Differentiated Supply Chains Strategies Based on Customer Insights

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ABSTRACT

Supply chains satisfy customers by striving for delivering the right products to the right place at the right time, at the right quality and at the right quantity within an increasingly faster pace and lower cost. One implication that can be made from this is that the nature of markets is the point of departure in both supply chain design and operations. Given that organizations usually offer a wide range of products and services with different supply and demand characteristics, one could argue that organizations conduct business in various types of non-coherent business environments. There has been a recognition that 'one-size-fits-all' supply chain strategies only satisfies a limited number of business environments, and that it is increasingly necessary to develop several differentiated supply chain strategies to satisfy all major business environments in a better way. This paper employs a descriptive case study approach to illustrate how a case company develops differentiated supply chains based on customer insights. Case study findings reveal that one efficient way to develop differentiated supply chain strategies is to combine different supply and delivery methods into supply chain solutions. By combining relatively few supply and delivery methods it is possible to develop several differentiated supply chain strategies.

1. INTRODUCTION

In recent years there has been a recognition that the traditional 'one-size-fits-all' supply chain strategies only satisfies a limited number of customers or business environments since firms usually offer a wide range of products and services with different supply and demand characteristics [1-2], and that this also opens new avenues for competitive advantage for firms. It is consequently of growing importance to develop several differentiated supply chain strategies to stay competitive and satisfy several major customers/business environments in a more accommodating way.

One concept for determining supply chain strategies is the concept of "market qualifiers" and "market winners" [3]. It is important to understand what the basis is for entering into a competitive area since this constitutes the "market qualifiers". Moreover, to obtain an order requires specific capabilities; the "market winners". Consequently the definition of market qualifiers and market winners logically defines the specification of the appropriate supply chain strategy [4]. Lean supply strategies are most powerful when cost is the market winner, whilst agile supply strategies are most powerful when service and customer value are the market winners [5]. Although lean and agile approaches are often discussed as opposing paradigms, they share a common objective: meeting customer demand at the least total cost [6]. It is in terms of the characteristics of this demand and the basis of meeting customer demand that the two approaches differ.

Researchers have in recent years suggested that the two approaches may be integrated in a variety of ways to create so-called "leagile" strategies [7-9]. This research uses descriptive case study approach to illustrate how a case company has developed differentiated supply chains mainly based on customer insights. Our research objective is to

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provide an increased understanding to the following questions: (1) 'How customers influence the configuration of operations in an international manufacturing company?', and (2) 'How different delivery methods (make-to-stock, assembly-to-order, engineering-to-order) are used in contemporary manufacturing related supply chains?'

This paper is structured as follows: First we present a literature review of supply chain strategies in Section 2. Thereafter, Section 3 presents and discusses research approach and data collection. Section 4 presents case study findings which reveal an efficient way to develop differentiated supply chain strategies by combining different supply and delivery methods into supply chain strategies. In the final Section 5 research is discussed and concluded, and further research avenues are proposed.

2. LITERATURE REVIEW: SUPPLY CHAIN STRATEGIES

Fisher [10] discussed two types of supply chain strategies: efficient supply (i.e. lean supply) and responsive supply (i.e. agile supply).There is an essential difference between lean supply chains that focus primarily on efficiency (i.e. costs and productivity) and agile supply chains that focus primarily on effectiveness (i.e. responsiveness). Supply chains emphasizing efficiency create a risk that production does not meet customer demand if it is not responsive enough, while supply chains emphasizing effectiveness create risk of low production efficiency [10]. Helo [11] identified efficiency and flexibility as components of productivity, but if markets do not appreciate high variety and low lot sizes, product mix flexibility is worthless.

If the supply chain is ineffective there is an impending risk that when e.g. the customer wants to buy a specific high fashion garment the shelf in the shop is empty, which leads to lost sales and lower customer satisfaction. On the other hand, if the supply chain is not responsive to fashion changes, there is a huge risk for a high level of unsold goods that have to be sold at reduced prices with lower margins (also possibly leading to increased customer stocks at home, cannibalizing future season sales; see [12-13]).

An important concept for determining manufacturing strategies is the concept of "order qualifiers" and "order winners" [12]. It is important for every organisation to understand what the basis for entering into a competitive area is since this constitutes the "order qualifiers". Moreover, to obtain an order requires specific capabilities which have been termed "order winners" by Hill. Consequently the definition of order qualifiers and order winners logically defines the specification of the appropriate manufacturing strategy. Several authors have borrowed these ideas to develop a wider supply chain oriented concept of "market qualifiers" and "market winners" to which they connect the lean and agile supply paradigms (e.g., [4, 14]). The lean paradigm is most powerful when cost is the market winner, while the agile paradigm is most powerful when service and customer value are the market winners.

The common objective of lean and agile is meeting customer demands at the least total cost [6] and the differing objectives of the two approaches are the characteristics of this demand and the basis of meeting customer demands [15]. Researchers have in recent years suggested that the two approaches may be integrated in a variety of ways to create so-called "leagile" approaches (see e.g. [15-18]). In the following sections, the three supply chain strategies: lean, agile and leagile are described in more detail

2.1 LEAN SUPPLY

Lean Manufacturing has attracted a major interest in recent years which also extends to the wider concepts of the "Lean Enterprise" [19-20]. The increase of interest in lean principles can be traced to the Toyota Production System (TPS) with its focus on the reduction of waste, or muda [23]. "Leanness means developing a value stream to eliminate all waste, including time, and to enable a level schedule." [7]. Christopher [5] argues that lean principles are applicable in environments where demand is relatively stable and therefore predictable and where variety is low.

Towill et al. [22] argue that the concept of leanness in a supply chain environment follows proven rules for simplifying materials flow. This similarity between the concept of leanness and "rules for" excellent materials flow has earlier been noted by Womack & Jones [20]. Consequently, the focus of improvement efforts, in terms of the lean approach is planning, development, coordination, organization, integration, control and review of the materials flow across the supply chain. The objective is to get the right product, at the right time, to the customer with minimum of handling and buffering. It includes reduction of inventories, reduction of lot-size, reduction of the supplier base, evaluating suppliers based on quality and delivery performance, establishing long-term contracts with suppliers, and elimination of paperwork [21].

2.2 AGILE SUPPLY

According to Christopher lean principles are applicable in environments where demand is relatively stable and therefore predictable and where variety is low [5]. On the contrary, in those environments where demand is volatile and customer requirement for variety is high, a much higher level of agility is required. "Agility means using market knowledge and a virtual corporation to exploit profitable opportunities in a volatile marketplace." [7]. This implies that the constraints of the market must be known in order to identify the best starting point for development of an effective and efficient supply chain strategy. Only when the possibilities of the market are known and understood can an organization attempt to develop strategies that will meet the requirements of both efficiency and effectiveness [10, 17].

Christopher [5] described agility as "a business-wide capability that embraces organisational structures, information systems, logistics processes and in particular, mindsets". A key characteristic of an agile organisation is flexibility [5]. In that respect, the origins of agility as a business concept lie partly in flexible manufacturing systems (FMS), which through automation (i.e. reduced set-up times) tries to enable rapid changeovers and as a result create responsiveness to changes in product mix and volume [17]. This idea of manufacturing flexibility has later been extended into the concept of agility as an organizational orientation [24]. Gunasekaran defined agility as the ability to respond to market changes in a cost effective and profitable manner [25].

The focus of improvement efforts in the agile approach is on integrating the information flow across the supply chain with the objective of creating a market-responsive supply chain that responds quickly to unpredictable demands to minimize lost sales, forced markdowns and obsolete inventory [9, 26]. A market-responsive supply chain emphasizes market mediation to a greater degree than the role of ensuring efficient physical supply of the product [21]. This requires reduction of process and information lead times throughout the supply chain [26]. It includes coordinated planning, improved communication, and increased access to demand information throughout the entire supply chain [21].

2.3 LEAGILE SUPPLY

Naylor et al. [7] created the term "leagile" to refer to hybrids of the lean and agile approaches. Based on this merged strategy Christopher & Towill [17] visualized three distinct lean-agile hybrids.

The first lean-agile hybrid is founded on the Pareto Rule, recognizing that 80% of a firm's revenue is generated from 20% of products It is suggested that the dominant 20% of the product assortment can be managed in a lean make-to-stock manner – given that demand is relatively stable for these items and that efficient replenishment is the appropriate objective – while the remaining 80% can be managed in an agile manner [6].

The second lean-agile hybrid is founded on the principle of base and surge demand, recognizing that most companies experience a base level of demand over the course of the year. It is suggested that the base demand can be managed in a lean manner while demand peaks over the course of peak seasons or heavy promotion periods can be managed in an agile manner [6].

The third lean-agile hybrid is founded on the principle of form postponement [6]. Form postponement refers to delaying the final form of a product until an order is received from customers dictating the quantity and qualities of the products demanded [27-30]. It was suggested that the production of generic, semi-finished product can be managed in a lean manner, while the customization process requires agile principles [4].

3. RESEARCH APPROACH AND DATA COLLECTION

This paper employs a descriptive case study approach to illustrate how product development and commercialization can be integrated, into a product management flow, to realize innovative and faster product development. It is an embedded case study from the Swedish appliance industry [31] the case company is Electrolux. Empirical data was collected from several sources to enhance understanding by examining the research object from several perspectives. The study is based mainly on data gained from in-depth interviews with a key person representing senior management at the case company. In addition a number of industry reports were examined in order to get information on both the industry and case company backgrounds. Furthermore a vast amount of PR-material (e.g. press releases, annual reports presentations produced by the company) was also included. The collected data has been analyzed by primarily using the principles of pattern-matching and explanation-building [31].

4. CASE STUDY FINDINGS

Electrolux is a global leader in home appliances and appliances for professional use. They sell more than 40 million products every year to consumers and professionals in 150 countries. The largest markets are in Europe and North America and the strongest market position is in Europe. In 2006, they had sales of SEK 104 billion and 59,500 employees [33]. The product range includes refrigerators, dishwashers, washing machines, vacuum cleaners and cookers. The products are sold under several brands – such as Electrolux, AEG-Electrolux, Zanussi, Eureka and Frigidaire – but the major share of products is sold under the Electrolux brand.

The case company is nowadays working in an increasingly competitive industry characterized by intense competition, increased global product standardization, and shorter product life cycles. To survive in this new environment firms' needs to create a truly consumer-driven organisation by focusing on consumer-oriented product development (to create an efficient and effective product flow), branding (to develop a strong global brand) and supply materials and products on demand (to create an efficient and effective demand flow).

Electrolux regard these three focus areas as the most important areas to create a consumer-driven organisation. Hence, they have defined Brand, Product Flow, and Demand flow as their major business processes. All these processes are currently in-house but they regards the brand and product flow process as more important then the demand flow process, which in theory could be outsourced in the future. In order for this to happen, the brand needs to be strong and the product flow process needs to be very efficient and effective.

The case company company's view is that increased investment in consumer-focused product development and in the Electrolux brand will give them an opportunity to maintain and improve sustainable margins and provide for top-line growth (Figure 1). Increased knowledge regarding the needs of consumers as well as how they think, feel and act when they use the products will enable the case company to develop products that the consumers really desires and are willing to pay a premium for, which in turn raises sales and margins. In addition, a strong brand with a leading position that stands for quality and innovative products can justify a higher price and provide an incentive for repeated buying, and also contribute to a higher profitability. It is therefore of great importance for the case company to focus on consumer-oriented product development and to make their brand strong, global and in the lead. The investments in product development and in the brand will be funded by cost reductions in the production, purchasing and supply.

The case company have launched several cost reduction programs to free capital to invest in product development and in the Electrolux brand. Firstly, they have started a restructuring program in 2004 aimed at creating a competitive production structure in the long term. The costs of this program are estimated at approximately SEK 8 billion [33]. When it is completed in 2010, more than half of the products will originate from low-cost countries, and savings will amount to approximately SEK 3 billion annually from 2010 [33]. Secondly, the case company is implementing a global program for more efficient production, the Electrolux Manufacturing System (EMS). It is based on proven methods for improving production that have been developed both in-house and externally. EMS has been implemented with great success in plants that manufacture kitchen and laundry products. In 2007, it will be implemented in facilities for production of vacuum cleaners and professional products.

Finally, Electrolux has started to purchase more materials from suppliers in low-cost countries in order to additionally reduce costs. Cost for purchased goods and services represents about 70% of cost of goods sold [33]. It is therefore obviously very critical to manage these costs in the most efficient way. The share of purchases from low-cost countries has risen from approximately 30 percent in 2004 to 40 percent in 2006 [33]. The figure for 2008 is expected to be approximately 50 percent. Another priority is to engage the purchasing function at an earlier phase of product development. In 2006, the case company achieved savings in purchasing of approximately SEK 1.9 billion [33]. In the next section the demand flow process will be described in more detail.

4.1. THE DEMAND FLOW PROCESS

Electrolux has no business without consumers purchasing their products. The single most important factor for success is keeping the consumer and retailer needs in focus, it is therefore vital that the total supply chain, both production and distribution, is managed in a competitive way. To a large extent, success depends on whether the case company and their supply chain are as good as or better than the competitors. This requires collaboration, first internally then with the retailers and suppliers.

In order to realize this, the case company have created a Demand Flow Process (DFP) with common goals and principles. The DFP has three major aims, first of all it is supposed to make sure that they deliver on time, as the first priority, however, it is also important to reduce unnecessary time which leads to Deliver On Time - In Less Time.

Secondly, the DFP is supposed to contribute significantly towards improving value creation. For example it aims to increase sales by making products available on time and to decrease costs and waste in the supply chain. Finally, innovation is critical to the success of new products, without new features based on consumer needs they will not be in a position to succeed in the marketplace. However, innovation should not only be restricted to the products, it should also be applied to customer service, the case company offer retailers products and service the DFP is supposed to give an edge over their competitors in that regard.

The DFP can be separated into two sub-processes (i.e. supply chain design and supply chain operation) and focuses on meeting consumer needs while minimizing both the capital tied up in operations and the cost required to fulfill consumer demand. In other words, the DFP concerns development and management of supply chains. Below the supply chain design part of DFP will be described in more detail.

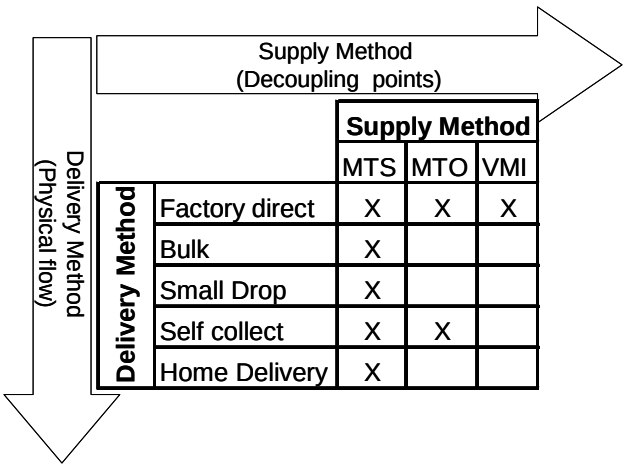
The supply chain design step is planning activity consisting of three steps, firstly the case company identify how their consumers via retailers would like to acquire their products (i.e. understand the market they serve). This is achieved through consumer insight where major information that can affect their service to the retailers is collected. Retailers have a number of characteristics that need to be considered before deciding how to serve them, such as:

- **Product Range:** which products does the retailer purchase?
- **Lead-Times**: which lead-times does the retailer require for the demanded products?
- **Sales Channel**: can the retailer be grouped together with other retailers into a sales channel that describe their approach to business to business and in turn affect demand patters?
- **Delivery Location**: where does the retailer want us to deliver the demanded products?
- **Volumes**: how much of the demanded product does the retailer purchase?
- **Shared Data and Collaboration**: is the retailer willing and able to share data and collaborate?

Secondly, they have to understand their capabilities to serve the retailers (i.e. the market) regarding their production and delivery system capabilities to produce according to demand. This includes the capability of the suppliers to supply the production system, it is also important to appreciate the capability of the distribution system to deliver the output from the factories (i.e. production system).

Finally, when those steps have been completed the case company can design various approaches to serve the consumers via the retailers, commonly referred to as Supply Chain Solutions (SCS). They may even have more than one SCS for each retailer, for example in the case of supplying both their own branded products and the retailers branded products (also known as OEM products or 'private labels'). Furthermore, SCS with retailers will evolve over time and as trust and cooperation increase, the SCS will become more advanced and mutually beneficial.

A SCS is a combination of a Supply Method (SM) reflecting the production system capabilities, and a Delivery Method (DM) reflecting the delivery system capabilities. Combining a supply method and a delivery method into a specific SCS creates freedom of choice while at the same time maintaining the efficiency of operations in the production and delivery system, Figure 1 illustrates some possible combinations.



		Supply Method		
		MTS	MTO	VMI
Delivery Method	Factory direct	X	X	X
	Bulk	X		
	Small Drop	X		
	Self collect	X	X	
	Home Delivery	X		

Figure 1: Supply Chain Solutions

One applied SCS within Electrolux combines the supply method Make-To-Stock (MTS) with the delivery method self collect. This implies that the case company produces in advance according to a demand plan and stock-keeping until the retailer collects the goods themselves from one of their factories or Regional Distribution Centres (RDC). Self-collection needs to be implemented carefully to maintain loading efficiency in the RDCs. Another employed SCS combines the supply method Make-To-Order (MTO) with the delivery method factory direct. This SCS is used when retailers order a number of weeks in advance, which enables the case company to produce and deliver to a specified date and time. Orders are normally in the form of full truckloads dispatched direct from the factory to a retailer (i.e. deliver method factory direct). Another utilized SCS combines the supply method MTS with the delivery method home delivery. This SCS implies that Electrolux on the retailers request physical bypass of their distribution network and deliver direct to the consumer's home. This delivery method is normally combined with other services such as installation and removal of old products. One more applied SCS combines the supply method VMI with the delivery method of factory delivery. This implies that the case company is responsible for the inventory of their products within the retailer's warehouses i.e. responsible for calculation of delivery dates and quantities. Deliveries are normally in the form of full truckloads dispatched direct from the factory to a retailer (i.e. deliver method factory direct). It is an advanced SCS that involves a great deal of close partnering and collaboration, including total sharing of data and regular communication.

Each SCS has different cost implications for the case company and the retailer. One solution might be more expensive for them, but cheaper for the retailer and vice versa. It is also important to appreciate the cost to serve for a particular retailer when judging its profitability.

5. DISCUSSION

During the last decades a new type of market with rapid and volatile demand changes, short product life cycles, and high levels of customized products has evolved. Competitiveness of the business is mostly determined by responsiveness characterized by the ability to scale up or down quickly, fast product development of innovative products, and quick incorporation of consumer requirements into the product development. Firms have to create a truly customer-driven organisation in order to survive. This can be achieved by focusing on customer-oriented product development (to create an efficient and effective product flow), branding (to develop a strong global brand) and supply materials and products on demand (to create an efficient and effective demand flow).

There has been a recognition that 'one-size-fits-all' supply chain strategies is not enough to create an efficient and effective flow of products and materials. It is increasingly necessary to develop several differentiated supply chain strategies to satisfy all major markets in a better way. The case study reveal that differentiated supply chain strategies can be developed through the following four steps:

1. Developing a segmentation model
2. Understanding the market we serve
3. Understanding the capabilities to serve the market
4. Developing necessary supply chain strategies to satisfy all major customers

In the first step the firm needs to find out what kind of segmentation factors that affect the selection of the most efficient and effective SCS and then developing a segmentation model. First a preliminary segmentation model has to be developed based on company knowledge. Later on this may need to be altered according to customer requirements. Example of segmentation factors are type of product, type of customer, geographical location, and means of communication. One way could be to identify major product categories by clustering similar products into product categories. Similar products imply comparable demand and supply characteristics. Customers could however acquire products from several product categories. This implies that one customer could be supplied in several ways (supplied by different SCS). If this is undesirable the starting point, instead of the product assortment, could be customers. In this case the firm has to identify how their customers would like to acquire the product, irrespective of product type. It is also possible to combine both these parameters along with e. g. geographical location. In the second step the firm needs to find out what kind of SCS their customers prefer? In other words, identify how their customers would like to acquire products from them within the identified segmentation categories. The customers perhaps prefer "one-size fit all" SCS that handle all products in a similar way, i.e. according to a few SCS, or different SCS depending on segmentation category. For example, standards products supplied and delivered according to one SCS whilst customized products are supplied and delivered according to another SCS. In the third step the firm needs to find out what kind of SCS they can provide, both existing and possible. In other words,

identify their capabilities to serve the customers, i.e. the market, which implies definition of their production system and delivery system capabilities. In the final step the firm needs to find out what kind of SCS they should provide to satisfy all major customers, and to what price. To satisfy all customers it could be necessary to develop a number of SCS in each segmentation category, however, each SCS could be used in several segmentation categories.

This research has also showed that different order fulfillment are needed to be used concurrently in international supply chains – as was discussed earlier, segments, customers and cost efficiency requires to act accordingly. In our case study organization seems to decide either to select make-to-order (MTO) mode, or make-to-stock (MTS). Based on the literature, especially from electronics industry [34-37], we would expect to see assembly-to-order (ATO) approach to take some ground, even in Electrolux's business environment. It is interesting to note, however, that instead of ATO approach, case company had developed VMI approach, which surely contains interesting further avenues to follow in research side.

6. SUMMARY

In this paper we show that one efficient way to develop differentiated supply chain strategies is to combine different supply and delivery methods into supply chain solutions. By combining relatively few supply and delivery methods one could develop several differentiated supply chain strategies. Furthermore, the case study findings reveal that this approach is effective in a mature business environment characterised by high market penetration where it is essential to supply and deliver products and services based on consumer requirement. In this mature business environment it is necessary to identify several differentiated supply chain strategies to satisfy all major customers. An interesting aspect for further research would be to study the delivery performance and customer satisfaction before and after implementing differentiated supply chain strategies. Another interesting aspect for further research is to study how logisticians can be involved in the product development processes since the delivery of product depends on several factors of which some are established in the product development. For example, successful use of ATO and VMI strategies demands collaboration between logistics as well as product development, and there is therefore a need for knowledge in working principles in this new environment. This surely includes questions related to outsourcing, its scale and scope, in all of the operational areas.

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