardless of the type of product. This is because changes in demand may be unpredictable; if the weather is good, more beach accessories are bought and if a hair product is ranked on the top ten by a famous stylist in a magazine, the stores will experience an increase in sales. This illustrates that, even if inventory costs are much higher in Norway, the company prefers to retain larger stocks and thereby prevent stock-outs and lost sales.

Concluding discussions and implications

Towards an understanding of international supply management

This paper started with the purpose of examining the organisation and management of international supply, based on a review of supply management literature and the example of a Norwegian retail and wholesale company that buys hard-discount products from China. The paper has presented and analysed four different supply management configurations. In line with suggestions in the literature, a total cost perspective has been applied (Trent & Montzka, 2003) and typical trade-off challenges between logistics costs and marketing objectives (Stock & Lambert, 2001; Lee, 2004) have been identified and discussed. The discussion has revealed that it is vital to coordinate the various actors' activities and resources to generate efficiencies in terms of the proper flow of goods (i.e. lean), cost effectiveness of the overall solution and customer service in supply (Persson & Håkansson, 2007). Supply chain management has traditionally centred on utilising sequential interdependencies (Håkansson & Persson, 2004) and creating efficiency (Lee, 2003).

The example and discussion in this paper has illustrated how pooled interdependencies can also be exploited by shipment consolidation methods, such as cross-docking, coordination and collaboration among suppliers and customers, which also generates economic benefits. In particular, the entrance of new types of actors, such as third- and fourth-party logistics providers, with their competence in planning and coordination using advanced technology and systems, offers new possibilities to utilise the specific resources and competencies of these actors. Apart from providing economies of scale and scope through pooled interdependencies, shifting the responsibility for supply operations to external professionals allows customers to reduce supply risk. In order to gain cost benefits through consolidation, while still ensuring agility, the paper has shown the need for coordination and collaboration among various suppliers and customers. Distributive and functional collaboration (Persson & Håkansson, 2007) between suppliers, customers and third parties makes it possible to coordinate and integrate different supply activities and to utilise resources that have the potential to reduce logistics costs and increase efficiency. In addition, systemic collaboration may encourage the development of new solutions across parties in the network, such as just-in-time solutions, which improve agility and the ability to respond quickly to changes in customer demand. In sum, the discussion reveals that, in order to balance between different objectives, it is vital to have proper organisation of the flow of goods accompanied by a proper organisational

structure and technology (Persson & Virum, 2006). Table 3 summarises the discussion of the identified aspects of the supply chain configuration alternatives.

The main managerial implication of this paper is that companies must be aware of the potential pitfalls of buying cheap products in foreign low-cost countries. Purchasing managers may be blinded by the substantial reduction in purchasing costs that producers' in such countries offer.

Table 3: Summary of the discussion of the four international supply management configurations

Configurations	Efficiency (lean)	Effectiveness (total costs)	Agility	Supply risk	Supply strategy
Alternative 1	Yes, but requires high volumes	Yes, but requires high volumes	Lack of flexibility, long lead time	Delays and obsolescence	Functional collaboration to exploit sequential interdependencies
Alternative 2	Yes, but requires high volumes	No, adds extra inventory cost in the buying country	Yes	No	Functional collaboration to exploit sequential interdependences, but distributive to exploit pooled interdependencies in the buying country
Alternative 3	Yes	Yes	Lack of flexibility, long lead time	Delays	Functional and distributive collaboration to exploit sequential and pooled interdependencies
Alternative 4	Yes	No, adds extra handling and inventory cost	Yes	No	Functional and distributive collaboration to exploit sequential and pooled interdependencies

However, as this paper has shown, managers should also be aware of the logistics costs and pay particular attention to the trade-off between transportation and inventory costs. Furthermore, a total cost perspective must be viewed in relation to implications for customer service. The literature has especially recognised the fact that the choice of global supply

strategies depends on different supply characteristics, where the type and complexity of the products are important (e.g. Christopher et al., 2006; Nassimbeni & Sartor, 2007).

In line with the theory, the current paper provides an example of a Norwegian retail and wholesale company that has pursued various supply chain configurations according to the volume demand and value of the product. Despite this, as the company most frequently applies Configuration 2 with a DC in Norway, this suggests that the company has prioritised customer service over higher inventory costs. This is in contrast to Lee (2004), who argued that most companies seem to pursue efficiencies and cost effectiveness over agility. Another challenge for these companies is that many of them are relatively small. This can mean that they are not as attractive to Chinese suppliers, which may influence their choice of strategy.

The question, nevertheless, is how companies such as the retail and wholesale company can reduce their total costs while still maintaining sufficient customer service. Nassimbeni and Sartor (2007) suggested that companies must distribute the tasks among different actors and define the existing reciprocal interdependencies. In other words, the organisational structure must be designed properly. This is in line with Persson and Håkansson's (2007) argument for different types of collaboration to exploit interdependencies. Furthermore, companies must be conscious of the need for proper communication and relationship handling when sourcing in geographically, socially and culturally distant locations (Nassimbini & Sartor, 2007). Such sourcing requires relationship-handling competencies, which is best catered for by engaging local agents or establishing purchasing offices in China. This means that creating a supply network, characterised by proper task distribution, utilisation of different types of competencies and collaboration among the actors could generate efficiency, cost effectiveness and agility.

Limitations

The limitations of the paper relate to the lack of systematic data. The paper is primarily conceptual and has utilised knowledge gained from previous research and consultancy work with various Norwegian companies that source from China. The aim of the study has been to identify different configurations that companies use in order to manage international supply when sourcing from low-cost countries. The findings from the Norwegian "hard-discount" retail and wholesale company are used as an empirical example in the discussion. Although the findings cannot be generalised in a statistical sense, they have been discussed in relation to the current supply management literature and an analytical generalisation has been made (Yin, 2009).

Suggestions for future research

Future research should add systematic empirical data on the topics that this paper has discussed conceptually. Such research could focus on the extent to which the different configurations are actually used by different companies and the results that they have provided. Studies of this nature could estimate the various logistics costs and trade-offs between such costs and customer service. Furthermore, the task distribution between different actors in an international supply network, such as that managed by the retail and wholesale company in this paper, could be mapped and the optimal division of labour for achieving cost reductions and maintaining customer service could be estimated. Finally, although the cultural dimension of handling supplier relationships in foreign countries has not been an issue in this paper, this dimension is likely to be important when managing international supplier relationships (Kotabe & Murray, 2004). The cultural dimension should be included in an empirical study that focuses on the relationship dimension, given that this influences the relationship handling costs and consequently the total costs of international supply management. Such a study would enable the development of a framework for how to manage international supplier relationships in order to ensure reduced costs while still maintaining customer service.

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