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DRIVERS AND BARRIERS OF COLLABORATION IN THE VALUE CHAIN OF PAPERBOARD-PACKED CONSUMER GOODS

Thesis for the degree of Doctor of Science (Technology) to be presented with due permission for public examination and criticism in the Auditorium of the Student Union House at the Lappeenranta University of Technology, Finland on the 19th of December, 2008, at noon.

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Abstract

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Value chain collaboration has been a prevailing topic for research, and there is a constantly growing interest in developing collaborative models for improved efficiency in logistics. One area of collaboration is demand information management, which enables improved visibility and decrease of inventories in the value chain. Outsourcing of non-core competencies has changed the nature of collaboration from intra-enterprise to cross-enterprise activity, and this together with increasing competition in the globalizing markets have created a need for methods and tools for collaborative work.

The retailer part in the value chain of consumer packaged goods (CPG) has been studied relatively widely, proven models have been defined, and there exist several best practice collaboration cases. The information and communications technology has developed rapidly, offering efficient solutions and applications to exchange information between value chain partners. However, the majority of CPG industry still works with traditional business models and practices. This concerns especially companies operating in the upstream of the CPG value chain.

Demand information for consumer packaged goods originates at retailers' counters, based on consumers' buying decisions. As this information does not get transferred along the value chain towards the upstream parties, each player needs to optimize their part, causing safety margins for inventories and speculation in purchasing decisions. The safety margins increase with each player, resulting in a phenomenon known as the bullwhip effect. The further the company is from the original demand information source, the more distorted the information is.

This thesis concentrates on the upstream parts of the value chain of consumer packaged goods, and more precisely the packaging value chain. Packaging is becoming a part of the product with informative and interactive features, and

therefore is not just a cost item needed to protect the product. The upstream part of the CPG value chain is distinctive, as the product changes after each involved party, and therefore the original demand information from the retailers cannot be utilized as such – even if it were transferred seamlessly. The objective of this thesis is to examine the main drivers for collaboration, and barriers causing the moderate adaptation level of collaborative models. Another objective is to define a collaborative demand information management model and test it in a pilot business situation in order to see if the barriers can be eliminated.

The empirical part of this thesis contains three parts, all related to the research objective, but involving different target groups, viewpoints and research approaches. The study shows evidence that the main barriers for collaboration are very similar to the barriers in the lower part of the same value chain; lack of trust, lack of business case and lack of senior management commitment. Eliminating one of them – the lack of business case – is not enough to eliminate the two other barriers, as the operational model in this thesis shows. The uncertainty of the future, fear of losing an independent position in purchasing decision making and lack of commitment remain strong enough barriers to prevent the implementation of the proposed collaborative business model.

The study proposes a new way of defining the value chain processes: it divides the contracting and planning process into two processes, one managing the commercial parts and the other managing the quantity and specification related issues. This model can reduce the resistance to collaboration, as the commercial part of the contracting process would remain the same as in the traditional model. The quantity/specification-related issues would be managed by the parties with the best capabilities and resources, as well as access to the original demand information. The parties in between would be involved in the planning process as well, as their impact for the next party upstream is significant.

The study also highlights the future challenges for companies operating in the CPG value chain. The markets are becoming global, with toughening competition. Also, the technology development will most likely continue with a speed exceeding the adaptation capabilities of the industry. Value chains are also becoming increasingly dynamic, which means shorter and more agile business relationships, and at the same time the predictability of consumer demand is getting more difficult due to shorter product life cycles and trends. These changes will certainly have an effect on companies' operational models, but it is very difficult to estimate when and how the proven methods will gain wide enough adaptation to become standards.

Keywords: Demand information, value chain collaboration, consumer packaged goods

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Combining research and everyday business life is not an easy journey – it has taken me nine years to get to this point. The completion of this thesis has required compromises, hard work and constant bad conscience for unfinished things. Nevertheless, I am quoting Edith Piaf: “Non, je ne regrette rien”, I have no regrets. To have the possibility to conduct scientific research on subjects which are close to one’s heart in the daily work adds a new viewpoint and spices up one another. During these years I was close to giving up more than once. Thanks to a group of people, I returned to this thesis time and again until the process was finished. I cannot list all the people I want to thank, because there are so many; so for the ones not mentioned below, please accept my gratitude and deepest thanks.

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Imatra, December 2008

Kirsi Viskari

List of Abbreviations

3PL	3rd party logistics (company)
AMR	AMR Research, a research and consulting company
CGEY	Cap Gemini Ernst & Young (currently known as Cap Gemini), a consulting company
CPG	Consumer Packaged Goods
CPFR	Collaborative Planning, Forecasting and Replenishment
CR	Continuous Replenishment
CRM	Customer Relationship Management
CSR	Case Study Research
ECR	Efficient Consumer Response
EDI	Electronic Data Interchange
EDLP	Every Day Low Price
EPC	Electronic Product Code, developed by EPC Global
ERP	Enterprise Resource Planning (system)
GDS	Global Data Synchronization
GDSN	Global Data Synchronization Network
GDSS	Group Decision Support System (general term for an ICT system used in brainstorming and group sessions)
GMA	Grocery Manufacturers' Association (USA)
GPS	Global Positioning System
HPC	Home and Personal Care

ICT	Information and Communications Technology
KPI	Key Performance Indicator
LSP	Logistics Service Provider
MRP	Material Requirements Planning (system)
NPDI	New Product Development and Introduction
POS	Point Of Sale
RFID	Radio Frequency Identification
ROI	Return On Investment
SCM	Supply Chain Management
SKU	Stock Keeping Unit
SME	Small and Medium-sized Enterprises
UML	Unified Modelling Language (for business modeling)
VICS	Voluntary Interindustry Commerce Solutions Association
VMI	Vendor Managed Inventory
XML	Extensible Markup Language

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1 Introduction

1.1 Background

Companies are concentrating more and more on their core competencies, and the non-core operations are often outsourced to other companies in order to increase efficiency and decrease costs (Bhatnagar & Viswanathan, 2000; McLaren et al., 2002; Shore & Venkatachalam, 2003). As a result of this trend, former intra-company issues have become issues to be handled between different companies, requiring co-operation and agreed-upon methods for it. It also has a significant impact on the supply chain dynamics, as the supply chains and networks are in constant change; the era of static supply chains with long-term relationships is history. This in itself forces all parties acting as a part of a supply chain, or usually several chains, to be agile and adaptable to quick and constant variations.

This thesis concentrates on the supply chains of consumer packaged goods. A more detailed description of the scope and research questions will be provided later below, but the overall area of the research are supply chains of consumer packaged goods. They are extremely interesting, as they include a large variety of companies, operations, relationships and entities. The trends described above also affect these supply chains and create dynamics in them. The companies operating in this area are not, however, fully prepared and ready to operate in ways that change constantly and require learning and adopting new models and rules.

Forecasting the demand in the supply chain has been studied extensively, and several models have been developed, including mathematical models and computer systems. In the value chain of consumer packaged goods, forecasting and demand estimation have concentrated on the consumer-retailer level, with some applications including also the next level, the manufacturer of the goods (Helms et al., 2000). Very recent research (Småros, 2005), including case studies, shows that there is

willingness for collaboration within the retailer and manufacturer parts of the value chain. The total value chain is, however, longer than that, extending upstream to the manufacturers of the raw materials or components as well as the providers of the packaging materials and packages.

The availability and reliability of demand information for the parties manufacturing packaging materials and packages is crucial for them to be able to operate economically. However, reality has shown that in most cases demand estimation and forecasting are based on historical information from within the companies' own data sources. Seasonality, trends and volatility are assumed to follow the same basic patterns as in the previous years or seasons. This means that capacity planning is based on rough level assumptions, and does not have a direct and tight linkage to actual demand information.

In the constantly changing business environment, the speed of change cycles is also increasing. All companies operating in this sector are faced with the necessity of adapting quickly to changes. In order to be agile, companies must be able to communicate and collaborate with their supply chain partners, both upward and downward. One major area for collaboration is sharing the demand information, which brings benefits for the whole chain and improves the efficiency and reliability, as well as the competitiveness of the supply chain (McGuffog & Wadsley, 1999; Sahay, 2003). Therefore it should be of common interest to develop collaborative models in this area (McLaren et al., 2002).

1.2 Scope and motivation of the research

This study concentrates on the management and transfer of demand information in the upstream part of the value chain of consumer packaged goods, more specifically with the parties involved in the manufacturing and processing of the packaging

materials and packages. The brand owners – the companies manufacturing the consumer products – are also included as the most important downstream party. The value chain of consumer packaged goods has been divided into two major areas in this study, as described in an exemplary situation in Figure 1. As can be seen, the brand owners are included in both the downstream and upstream areas. The brand owners play a significant role in both areas, and for the upstream area they represent the interface towards the downstream area, from which the original demand information can be received.

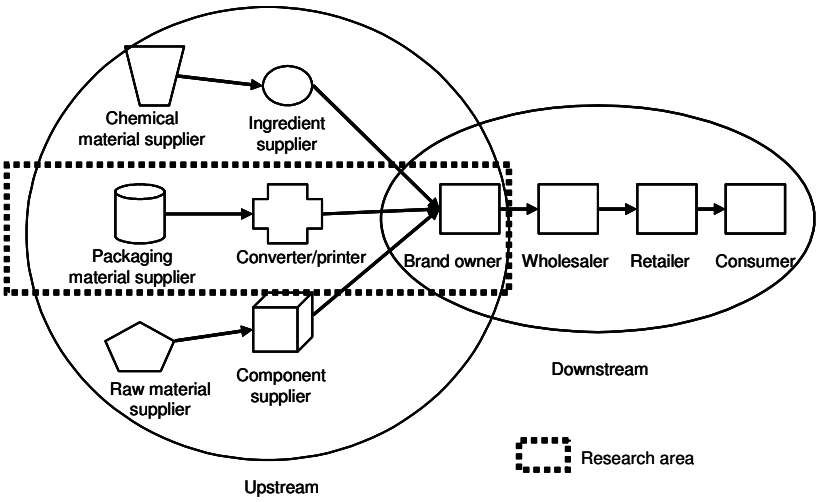


Figure 1. Value chain area of consumer packaged goods

The reason for focusing on the upstream area of the value chain of consumer packaged goods in this study was that the majority of research has so far concentrated on the consumer-retailer-manufacturer area, from the point of view of a distribution chain and its problem setting (Barrat & Oliveira, 2001; Holmström et al., 2003; Kaipia et al., 2002; de Kok et al., 2005; Kotzab & Teller, 2003; Pohlen & Goldsby, 2003; Småros, 2005; Svensson, 2003b). Småros (2005) also suggests that more research should be done in the upper parts of the value chain. Therefore it can

be claimed that there exists a research gap in the area of extending the existing collaboration theories and practices to the upper parts of the value chain of consumer packaged goods.

As the original demand information uses the final product as the entity of measure, the upstream point of view creates an interesting research challenge, because the upstream parties cannot use the same entities of measure. The upstream areas of this particular industrial segment – the parties involved in the packaging and packaging materials – has not been researched extensively so far, which brings a novelty aspect for this study.

The upstream parties are relatively far from the source of the original demand information, the consumers' buying decisions. Their products are also different from the ones used in measuring the demand at the retailers. So the question is more complicated than in a distribution channel, where the same goods change ownership and responsibility. Furthermore, another challenge comes from the nature of the companies involved in this value chain: their size differences are significant, and therefore the ability of the companies to invest in new models and systems varies remarkably. Figure 2 highlights the size differences in this particular value chain of packaging and packaging materials, where the majority of packaging suppliers are small companies compared to their customers and upstream suppliers.

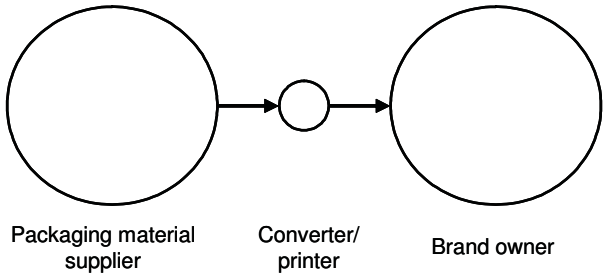


Figure 2. Company size scales in the packaging value chain

The length of the value chain poses challenges, as there are several parties with their own sub-optimization processes involved. At the same time the supply chain requires faster output and smaller order sizes from all the parties involved, and the material flows become more and more scattered.

The supply chain area of the scope of this study is described in more detail in Chapter 3.2, with examples of differences in company size.

One major aspect in this thesis is the role of packaging in the chain of consumer packaged goods. Packaging has earlier been seen as having the functions of protecting the goods inside it. This role has evolved to include branding features through forms, shapes and graphics. Another currently important feature for packaging is carrying and exchanging information for example about the identification, contents, conditions required and expiry times. New technologies are expanding the role of packaging into interactive areas where the information carried by the package can change during the supply chain. This is discussed in Chapter 2.3.5.

1.3 Research questions and objectives

This study aims to explore the drivers and barriers of collaboration in the packaging value chain, to find out the motivation for collaboration. It also discusses the reasons why the existing collaboration models in the supply chain have not gained more ground. It presents the most common collaboration models used in the value chains of consumer packaged goods, and evaluates their potential benefits, as well as the obstacles for using them.

The two first research questions are:

1. *What are the drivers and motivation for using collaborative models in the value chain of paperboard-packed consumer goods?*
2. *What are the existing barriers prohibiting a wide use of existing and developed collaboration models?*

Parts one and two of the empirical material aim to answer these two research questions regarding the packaging value chain defined in the scope of the study.

The study proposes an operational model to overcome some of the barriers enabling and widening the collaboration between supply chain partners. The development suggestions are related to the collaboration between two supply chain partners, but attention is also paid to extending the models to cover more than two consequent supply chain partners. This model is proposed for a selected business situation in part three of the empirical material in order to verify the suggested benefits of this model.

The third empirical part aims to answer the third research question, which is:

3. *Based on the findings of the first two empirical parts, how can the collaboration barriers be overcome and benefits implemented by introducing a collaborative operating model into a real business environment?*

1.4 Structure of the thesis

This thesis consists of six chapters. Chapter 1 introduces the topic, presenting the background for the research, the scope of the research and the research questions. It also describes the methodology used in the empirical part of the thesis and the sources of empirical information.

Chapter 2 contains a literature review, including findings from several literature sources concerning the research questions. The main concepts of collaborative supply chain management, operations and models are examined, with a critical discussion on their position in practical implementation, as well as their suitability for the part of the supply chain in the scope of this thesis. The chapter is structured according to the two first research questions; drivers and barriers of collaboration.

Chapter 3 describes the consumer packaged goods industry and the value chain in detail. Special attention is paid to describing the upstream part of the value chain: the part involved in manufacturing packages and packaging materials, especially for paperboard-based packaging. The special features of this part of the value chain are also described, including the differences between the value chain partners involved.

Chapter 4 presents the empirical study material. This chapter is divided into three parts, each one handled separately. The reason for this is that they also represent three different research approaches. The first two empirical parts aim to answer the first two research questions, the third part concentrates on the third research question.

Chapter 5 summarizes the findings and value of the empirical research. It also draws conclusions of the empirical parts in relation to the literature findings.

Chapter 6 discusses the outcome of the thesis from theoretical and managerial points of view. It also proposes directions and topics for future research.

1.5 Methodology

This chapter presents the methodology, research process and methods that have been used to achieve the objectives of the study which conducted with qualitative research methods and case study research. The reasons for this selection is that the

study aims to understand how various theoretical models can be and are applied in the business world; and if not, then why.

Silverman (2005) discusses the validity of qualitative research, and claims that it should not be questioned because of the research approach being qualitative. He continues that researchers using a qualitative approach have to overcome the problem of anecdotalism in order to convince their audience that their findings are not based on carefully chosen examples. In order to avoid anecdotal research, the following issues have to be taken into account:

- The research reports should include more than a few exemplary instances from the field notes of the researcher.
- The researcher should provide criteria or grounds for including or not including certain instances and not others. This is needed to specify the representativeness and generality of the instances and findings. (Silverman 2005)

Yin (1989) defines the case study as an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between the phenomenon and context are not clearly evident. Case study research (CSR) often involves research related to the question *why*. CSR is defined by the way the researcher acquires the data, resulting in describing, understanding, predicting, and/or controlling the individual case (Woodside & Wilson, 2003).

Eisenhardt (1989) approaches case study research from the point of view of theory induction, even though she discusses also theory testing. She defines case study as a method of "*understanding the dynamics present within single settings*" (op. cit. p 534). Eisenhardt stresses the importance of case selection: defining a representative sample in order to be able to define how well the results can be generalized. She also mentions that multiple data collection methods – triangulation – can strengthen the constructed theories. The gathering of field notes can often create a massive

amount of data for analysis. Therefore it is useful to conduct within-case data analysis, which helps the researcher to cope with the data.

Achieving deep understanding in CSR usually involves the use of multiple research methods across multiple time periods (i.e. triangulation). Triangulation often includes direct observation by the researcher within the environment of the case, probing by asking case participants for explanations and interpretations of operational data, and analyses of written documents and natural sites occurring in the case environment (Woodside & Wilson, 2003). Silverman (2005, p. 212) mentions that triangulation "refers to the attempt to get a true fix on a situation by combining different ways of looking at it or different findings." Eisenhardt (1989) stresses the usefulness of cross-case pattern search in order to avoid premature conclusions.

CSR has been criticized by researchers conducting surveys with large samples, because of not being generalizable. They claim that a particular case is unique, and the results do not necessary apply to other cases and situations. Woodside & Wilson (2003) state that the purpose of CSR is not to generalize but to probe the theory. They also point out that in order to gain deep understanding about organizational behavior, multiple research methods should be used across several time periods. Case studies can basically be used to provide descriptions of phenomena, to test existing theory or to generate new theories. As the use of CSR requires time, it is often not possible to include more than one or a very limited number of in-depth case studies in one research project (Gummesson, 2000).

Gummesson (2000) discusses the importance of access and preunderstanding for management research. The problems of researchers are often related to limited access to the business organization involved and to in-depth issues of the research question. For an outsider it is often quite difficult to get enough attention from the business management representatives to be able to get below the surface of the research problem. Therefore preunderstanding of the research problem remains superficial. Also first hand experience of decision making, implementation and change processes are needed for productive research. Gummesson (2000) divides

case study research into two categories; one attempts to draw general conclusions from a limited number of cases, and the other targets to achieve a specific conclusion from a single case study, because that particular case has some special characteristics. Gummesson claims that both categories can create results that can be of general interest. Would it also be possible to combine these two categories so that a particular case could provide results that could have more general implications? Or that a limited number of cases could provide results with characteristics special for the chosen cases?

Generalization made on the basis of one or a limited number of case studies has been both supported and doubted by academic researchers. Gummesson (2000) lists several methods of approaching the generalization that have been used in management research; one is comparison, where the chosen cases represent different points of view, another is defining the necessary number of cases by saturation, also called as purposeful sampling. In the comparison approach two phenomena are viewed in a way they cooperate with each other, in the saturation approach each of the chosen cases provides new insight, but adding further cases would add little or no value.

Gummesson also discusses the purpose and meaningfulness of generalization in the research of organizations and business processes. As every case involves a specific business situation, the circumstances cannot be repeated in exactly the same way in another case. Therefore the theory generated from individual case studies can be regarded as local theory, something which applies only within that particular business case and situation. Gummesson (2000, p. 97) claims that “generalizations in a social context can act as a prejudice that effectively blocks understanding rather than constitutes supportive preunderstanding”.

1.5.1 Methodology used in the thesis

This thesis uses case study research, including three individual parts. They are all related to the research questions and research scope, but with two different roles; the first two parts aim to answer the first two research questions, and the third proposes a practical solution based on the findings of the first two parts, aiming to answer the third research question. Figure 3 presents the structure of the thesis by describing the relationships between the three empirical parts and the research questions.

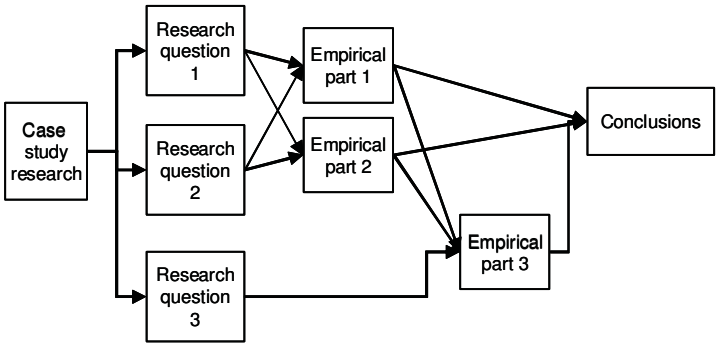


Figure 3. Structure of the thesis and relationships between the empirical parts and the research questions

The three empirical parts in this thesis apply different research techniques: the first one is based on a questionnaire for selected key decision makers, the second one uses observational participation in interactive group brainstorming sessions, and the third one proposes an operational model for a selected supply chain. All three empirical parts approach the problem of collaborative demand information management and transfer from different angles, but concentrate on the same value chain. Figure 4 highlights this approach.

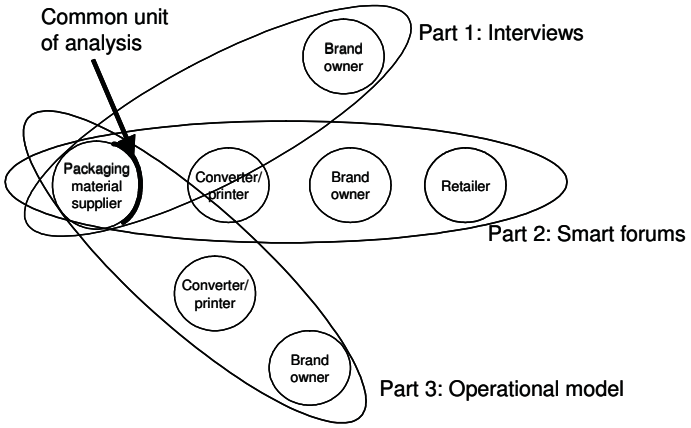


Figure 4. Positioning of the empirical parts

Triangulation of empirical research has been used in order to look at the research question from different angles with different time periods and different target groups.

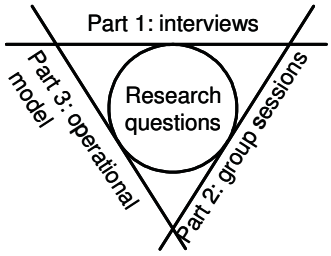


Figure 5. Triangulation of the empirical research

1.6 Sources of empirical information

First, it has to be pointed out that the extensive working experience of the author in the paperboard packaging industry has influenced the process of the empirical study of this thesis. It provided a contact network that was very helpful when finding the

people and organizations for the empirical studies. It has also built a profound understanding of the nature of this particular business segment and value chain position, which in turn has enabled defining the approaches of the empirical study in a logical manner. The sources of empirical evidence can be categorized as per the closeness of their relationship. The empirical sources for the first and third part are based on direct relationships and personal contacts of paperboard sales people working actively in this field of business. Thanks to their experience and open-mindedness, suitable organizations and people were found. The second part included people and organizations both known and unknown from previous engagements, and thus provided a more neutral and objective input in this study.

The first part of the empirical material sheds light on the research questions, showing potential benefits and barriers for collaborative working. The research was conducted by using a questionnaire, by interviewing selected persons on the basis of a predefined question list. The selected persons represented the buying decision makers at selected brand owner companies manufacturing consumer products. The questions were both closed and open-ended, giving the interviewees the possibility to express their opinions as well as providing exact data for evaluation. The reason for choosing this particular group for the first part was to get a preliminary picture of the key purchasing decision makers in value chain parties who are in contact with both retailers and packaging providers. A more detailed description of the value chain partners of consumer packaged goods can be found in Chapter 3.2. These purchasing managers have a huge influence on how the demand information is forwarded to the packaging suppliers, and therefore represent an interesting group for this thesis.

The second part consisted of the output of five Smart CPG Forums. The Smart Forums used group discussion, brainstorming of ideas, voting, and comments and questions in response to stimuli. A group decision support system (GDSS) was used in all sessions. The participants in the invite-only forums were representatives from major European companies in the CPG value chain from retailers to manufacturers, suppliers and logistics companies. These forums were organized by a company

called Netmarkets Europe, with the aim to process the collaboration issue from initial reasoning towards practical means for implementation. People invited to these forums were from managerial and executive levels, having the decisions making authority within their own organization. These groups were interesting for this thesis, as they reflected the actual practices, opinions, values and thinking of the key players of consumer packaged goods industry at European level.

The third part consists of a proposed operational model, describing a practical solution proposition tailored for a selected part of a selected supply chain. It included three consecutive supply chain parties: a packaging material producer, a package converter and a brand owner manufacturing consumer products. The solution proposal was defined to produce benefits discovered in the two earlier parts of the empirical research, but also to overcome some of the barriers named in these earlier empirical parts. The defined operational model consists of practical tools and guidelines as well as a collaborative working model, aiming to bridge the demand information exchange to cover three consequent value chain partners. For reasons of confidentiality the names of the participating companies are not published. These parties were chosen based on the existing relationships and knowledge of the operations and practices of this particular part of the value chain, but also because they all had experiences of exchanging demand information with another partner. These companies were very co-operative towards this research and gave valuable input from real business situations and applications.

2 Literature Review

The literature review presents and describes the main issues influencing demand information management and affecting the planning functions in companies operating in the upstream of the consumer packaged goods value chain. This chapter also presents the drivers and motivations found in the literature and earlier research for using developed collaborative methods to overcome the disruptions of demand information management. The third part of this chapter describes the barriers and obstacles of collaborative working found in earlier research.

2.1 Demand information in the value chain

2.1.1 Evolution from intra-company transactions towards collaboration

Supply chain management activities

Logistics is defined in various ways; a definition from Bowersox et al. (1999, p. 1) is that logistics is "*the process of moving and positioning inventory to meet customer requirements at the lowest possible total landed cost".* When a firm's management makes a unique effort to position and align distributive capabilities strategically to gain and maintain competitive advantage, the process is referred to as *supply chain management* (Bowersox et al., 1999). Another way is to define supply chain as collaboration in a long-term relationship among organizations actively working together as one toward common objectives. Taylor's (1998) definition includes the management of related information as a component of successful supply chain

management, whereas Hugos (2003) discusses how supply chain management should be viewed as building responsiveness to the customers.

The supply chain literature has concentrated on the areas of efficiencies and execution, the physical processes of the chain. Especially in the retail area, a lot of research has been done in channel selection and in-shop logistics. Also, the impact of 3rd party logistics (3PL) has been studied extensively. When defining the strategy or strategies for the supply chain of a company, there are four dimensions that should be included: sourcing strategy, demand flow strategy, customer service strategy and supply chain integration strategy (Gattorna, 1998). In fact, an integrated supply chain strategy consists of the three former elements. Also Christopher & Peck (2003) highlight the importance of extending the supply chain management towards both the suppliers and customers.

Integrating supply chain activities

Until recently, supply chain strategies and their implementation have concerned one single company or entity. Lately the term *integration* has been evolving (e.g. de Búrca et al., 2005; Vaaland & Heide, 2007), and the supply chain is now seen as a larger group of companies or entities. Integration has to be performed first inside each company or party for it to act as one without departmental barriers. To begin with, the supply chain planning processes should be integrated to enable a mutual view in the form of a common plan. For example, a common forecast is a result of co-operation between sales, marketing, resource planning and purchasing functions. Without a common forecast, the company has no means for successful collaboration with the other parties in the value chain.

Forecasting and demand estimation in companies commonly result in multiple views and forecasts. Integrating the planning processes should lead into one commonly accepted forecast. Best-practice companies have implemented an integrated

process, where second-guessing is eliminated. The forecast is made across all the functions, resulting in an enterprise-wide forecast.

Integrating the processes within a company should also cover the service processes, such as order management and invoicing. This is where most industries still are: implementing integrated logistics, rather than really managing the supply and demand chain. This especially concerns supply chains with small and medium-sized enterprises (SMEs) (de Búrca et al., 2005; Vaaland & Heide, 2007). When discussing integration, the research is largely concentrated on the technical aspects, like the utilization of ICT technology and integrating ERP systems. Before any of this can happen, joint understanding is needed on how the integrated processes should work, including mutual understanding of concepts, roles, responsibilities and targets.

The next step from integrated logistics is to involve the suppliers, customers and other intermediate parties of the value chain. It is the linking between enterprises that can lead to the ultimate goal of moving beyond supply chain efficiency to integrating supply into demand. Gattorna (1998) describes the evolution of supply and demand chain alliances by the degree of integration and the productivity of the relationship. The steps start from confrontational alliances, moving on to transactional and those with mutual respect. The two highest modes include selective initiatives and fully integrated alliances.

From supply chain to supply and demand chain management

The shortcoming of supply chain management is that it has focused on efficiencies and execution, operational logistics and manufacturing processes, and not so much on improving the competitiveness of a company. The demand chain focuses primarily on revenue enhancement, instead of the traditional supply chain emphasis on cost minimization. Secondly, the supply chain tends to ‘push’ products based on limited knowledge about the market, versus a ‘pull’ from the consumers based on current demand. The demand chain is also much more planning and strategy-

oriented, rather than executional or transactional by nature, as the demand chain uses key consumer and market information that is essential to the strategic planning process. The ultimate goal of the demand chain is to satisfy the most profitable markets, while managing service levels for the markets with less profitable demand patterns. Companies will be profitable only if their supply chains are effective, and they will be effective only if they are demand-driven (Langabeer & Rose, 2001).

Beech (1998) defines supply and demand processes as distinct processes, which should be defined separately. An illustration of his view of the supply-demand chain is shown below in Figure 6, in which the upper part describes the demand chain processes, and the lower part specifies the supply chain.

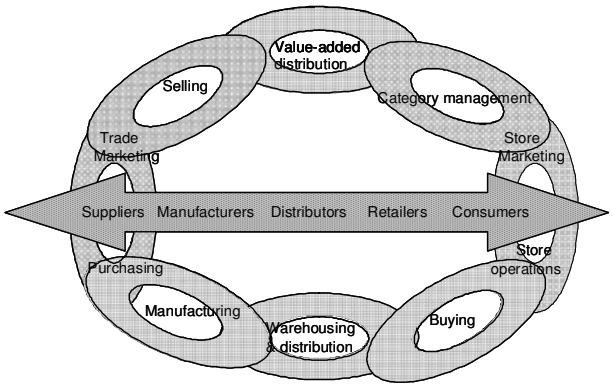


Figure 6. The supply and demand chains (adopted from Beech, 1998)

Separating these two processes when defining them in the value chain, creates a better starting point. However, both sides (demand and supply) contribute to each other, and therefore in practice should be seen as parts of the overall process definition. For example, value-added distribution provides improved offering for warehousing and distribution processes.

From transactional integration to collaboration

Collaboration between companies has many forms and definitions; Bowersox et al. (2003, p. 22) give the following definition: “Cross-enterprise collaboration emerges when two or more firms voluntarily agree to share the risk associated with integration of human, financial, and/or technical resources and establish joint policies, reflecting the interests of all participants, in an effort to create a new, more efficient and/or effective business model.”

Moving from a traditional business environment into a collaborative business model requires changes in the business processes, such as marketing and logistics. There are several ways for implementing the change; some examples are shown in Figure 7 (Aldin & Stahre, 2003). In the starting point, the marketing and logistics functions are seen as one channel, whereas alternative (A) separates these two, and as an example the logistics process bypasses the intermediary. Alternative (B), multiple channels, is an example of using many simultaneous channels in marketing and logistics; a practical case of for example electronic commerce. Disintermediation (D) is an example of elimination of intermediaries, for example bypassing wholesalers and dealers.

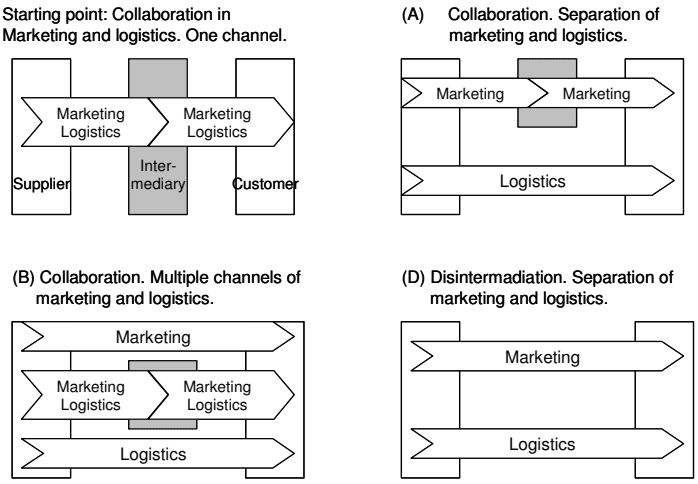


Figure 7. Examples of collaboration, separation, multiple channels and disintermediation (Aldin & Stahre, 2003, p. 274)

Collaboration can be divided into three main forms: i) transactional, ii) information-sharing, and iii) joint planning and forecasting. The first two ones are traditional co-operation forms, and only joint planning and forecasting can be seen as a form of collaboration. As the following figure by Bermudez (2003) and AMR Research points out, the level of business transactions with true collaboration with customers and suppliers is very low.

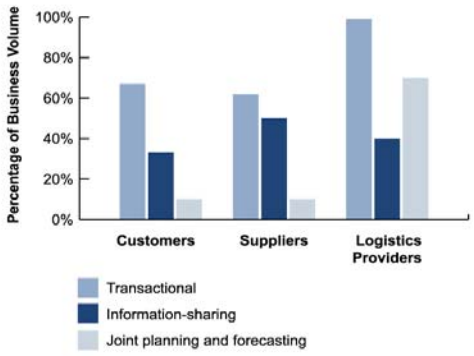


Figure 8. Median percentage of business transacted via each collaboration form with trading partners (Bermudez, 2003, p. 12)

2.1.2 Demand information disruptions

All of the above-mentioned research findings view supply and demand chain management from the perspective of two companies having a direct business relationship with each other in the supply chain. In real life all supply and demand chains extend to include several companies, all of which operate in several chains with several partners. The dynamics of today's world cause constant changes to the set-up, and the partners and their roles also change constantly.

Lee (2003) discusses the pitfalls and key principles of demand chain optimization, and extends the demand chain to cover three parties. They are, however, from the down-stream of the supply chain and represent distribution type of logistics. Svensson (2003b) suggests that supply chain theory building and research should include a more holistic view and cross-disciplinary approach, having the ultimate consumer as the starting point. The same suggestion has been made by Chapman &

Soosay (2003). When looking at the whole chain of consumer packaged goods, the supply and demand chain includes more levels of partners, as well as complexity in the form of changing products. This will be discussed more thoroughly in Chapter 3.

2.1.3 Bullwhip effect

In most companies forecasting and demand estimation are based on historical order or delivery information, which might not reflect the actual demand. However, actual consumer demand may be very different from the order stream. Each member of the supply chain observes the demand patterns of its customers and in turn produces a set of demands to its suppliers. But the decisions made in forecasting, setting inventory targets, lot sizing and purchasing transform (or distort) the demand picture. The further upstream a company is in the supply chain (that is, the further it is from the consumer), the more distorted is the order stream relative to consumer demand (Gattorna, 1998). This phenomenon is also known as the *bullwhip effect*. Svensson (2003a) also states that it is important to see the meaning of the bullwhip effect both in the downstream and upstream of the value chain, expressly, the variability caused by the gap (or unbalance) between companies' speculation and postponement of business activities.

The variability leads to a demand curve with ever steeper peaks and plunges and with less reliability the further up the party is in the value chain. In the upstream of the value chain the parties are forced to take extreme actions to survive the peaks, only to find out that the demand was exaggerated. The total cost of the value chain is increased heavily, and the reliability and timelines of the deliveries suffer. In the so-called high clock-speed industries, where the life cycle of products or even business lines is extremely short, the bullwhip effect can have dramatic consequences with for example non-marketable inventories (Fine, 1998).

The cause of the steep demand curve and fluctuations is not necessarily related to seasonality or economic trend variations. The fragmented organizations in companies have, according to Svensson (2003a), led to atomistic considerations, namely the sub-optimization of business activities, which cause the bullwhip effect to occur internally in the company. The multiplied effect of the intra-organizational and cross-enterprise sub-optimization and non-collaborative, non-synchronized, individual processes lead to a bullwhip curve (Ravichandran, 2006).

The traditional bullwhip definition starts from the premise that each company speculates more in their incoming goods inventory than in their outgoing goods inventory. Svensson (2003a) describes a reverse bullwhip effect, where the starting point is the opposite: the company speculates more in the outgoing inventory than in the incoming one. If there is a balance between the company's inventory management in the incoming and outgoing side, there is no bullwhip effect within the company. In other words the internal forecasting process operates well, and the company has a common plan or forecast in both ends.

Special attention should be paid to finding the pieces of information causing overreactions. This has been studied by Paik & Bagchi (2007), and their simulation proved that an effective information flow and channel coordination help eliminate the bullwhip effect. They also list demand forecast updating, level of echelons, and price variations as the most significant causes for the bullwhip effect. The final aim is to have centralized demand information, or one forecast. Disney & Towill (2003) show in their simulation-based study that the causes of the bullwhip effect – price variations, rationing and gaming, demand signal processing and order batching – can be eliminated by implementing a vendor-managed inventory (VMI). According to Svensson (2003a), the four material flow principles, which can be used to reduce the bullwhip effect, are control system, time compression, information transparency and echelon elimination.

Minimizing the volatility in demand patterns, namely demand smoothing, aims at making demand easier to forecast. The prerequisite for this is distinguishing the demand volatility caused by natural consumption of the product from the artificial volatility caused by internal sub-optimization. By minimizing artificial volatility, any existing system will achieve better forecasts at no incremental cost. In proactive collaboration, companies employ collaboration technology to facilitate mutually beneficial relationships with retail trading partners. The objective is to encourage demand patterns that are smoother and more predictable, resulting in more profitable growth for both parties. (Berger, 2003)

Berger (2003) discusses the minimization of artificial demand volatility via smoothing techniques, while Carlsson & Fullér (1998) see that smoothing techniques would amplify the fluctuations, while moving upwards in the supply chain. Using for example exponential smoothing for the benefit of one particular supply chain entity in order to improve their forecasting, would actually increase the bullwhip effect when looking at the whole supply chain. Also Disney et al. (2005) discuss taming the bullwhip, and claim that net stock variability and order variability should not be addressed separately, and that a lot of order variability dampening could be achieved with a small increase in the safety stock.

2.1.4 Collaborative models and initiatives

Vendor managed inventory

The basic idea of Vendor Managed Inventory (VMI) is that the supplier manages the inventory on behalf of the customer, including stock replenishment (Kaipia et al., 2002; Disney & Towill, 2003). In VMI, the vendor is given access to its customer's inventory and demand information (Pohlen & Goldsby, 2003; Småros et al., 2003). As VMI should be beneficial to both parties, some limitations need to be defined:

- The business relationship between the supplier and the customer has to be established, strong and collaboration-oriented, like a partnership.
- Deep trust and extensive sharing of information is required.
- The material flow should be ongoing (steady, not erratic at least in the long term) and preferably have some historical statistics (realized sales, usage and inventory figures) available.
- Effective management of VMI increases, if the items or item groups to be managed are few and substantial in volume. However, with the use of modern information and communications technology (ICT), smaller and numerous items can be managed as well.
- The VMI setup has to be defined jointly in detail. The details include: products (or product groups) included, inventory levels with tolerances, demand (or consumption) levels, demand information sharing rules, transportation routes (e.g. modes, lead times, costs), warehousing details and exception handling.

In the VMI model the customer does not place purchase orders to the seller, even though the purchase orders may be triggered by the IT systems for legal and archiving reasons (Pohlen & Goldsby, 2003). The main tool used to operate the VMI is a demand estimate or forecast. The customer is responsible for giving the estimate for a period of time and 'use' the goods according to the estimate within agreed tolerances. The customer is invoiced according to the real usage or even pays according to the usage without being invoiced. The exception handling rules should include definitions on how to act in cases when the usage versus estimate is outside the tolerances agreed. The supplier is responsible for maintaining an agreed level of inventory also within certain tolerances. However, if the supplier wants to utilize some build-ahead strategy for high seasons, the rise of the inventory level must not affect the customer.

Continuous replenishment

Another supply chain management method, Continuous Replenishment (CR), emerged in the early 1990s in the retail industry. It moves one step further from VMI, including visibility to the customer's sales. Point-of-Sales (POS) information is used in forecasting, and the forecasting is not purely based on inventory levels. The CR concept is based on automated information exchange of current demand and inventory within an agreed supply policy. Even though the CR method extends VMI to cover inter-company planning, the creation of the sales pattern is still a weak point in CR. CR also focuses on collaboration in the area of efficient replenishment, neglecting such areas as planning and forecasting.

CR can be regarded as a reactive supply chain initiative, as it concentrates on the current inventory situation and focuses on execution. Therefore it automates operational transactions, and aims to cut company costs. The necessity of EDI as a key enabler of CR is acknowledged; the amount of information exchanged between the parties is too large for manual handling, and requires efficient technological tools (ECR, 2001; Pramatari, 2007).

Efficient consumer response

In 1992 the Grocery Manufacturers of America and the Food Marketing Institute created a group called Efficient Consumer Response, ECR. With the involvement of the consulting company Kurt Salmon Associates, they published guidelines for efficient management of the supply chain in the form of a vertical partnership between the retailers and the consumer goods manufacturers. The main objective of ECR is to be able to react efficiently and timely to the changes and trends of consumer behavior via jointly set targets and harmonized business processes.

The ECR initiative provides a framework for vertical collaboration between independent manufacturers and suppliers in the areas of replenishment, assortment,

promotion and product introduction. The initiative was started among large food companies in order to shift the activities from continuous negotiation on prices, conditions and individual sales promotions towards coordinated collaborative processes and clear distribution of responsibilities. The ECR principles include ideas from philosophies like Total Quality Management (TQM), Just-in-Time (JIT) and Business Process Re-engineering, aiming to combine the feasible parts of them into a model suitable for the daily consumer goods industry (Borchert, 2002; Tarpila et al., 1999, Svensson, G., 2002).

ECR is claimed to produce benefits in the form of reduced consumer prices, but also in forms more difficult to measure. These include enlarged assortment, less stock-outs, improved consumer loyalty and closer co-operation between the manufacturers and distributors. The enabling technologies have a key role in the investments in ECR implementation, but changing existing ways of working and training of people also need substantial effort (Tarpila et al., 1999).

Continuous planning, forecasting and replenishment

The Consumer Packaged Goods (CPG) sector has published an initiative called Collaborative Planning, Forecasting and Replenishment or CPFR, which describes the basic structure of managing the demand chain collaboratively. The organization behind CPFR is called Voluntary Interindustry Commerce Solutions (VICS), whose mission is to engage communities of interest in joint forums, targeting a world with seamless and efficient supply chains (VICS website, 2007). The mission of the CPFR Committee is to develop business guidelines and roadmaps for various collaborative scenarios, including upstream suppliers, suppliers of finished goods and retailers, which integrate demand and supply planning and execution. The real power of CPFR is that, for the first time, demand and supply planning have been coordinated under a joint business-planning umbrella. CPFR can be regarded as an

evolutionary step from VMI and CR, covering a more comprehensive area of supply chain activities (Holmström et al., 2002).

Figure 9. CPFR process diagram (http://www.vics.org/committees/cpfr/, 9/12/2006)

CPFR covers some of the gaps left by previous supply chain management models, like VMI and Continuous Replenishment (CR). Barratt & Oliveira (2001) list the following issues, which are more fully addressed in CPFR:

- the influence of promotions in the creation of the sales forecast (and its influence on the inventory management policy)
- the influence of changing demand patterns in the creation of the sales forecast (and its influence on the inventory management policy)
- the common practice of holding high inventory levels to guarantee product availability on the shelves

- the lack of coordination between the store, the purchasing process and logistics planning for retailers
- the lack of general synchronization (or coordination) in the manufacturer's functional departments (sales/commercial, distribution and production planning)
- the multiple forecasts developed within the same company (marketing, financing, purchasing and logistics)

Radio frequency identification

The possibilities of Radio Frequency Identification (RFID) technology for supply chain collaboration come again from standardized ways to use the technology, both from the technical and content point of view. EPC Global together with GS1 have worked on this issue, and published some guidelines for the CPG sector. By extending the standardized product and item identifier codes to a more detailed level, the Global Data Synchronization Network (GDSN) aims to provide common tools to exchange information for tracking and tracing, inventory management, product recall and other similar processes (GS1, 2006).

2.2 Drivers for and benefits of collaboration

Effective relationship management is essential in supply chain engagements. In final analysis, the successful implementation of a supply chain strategy will rest on the quality of the basic business relationship between partners (Bowersox et al., 1999). Relationship management with partners includes customers, suppliers, subcontractors, intermediators and other types of partners involved in the supply chain both directly and indirectly. This chapter highlights the motives for collaboration as well as the stated benefits in earlier research and literature.

In general the majority of benefits of collaboration found in the literature are based either on theoretical calculations or individual implementations. Vereecke & Muylle (2006) have examined the connection between collaboration and performance improvement, and claim that a lot of collaboration discussion is rhetoric instead of showing real results.

2.2.1 Reduction of costs

Firstly, demand forecast accuracy helps create high responsiveness and cuts costs inside the supply chain through the integration of planning and scheduling with logistics execution, resulting in 15 per cent less inventory and as low as one tenth of the stock-outs of the non-collaborative competitors (Friscia et al. 2004). Joint planning and demand information exchange between supply chain partners has been proven to reduce costs via improved reliability of forecasts (Zhao et al., 2002; GMA Logistics Study, 2005).

In order to gain operational benefits from VMI, suppliers have often built connections to their order management system, and the estimates from the customers trigger an order-emulated operation (Småros et al., 2003). As the supplier receives the demand information earlier than in a traditional ordering process, VMI reduces the need to keep safety stocks (Kaipia et al., 2002). Kaipia et al. (op. cit.), as well as for instance Disney et al. (2003) discuss the time-based benefits achievable via successful VMI implementation. Both articles also show evidence of realized benefits from utilizing VMI in the supply chain.

According to AMR Research (Askegar & Suleski, 2003), there are significant benefits to be achieved with VMI. When done correctly, some companies have extracted big benefits, such as:

- 50% reduction in lead time
- 20–70% reduction in inventories

- in-stock improvements of 1–12%

As discussed in chapter 2.1.4, one of the main motives of collaborative initiatives like VMI, CR, ECR and CPFR is to reduce the costs of carrying inventories. Also the issue of obsolete inventories is closely related to these savings, and the initiatives aim to minimize this via providing a common understanding of the future demand. The inventory costs have another point of view as well; the initiatives also aim to reduce the number of out-of-stock situations at the retailers.

2.2.2 Increased efficiency

According to Friscia et al. (2004) companies that practice best demand forecasting can on average gain such supply chain benefits as 17 percent stronger perfect-order fulfillment, and 35 percent shorter cash-to-cash cycle times. The accuracy of forecasts has a great impact on the overall performance and effectiveness of the whole supply chain, and it shows in effective capacity utilization (Zhao et al., 2002).

VMI can decrease the bullwhip effect, as the safety stock is built purely on known demand including real variations, and not on assumptions and artificial variations (Småros et al., 2003). Especially in industries which are very capital intensive, the effective and stable load of the machinery creates significant opportunities for increasing profitability. When a substantial amount of the supplier's volumes are included in the VMI model, it brings benefits for more stable and predictable resource (e.g. production, warehousing or transportation) planning.

If demand smoothing is used only in order to minimize inventory level variations, it results in increased order variability, which increases the production costs. Boute et al. (2005) suggest including the order decision impact on production into the order pattern smoothing model, which they claim to shorten and reduce the variance of lead times. All these suggestions highlight the importance of seeing the supply chain and its activities as a whole instead of drilling into one particular activity or entity.

The big retailers collect massive amounts of information of the real demand, point-of-sales (POS) data from their cash register and loyalty systems. This information is used in the planning processes of the retailers, and there are several examples of successful implementations of information sharing with the next up-stream parties (manufacturers and logistics service providers). Some of them are willing to share this information even further (some retailers even put a price tag for it), but it is often not available to upper-stream parties. Croson & Donohue (2003) discuss the impact of sharing POS data in a value chain with known and stable demand, and claim that the POS data can help the reduction of order oscillations in the higher parts of the supply chain. They claim that POS data sharing leads to both operational and behavioral advantages, especially for the upstream parties.

Collaboration can also take forms of supplier parks located in the proximity of the manufacturer, as demonstrated by Vereecke & Muylle (2006). Their paper examines the connection between collaboration and performance improvement. They divide collaboration into information exchange (e.g. delivery agreements) and structural collaboration (e.g. VMI and co-location of plants), and show results of maximum performance improvement being found in companies which are engaged in collaboration with both their suppliers and customers. They also show that structural collaboration generates higher performance improvements than plain information exchange.

One major objective of ECR is to prevent inefficiency resulting from uncoordinated or even conflicting tasks by reconstructing processes, organizational structures and job sharing within the distribution channel (Borchert, 2002). Also a major conclusion of companies with CPFR experience is that it improves forecast accuracy and reduces out-of-stocks. Still, the adoption rate of CPFR has been significantly lower than predicted.

The 2003 GMA Logistics Study indicates that in the Grocery, Food and Consumer Packaged Goods (CPG) sector in the US more than 83 percent of the participants of

the survey stated that they have implemented either VMI or CR or both (Berger, 2003). The typical benefits of VMI and/or CR include:

- Increase in inventory turns
- Increase in sales

Logistics efficiency improvements represent an area where technologies like RFID can provide the biggest financially tangible benefits. Especially at the operational level, long distance readability with UHF (Ultra High Frequency) tags speeds up the identification in warehouse, loading, unloading, inventory control and other similar functions. It also reduces the possibility of a human error caused by manual information handling like typing. (Viskari, 2007).

2.2.3 Improved satisfaction and loyalty

An alliance or partnership involves a business relationship between two separate organizations, based on mutual trust, openness, shared risk and shared rewards that yield a competitive advantage resulting in business performance greater than would be achieved by the firms individually (Lambert et al., 1996; Lemke et al., 2003). Partnerships can have various forms from strategic alliances to joint ventures and transactional, contract-based, but loose relationships between different companies. Griffin & Pustay (2003) categorize them into comprehensive alliances (bringing new products to the market) and functional alliances (related to production, marketing or some other corporate function). Another way is to categorize them into horizontal (between companies in a role in the value chain, e.g. competitors) and vertical alliances (e.g. supplier-customer alliances).

The relationships between the parties in the supply and demand chain (or network) can be anything between loose and tight. When investigating the relationships between mold users, mold processors and plastic injection molders, Fujimoto (2003) found that the more precise the technology was, the more intimate the transactional

networks were. This can be compared to the value added of the product in the value chain: the higher the value added becomes, the closer the participants become. In order to increase the competitiveness of a product, the company has to involve strategic suppliers earlier into the process and with more substantial information than their competitors.

ECR has published guidelines for managing the supply chain efficiently in four core strategies: efficient promotions, efficient replenishment, efficient store assortment and efficient product introductions. The target was to improve the relationships between retailers and manufacturers, share information and enhance customer value. Kotzab & Teller (2003) discuss ECR from the point of view of value-added partnerships, and claim that "*the traditional win-lose or friend-foe paradigms have been becoming obsolete in collaborations, which to some extent seems to be the result of the rising complexity and dynamics, especially in fast moving consumer goods markets*" (Kotzab & Teller, 2003, p. 271).

The improved customer service level is also reflected to those customers who are not involved in the VMI model (Kaipia et al., 2002). VMI has potential for increasing customer satisfaction, as it enables the supplier to act beforehand for the high seasons, and thus ensure reliable delivery. Research of VMI and its benefits either take one supplier-customer relationship into consideration, or assume that the forecast information is available from all customers. The forecast accuracy has a wide impact on the whole supply chain, and it shows also in increased customer goodwill (Zhao et al., 2002).

The customer service strategy starts from segmenting customers from the logistics point of view into segments that are distinct, significantly different from each other and large enough to build critical mass in service provision (Gattorna, 1998). The logistics service level provided for each segment versus the cost of the service should be defined. This definition provides a tool for developing the offering for a segment either by improving the service level or by reducing the cost, depending on the category the segment belongs to. For example, in a segment consisting of

partner-type customers, the improvement of logistics services would improve customer satisfaction and therefore lead to increased loyalty and profitability of that segment.

The change from product-driven strategies towards customer and market-focused ones has increased the need for systematic customer relationship management processes. Dyché (2002) defines Customer Relationship Management (CRM) to be the infrastructure that enables the delineation of and increase in customer value, and the correct means by which to motivate valuable customers to remain loyal. Customer loyalty is the main target of CRM, but the detection of profitable customers has to be involved in the process to be able to target the activities to the right customers.

The implementation of CRM represents the key to increasing customer loyalty, which helps in retaining customers and thus gaining competitive advantage against competitors (Nguyen et al., 2007). The eLoyalty matrix, an economic model developed at eLoyalty (Conway & Fitzpatrick, 1999 according to Wilcox & Gurau, 2003, p. 182), shows that the turnover is greatest with customers who are dissatisfied with the relationship they have with the company.

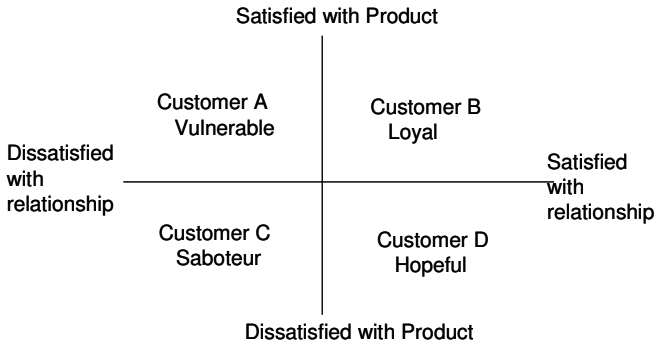


Figure 10. eLoyalty Matrix (Conway & Fitzpatrick, 1999 cited in Wilcox & Gurau, 2003, p. 182)

Wilcox & Gurau (2003) state that despite a rising consciousness about the importance of loyalty marketing, 70 percent of online retailers lack operational strategies for cultivating their all-important customer relationships. They also discuss the importance of gathering and using attitudinal data in the customer segmenting process.

The implementation of an efficient CRM strategy requires the introduction of a customer-focused organizational culture. Today, many companies employ operational CRM systems to communicate better with their customers. But successful CRM means more than simply being connected to customers: it means tracking customer behavior and using this data to maximize the customer's profitability and loyalty throughout the entire life cycle, from customer acquisition to retention.

One major area in the customer relationship management in the value chain of paperboard-packed consumer goods is to be able to manage demand information. The prerequisite for this is thorough knowledge of the customers' value and role in the overall business and their impact on it. The paperboard industry has used ERP systems as a basis for their analytical CRM processes (Hinkkanen, 2003). Analysis of past performance has been used to evaluate and segment customers, and the results have been used to concentrate the development efforts on certain customer categories.

2.2.4 Increased visibility

The bullwhip effect can be (at least partially) eliminated by sharing information with suppliers and customers – including intra-company suppliers and customers. By sharing information, a common understanding of the real demand can be achieved. The visibility of information should extend beyond the immediate trading partners in order to avoid for instance excessive safety stocks caused by a single-source view of

the demand (Lee, 2003). The effect of information sharing for reducing the bullwhip effect is also supported by Carlsson & Fullér (1998), de Kok et al (2005) and Ouyang & Daganzo (2005).

Helo et al. (2006) discuss agile supply chains, and mention full and thorough visibility as a prerequisite for a truly collaborative supply chain. They also suggest synchronization of companies' operations and full utilization of Internet technology among other structural changes in order to reach the goals of improved competitiveness. IT systems in intra-company activities are not enough; the companies should understand the importance of viewing the whole supply chain and the value of information sharing.

There are also case studies of real business-life showing how collaborative models have reduced the bullwhip effect. McKenney & Clark (1995) describe the well-known case study of Pampers diapers at Procter & Gamble, and De Kok et al. (2005) present the benefits Philips Electronics has gained with a collaborative planning process, which was implemented with one of their main customers. Also Ravichandran (2006) presents a case study where the joint implementation of an ERP system and VMI model has led to a reduced bullwhip effect.

2.3 Barriers and obstacles of collaboration

2.3.1 Lack of trust and reliability

As trust is a key issue in all kinds of alliances, it appears to be on a higher level in vertical than in horizontal alliances, since in vertical alliances the partners are usually not in a competitive situation with each other (Rindfleisch, 2000; Perry et al., 2004). According to Lee et al. (1997), there are four main causes for the bullwhip effect:

demand forecast updating, order batching, price fluctuations and rationing, and shortage gaming. The lack of trust for the supplier as well as for the company's internal planning creates these disturbances.

The quality of forecasts the suppliers receive from their customers determines whether and how they can be utilized. Forslund & Jonsson (2007) have studied the forecast information quality (FIQ) with the following conclusions: the quality is lower upstream in the supply chain; the quality is lower in make-to-order companies than in make-to-stock companies; and that forecasts are considered unreliable. According to Forslund & Jonsson the quality cannot be measured objectively, but the measurements are based on evaluations by the party receiving the forecast information. Their results show that even in established customer-supplier relationships the forecasts are unreliable, inconvenient to access and not in time. They suggest more attention to be paid also to receiving and processing customer forecasts.

Sharing of forecast information might not lead to improved supply chain collaboration in practice, if the supplier acts on the forecast too early. Terwiesch et al. (2005) point out that as forecasts are continuously updated, it is difficult for the supplier to know when to act on the forecast. They also discuss the challenges of the forecasts being signs of what the customer intends to do in the future. As the customer is not obliged to buy what they have earlier forecasted, they might inflate the forecasts, which in turn can motivate the supplier to delay its actions until the customer commits to the forecast.

As forecasting is usually based on information received from the customer and the downstream parties in the supply chain, the information is treated and accepted as given. Berger (2003) calls this a passive approach to forecasting. Instead of accepting this, he suggests taking a more active approach to demand patterns, or making the demand more "forecastable".

It must be noted that CPFR is only a tool that facilitates collaborative forecasting between supply chain partners. As with any other tool, the use of CPFR alone will not result in successful collaborative efforts, unless internal forecasting processes have been established, and solid relationships among partners have been forged. Collaborative forecasting involves reliance on supply chain partners to provide accurate, detailed and timely demand information. It requires trust in the information as well as in the partners that provide it. Collaborative forecasting can be defined as the purposive exchange of specific and up-to-date collaborative forecasting information (e.g. quantity, level, time horizon, location, probability of new business) between trading partners to develop a single shared projection of demand (McCarthy & Golicic, 2002). Fliedner (2003) states barriers to CPFR implementation to be lack of trust in sharing sensitive information and lack of internal forecast collaboration.

One definition of collaboration is that it is ”eliminating the honest mistakes” (Bermudez, 2003, p. 14). This refers to the fact that business relations will remain arms-length transactions, but collaboration should aim at more visibility and more structured ways of transferring information. The ultimate target of collaboration according to Bermudez should be replacing the inventory with information. The criteria for selecting the collaboration partners are reliability, loyalty and innovation.

The most difficult issue in VMI is the accuracy of demand information, and it is even more important in VMI than in a normal order-to-delivery model. The reason is that in VMI the buyer is not able to build just-in-case safety stocks by ordering too early or too much. The safety stock in VMI should also only cover enough material for the buyer to survive in case something unexpected happens, meaning issues like replacing damaged material or accidents. The main cause for keeping excess buffer stocks is the lack of trust between trading partners, which also hinders the implementation of VMI for some companies (Kaipia et al., 2002).

2.3.2 Uneven share of benefits, lack of win-win business case

In practice, partnerships do not always create equal benefits to both partners, but can be a necessity to one, while providing extra value to the other. Small companies often face this issue when partnering with bigger companies; the smaller partner's business might depend heavily on the partnership, while the bigger partner exploits this information. One might argue that this is not a partnership, but the business world's definition for partnership is wider than that in the literature. Very often long-term relationships and contracts are called partnerships even though they may not fulfill the above-mentioned definitions.

Holmström et al. (2003) discuss the partial visibility issue of VMI and claim that the existing literature offers limited benefits for real-life companies. AMR Research also calls for best practices in implementing VMI, which would help the companies starting a VMI business model to "do it right". Technology provides the tools for VMI, but practical case examples of successful and not successful implementations are clearly needed (Askegar & Suleski, 2003).

There are also several pitfalls in CRM implementation. Nguyen et al. (2007) discuss this and list the following major barriers to successful CRM implementation: lack of definition, poor leadership, insufficient help from CRM vendors, not enough customer demand, large capital investment requirement, and meeting customer expectations. These refer to CRM system implementation, but Nguyen et al. (op. cit.) also discuss the problems of mismatches between CRM and business strategy, commitment to the implementation and lack of focus on creating return on investment (ROI). For a successful CRM implementation, Nguyen et al. (op. cit.) suggest the following steps to be included: understanding the CRM connection to the business strategy, assessing the company's current CRM capabilities, having a business case (need), and creating a plan for the implementation. They also claim that CRM is not as valuable for companies that are far away from the end customers, but this may only refer to operational CRM systems, and not to analytical customer relationship

processes that are often included in the enterprise resource planning (ERP) systems of companies operating in B2B areas.

2.3.3 Change resistance and organizational issues

Key issues in successful partnerships require agreed joint targets, performance measurement and control. They also require that the people operating in the partnering organizations are adaptable to changes that necessarily occur when partnerships are taken onto the operative level. In long-term partnerships the external environment also needs to be monitored from time to time, as its changes can have an effect on the ways the partnership evolves. (Wagner et al., 2002)

Even today, in most companies each department makes its own forecasts based on multiple information sources. This usually results in excess inventory in the process and non-optimal utilization of resources, and thus decreases the company's financial results.

Wu & Katok (2006) show evidence that communication or training to use collaborative tools themselves cannot eliminate the bullwhip effect. Their article discusses the results of a beer-game simulation, and concentrates on the human behavior and decision making in supply chain activities. The article points out that more effort should be put into combining subjective individual decision making issues and inadequate communication between supply chain partners. Wu and Katok claim that improved training together with shared knowledge and coordinated communication can help in eliminating the bullwhip effect, but the experimental environment they have used is quite difficult to repeat in a real business environment.

In general, managers of firms are far better at the practice of competition than they are at the art of co-operation. Many long-standing barriers exist to prevent successful implementation of collaborative relationships. One major barrier are the existing incentive systems. While many firms seek to enhance the overall supply chain performance, most incentive systems are still focused on the firm or even functional performance. Also, fragmented organizations and semi-isolated functionalities cause logistics to be operated in a sequential way instead of focusing on overall objectives (Bowersox et al., 1999; McGuffog & Wadsley, 1999).

Outsourcing of non-core competencies has changed the operational environment significantly, also moving the company's internal collaboration to the cross-enterprise level (Bhatnagar & Viswanathan, 2000). Things that were earlier handled between the company's departments are now handled with external partners, often involving commercial angles. This fragmentation has also resulted in competitive and individualistic rather than collaborative cultures (Miller & Ahmad, 2000; McGuffog & Wadsley, 1999; Lee, 2001). It has also been claimed that this has undermined the morale of staff and created a climate of mistrust. As trust is the core prerequisite for collaboration, this change can be seen as creating extra challenges for it. The most critical factor to be overcome in successful collaboration is not the technical barrier, but rather the people barrier (Berger, 2003). In global business environments also national cultures have a key role in collaboration. Tammela et al. (2008) discuss the importance of cultural awareness, which has a direct impact on customer satisfaction and logistics.

The CPFR process defined by VICS is a step-by-step process, which has also been largely used in CPFR research. Skjoett-Larsen et al. (2003, p. 532) offer a different approach, defining collaborative relationships as "*collaboration where two or more parties in the supply chain jointly plan a number of promotional activities and work out synchronised forecasts, on the basis of which the production and replenishment processes are determined*." They also state that the typical barrier in CPFR implementation is that the organization structures are functionally build, based on a product-oriented vision.

Collaboration is not an IT issue; Strandquest (2002, p. 3) defines collaboration as "*real-time, collective decision making and execution*". This definition extends the traditional concept of working together as being a gradual turn-based process of negotiation and interaction. According to CGEY, addressing behavior issues would deliver twice the benefits of technical issues (Netmarkets Europe, 2003a).

2.3.4 Inconsistency of the business environment

Supply chain partnerships should be reviewed at times, as the competitive situation as well as the partnerships themselves evolve and change. Knoppen & Christaanse (2007) propose a temporal approach to supply chain partnering, and suggest using three stages: decision, preparation and operation, to be able to manage the three concerns, namely appropriation, coordination and adaptation, respectively. Their model exhibits the importance of the human perspective in successful supply chain partnering instead of the more hard factors which are often highlighted.

The ever-shorter product life cycles are another reason for the VMI concept not to be implemented more widely. If forecasting and planning are done on a detailed level, the continuous change in products is seen as a prohibitory factor for reliable forecasts. However, there are ways to overcome this problem; e.g. by increasing the forecasting and planning level to become more aggregated, when planning would be done in a product group or at a similar level. Also, products are increasingly made of standard components, be they ingredients, parts or whatever. By managing the raw materials for production through standardized components, the forecasting of the raw material need would depend less on changing end product details. This also applies to internal planning and forecasting in cases where there are several production phases and intermediate inventories involved.

The investment needed in establishing a VMI model sets criteria for the products involved. As mentioned above, stable products of substantial volume with relatively

long life cycles create the basis for a VMI model, and the benefits are also easier to measure and realize. However, there are more and more consumer products with very short life cycles – especially new technology products – and the usage of VMI cannot be justified as easily. Another phenomenon shortening the life cycle is the decreased length of seasons: instead of two annual seasons, trend products today have 4–6 seasons, and stock replenishment during the season is not possible.

Fine (1998) discusses the increasing clock-speed in the industrial environment, where the structural changes are becoming faster all the time. He calls for agility and adaptability for companies to be able to survive. This creates challenges for collaboration, as the partner base does not remain stable, and investments in new initiatives need to have shorter pay-back time.

2.3.5 Technology and standards

The amount of pilot results of CPFR available in the literature is much smaller than the number of companies involved in the CPFR process. The technology barriers and lack of standards in particular have been a significant factor in inhibiting CPFR rollouts for many companies. The XML communication standards have been released and software providers now have CPFR-enabling solutions available (Berger, 2003). Even though the technological readiness is seemingly there, the implementation rate of cross-company communication has not increased dramatically.

Among the barriers in CPFR implementation are the provision of adequate technology and software, difficulties of real-time coordination of information exchange, substantial investment of time and personnel in the set-up, the process intensive nature of maintaining the efforts across several suppliers and products, lack of scalability from the pilot stage, and the required synchronous changes in

corporate culture for both firms in a collaborative relationship (McCarthy & Golicic, 2002). Barratt & Oliveira (2001) also state that even though the sales forecast has been initially issued as expected, the exception management and the review processes have failed. Fliedner (2003) lists some main barriers to CPFR implementation: availability and cost of technology/expertise, fragmented information sharing standards, aggregation concerns (number of forecasts and frequency of generation) and fear of collusion.

The implementation situation has somewhat improved lately, but still the number of published best-practice case studies is quite small. Their nature is also very similar: the CPFR implementation consists of two parties, a retailer and a supplier, both being relatively or very large companies. Case studies involving small companies are lacking, and barriers of technological readiness still exist in the SME sector.

Bermudez (2003) has listed the key development areas for two years (2003 and 2004) in collaboration as follows:

- 2003: Foundation support
    - get existing applications operational
    - marching up the learning curve
    - debut of flexible ERP architectures
    - integration, integration, integration
    - smart vendors plug the gaps
- 2004: Business Process Management
    - collaborative applications are real
    - private exchanges have impact
    - supplier management is mainstream
        - micro connectivity
    - RFID begins to have real impact

As we can now see, even forecasting the development of collaboration is difficult, and not all new technologies and methods mature in the pace we hope (and Bermudez predicted). It is true that the software area has developed, including the systems integration using XML and EDI. However, the implementation of modern software including implementation of systems integration has proceeded at a slower speed. RFID adoption continues to lag behind every forecast made for it, the main reasons being the costs and weak standards. In a recent report by the Grocery Manufacturers of America (GMA Information Technology Investment and Effectiveness Study, 2006), nearly half of the companies reported that they were currently piloting RFID internally or in conjunction with a trading partner, but only three percent were actively leading the way and aggressively implementing RFID.

However, the modern ICT technology provides intelligent tools to support collaboration. Barratt & Oliveira (2001) present survey results of the importance of IT in the various stages of the CPFR process: the importance is very low in the initial stages (related to front-end agreements), but increases in the sales forecast process, and becomes vital in the order forecast process management.

As the business environment is becoming increasingly online, the preconditions for a successful CRM system have to reflect that. The systems need to be distributed, concurrent and connected. However, concurrent, distributed systems have complex interactions that are difficult to understand and predict. Vague system specifications and wrong model designs present major problems. (Wilcox & Gurau, 2003)

The application of information technology in value chains cannot be regarded as new technology as such, but even today the usage is still in the process of implementation. The mistrust caused by the e-commerce hype and fall in the early 2000s, as well as the ERP system implementation era – still on-going – have slowed the effective use of the potential the web-based technologies offer; this is especially true in SMEs (Lee et al., 2003). There is also a lack of trust towards the safety of internet-based information transfer (Agarwal & Shankar, 2003). Park & Bunn (2003)

also claim that e-commerce promotes more arms-length ways of conducting business, which is in contradiction to closer buyer-seller relationships.

Technology-based initiatives are promoted to reduce manual workload and human error-related issues, but companies are hesitant to invest in immature technologies. The GDSN idea of providing a standardized way to utilize RFID is good, as it also offers a platform solution for the data exchange in practise. However, bundling a standard with a commercial solution is not accepted by all companies, and the benefits from such an initiative come from having all relevant parties involved. If the solution cannot provide information from all relevant parties for a company, the value of the solution may not exceed the investment.

As a technology, RFID enables the use of long codes, which is the prerequisite for detailed identification. The memory chips can also store other data, which can be written in them along the supply chain by various parties; this data can be for example production-related information and expiry times. These enabling possibilities require widely accepted rules on the format, content and other similar details, before they can be used efficiently in the supply chain.

If and when commonly accepted rules are in place, RFID technology offers a method for exchanging information between supply chain partners as the products travel forward. This would eliminate the need of connecting ICT systems from various companies in order to transfer the information, as the information would travel with the product. This kind of information transfer would function, when the information travels in the same direction as the products, but it would not substitute the information exchange dependent on an ICT system when there is a need to send the information upwards in the supply chain. To summarize, RFID offers new opportunities for the supply chain, but not as much for the demand chain.

2.4 Trend changes in the supply chain from 2003 to 2005

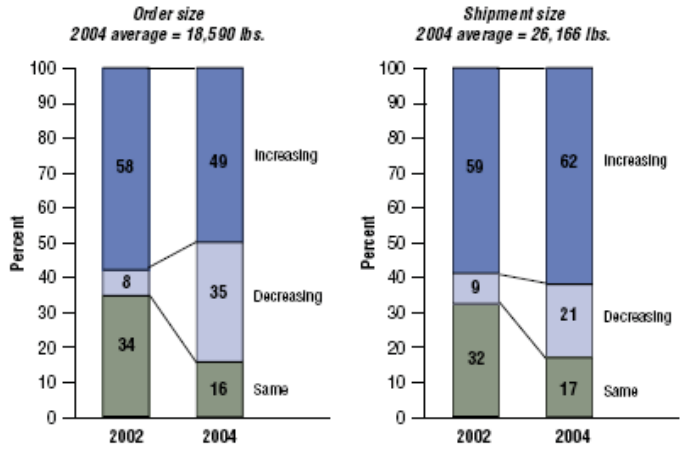
The Grocery Manufacturers' Association (US) or GMA has conducted logistics studies in 2003 and 2005 on the key industry trends in the Food, Grocery and Consumer Product Supply Chain. These reports offer insight into the opinions of the consumer product industry managers, and the changes are easy to highlight by comparing these two reports. The following comparison points out the areas of importance in these two reports.

Table 1. Supply chain trend changes from 2003 to 2005

2003	**2005**
Responsiveness has increased and the supply chain is more demand-driven, because of new ERP systems, improved internal collaboration and tougher service targets	*Integrated planning and forecasting with suppliers and logistics service providers* to provide differentiated customer segment product and service bundles and superior customer service levels
The inventory level decreases slower than anticipated, because of the increased number of new products, shorter order-to-delivery cycle, high forecasting inaccuracy, misaligned goals and lack of internal collaboration	*Continue to rationalize distribution networks* with regionalization for specific customer requirements; increase the use of flow-through or cross-docking and direct-to-store strategies by various product and customer categories
The use of supply chain services is limited, because of the lack of understanding customer needs, collaborative planning and general lack of supply chain service providers	*"Condition" demand through planning and forecasting* to serve customers' specific requirements for promotions, special packaging and other value-added services

The forecasting accuracy is low, because of the low level of integrated sales and operations planning processes, inadequate level of collaboration between manufacturers and retailers, lack of accurate and timely flow of demand information and retailers' forward buying practices	*Implement advanced collaborative planning and forecasting with customers,* including continuous replenishment programs and shared management of inventory

One often mentioned important trend is the decreasing order sizes. As the volumes grow at the same time, this increases the importance of efficient logistics processes. It also affects demand estimation in a negative way, because fulfillment becomes more and more scattered. The suppliers (manufacturers) have made an effort to compensate for this trend with combined shipments, and Figure 11 below shows that the decrease of shipment size has not been as dramatic as the decrease of order size.



Source: GMA 2005 Logistics Survey.

Figure 11. Order and shipment size changes from 2002 to 2004 (GMA 2005 Logistics Survey, 2005, p. 9)

Even though the companies that participated in this survey listed the important focus areas as indicated in the figure above, they had not been able to implement these issues in practice. The survey clearly shows that the importance of efforts in partner collaboration and the need to coordinate and integrate supply chain activities to reduce costs and improve performance were higher on the list in 2005 than in 2003, but the companies had not been able to move to the implementation phase. The implementation rates of measured logistics practices are shown in Figure 12 below.

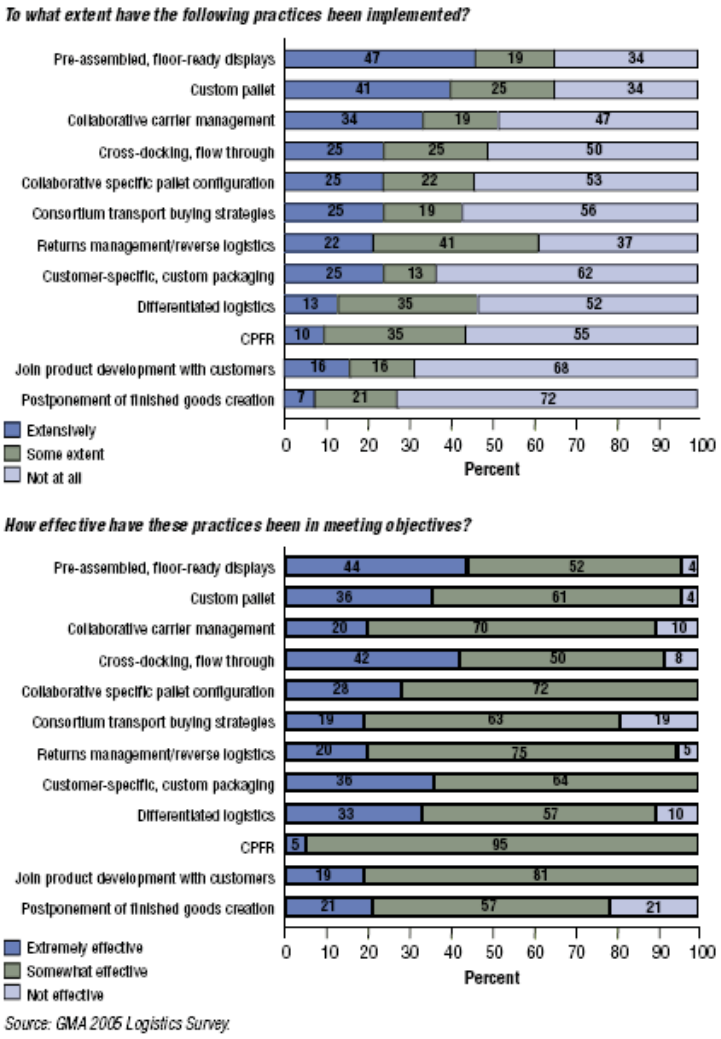


Figure 12. Implementation rates of measured logistics practices (GMA 2005 Logistics Survey, 2005, p. 14)

Most of the respondents collaborated more than ever with partners on strategic issues, such as customer visibility to point-of-sale, forecasts, inventory and promotions, collaborative decision-making and performance scorecards with logistics

providers. They shared information about plans, issues and actions to enable rapid decision-making in collaboration with partners and logistics service providers, and proactively to manage logistics activities with scorecards and event monitoring of exceptions. Enhanced customer visibility and collaborative decision-making are mentioned to be the top initiatives in order to enhance trading relationships.

According to the survey (GMA Logistics Survey, 2005) ,the responsibility of demand forecasting remained with the sales and marketing, according to the survey, in collaboration with supply chain execution process owners. The survey also states that only seven percent of the respondents received forecasts and plans from their customers, and that the forecasts were mostly based on historical data. This means that forecasting and demand planning were still done internally, and not in collaboration with the customers.

Also, the implementation of CR, VMI, postponement techniques and other advanced inventory management methods had not progressed widely – less than 50 percent of the respondents were using them. Significant progress was reported in the areas of data synchronization and information management initiatives, which are prerequisites for collaborative information transfer between business partners, but as such do not facilitate it. The main data synchronization effort had been the Electronic Product Code (EPC), which is said to be a precondition for establishing a network for identifying a product globally. Information transfer concentrated mainly on exchanging transactional information using EDI, but few respondents were using this information to drive demand-based replenishment.

Accurate forecasting is a key driver of improved customer service and reduced inventory. However, manufacturers must look for alternatives to the history-based forecasting approach to improve forecasting accuracy, which remains one of the major supply chain challenges for the CPG industry. The biggest overall hurdle is the development of trust in the buyer-seller relationship. Without this trust, meaningful consumer information is not shared, and most incentives remain tied to costs and volume rather than to actual consumer needs.

The majority of industry leaders agreed already in 2003 that electronic collaboration was a critical business priority. However, most executives at that time were reluctant to invest in preparing internal systems and processes for data synchronization, because of conflicting messages on whether the infrastructure and the business case had been proven.

RFID has gained some ground in the consumer packaged goods industry, mainly because of the work EPC Global has been conducting to develop standards around it. Also, mandates from major retailers have forced the supplying consumer product manufacturers to adapt and implement RFID for their supply chain. Anti-counterfeiting activities have also provided motivation for the implementation of the RFID system. (GS1, 2006)

RFID continues to be implemented in only a small percentage of manufacturers' operations, with the majority making the least possible investments to comply with retailers' requirements. Only ten percent of the respondents in the GMA 2006 study stated that RFID was extremely effective in meeting business objectives. The explanation for this is that the implementation stage is still very low, and companies have little experience in this particular technology. Also, there are not many existing benchmarks showing actual return on investment from RFID. Manufacturers state that the most significant benefits expected from implementing RFID technology are 1) meeting the compliance requirements (of retailers), 2) reduction of out-of-stock at retail stores, 3) improving the trading relationships, and 4) reduction of shortage claims from retailers (IBM, 2005). None of the listed benefits are related to manufacturers' internal operations, or towards the suppliers' upstream. High variable costs have discouraged the use of RFID tags in consumer products (on item level). Kärkkäinen (2003) discussed this several years ago, but the situation was still valid in 2007.

2.5 Summary of the literature review

The literature review described several collaborative value chain initiatives, methods and models. It also discussed the collaboration drivers and barriers mentioned in earlier research. Chapter 2.4 indicated the trends of supply chain activities in 2003 and 2005, highlighting the development of the focus areas. The objective of the literature review was to find answers to the first two research questions of this thesis. The findings of the literature review are summarized below.

Research question 1:

1. *What are the drivers and motivation for using collaborative models in the value chain of paperboard-packed consumer goods?*

Cost reduction via decreased inventory levels and reduced out-of-stock situations has been pointed out in several earlier research reports. It is directly related to the second mentioned driver; increased efficiency. The efficiency increase results both from the reduction of practical transactional activities and from more coordinated processes reducing speculative activities. Customer satisfaction and loyalty are important in customer retention. The collaborative initiatives have been shown to improve the customer satisfaction via improved relationship management and services. Increased efficiency enables the companies to base their planning and forecasting on more reliable information and thereby improve the quality of forecasts.

Research question 2:

2. *What are the existing barriers prohibiting a wide use of existing and developed collaboration models?*

Several research reports have listed the lack of trust and reliability as a barrier for collaboration. Companies do not seem to trust their value chain partners' motivations to share information openly, and at the same time do not seem to be able to trust

their partners with giving information to them. Also the reliability of the information gained from partner companies is not seen to be on a reasonable level. Defining a win-win business case is mentioned as another barrier, which is tightly connected to the previous barrier; lack of trust. It is very difficult to define a business case with evenly shared benefits, as every company is understood to guard their own interests.

Organizations have their fixed ways of working, and especially large companies have internal hierarchies, which often lead to sub-optimization and departmental thinking. Change resistance as a collaboration barrier exists on organizational and individual levels, blocking collaborative initiatives efficiently. With the increased speed of change in the business environment, the relationships between companies are shortening. This de-motivates the building of collaborative arrangements, when the investment payback time requirement tightens.

Technological barriers are still listed in the literature, even though the development of ICT technology and information transfer networks have progressed very fast. Technologies alone are not able to offer solutions, they also require commonly accepted ways of using them. Immature standards for RFID are a good example of a practical barrier for wider exploitation of this technology.

The comparison of supply chain trends points out the change from a response focus to an integration focus, from transactional initiatives to more strategic approaches. Still, the implementation rate as well as the realization of claimed benefits has been lower than expected, and this continued also in 2005. This clearly shows that the drivers have not offered enough motivation for companies to start large-scale collaborative activities, and that the barriers seem to be stronger than the expected benefits.

3 Consumer Packaged Goods Industry

3.1 Definition and description of consumer packaged goods Industry

The Consumer Packaged Goods (CPG) industry was chosen for this study, as it reflects one of the key end use areas of the packaging boards supplied by Stora Enso, the initiator of this research. The end products, consumer packaged goods, have a large variation: they include products like fresh, dry or frozen food, pet food, detergents, cosmetics, pharmaceutical products, confectionaries and consumer electronics. The common denominator for all of them is that the consumer creates the principal demand impulses, which reflect the demand in the whole value chain.

The CPG industry is often seen to cover retail, wholesale and consumer product manufacturing companies. There are, however, a large number of companies operating for the above listed parties as part suppliers, subcontractors, logistics providers, raw material producers, and in other similar roles. These companies also sell their products and services in other than the CPG sectors, but in this study they are included as members of the CPG industry. The research scope also defines that the upstream part covered here consists of companies providing the packaging for consumer goods.

The companies in the CPG industry represent different industry types: retailers and wholesalers can be categorized as belonging to service providers, but are also known for operational logistics efficiency. Transportation companies operate in various parts of the CPG value chain, and sometimes are take care of warehousing and wholesaling activities as well, and they also belong to service providers. Consumer product manufacturers, or brand owners, produce the actual goods, but sometimes also operate as contract manufacturers for retailers' private label brands.

Package converters are companies that print, die-cut and pre-glue the packages for consumer goods. The packages are converted according to the design and structures given by the brand owners, often highlighting the brand identity. The packages can be item level packages, wholesale packages, transportation packages and mixtures of these. The item level package equals the unit of purchase for the consumer. The wholesale package represents the unit of purchase at the wholesaler and/or retailer level. The transportation package is meant to cover and protect the lower level packages and the items inside them during transportation, and also to make handling more efficient.

The packaging material manufacturer produces the material for the package converter, in this study referring to a company producing packaging paperboard material. Depending on the printing methods used by the package converters, the material is delivered in a reel or sheeted format. Also, the material is made and packed according to specifications from package converters, meaning that it is produced against customer orders (not make-to-stock).

Another way to categorize companies in the CPG industry is to name the executors and influencers. The executors are parties that act in the value chain according to the trends, changes and requirements set by the influencers, whereas the influencers are companies and parties that with their power and initiative have the possibility to define, implement and even dictate how the rest of the value chain operates. Examples of how the influencers can act include new product development at the band owners including the decision of packaging, and RFID labeling of pallets and cases required by retailers for their immediate suppliers. Roughly speaking, the logistics providers and wholesalers can be included in the executor category, but also the package converters and packaging material producers belong to that group in many cases. The influencer category includes the retailers and the brand owners, not forgetting the consumers.

The companies in the CPG industry also represent very different structures in size, locality (or globality) and process type. The largest companies are in the retail sector, some multi-national, and their influence in the whole industry is extremely high. The competitive situation has led to a situation where the brand owners are fighting for the best positions and visibility in the main retailers' shelves. The consumer product manufacturers are global as well as local companies, and their sizes vary greatly. There are companies whose product brands are more known than the company identity. The package converters are either very large (companies like Tetra Pak) or relatively small, even family-owned firms operating very locally. The packaging material producers are large, usually multi-national companies, operating also in other areas in the forest industry. Figure 13 contains some well-known companies in the CPG sector and shows their size differences.

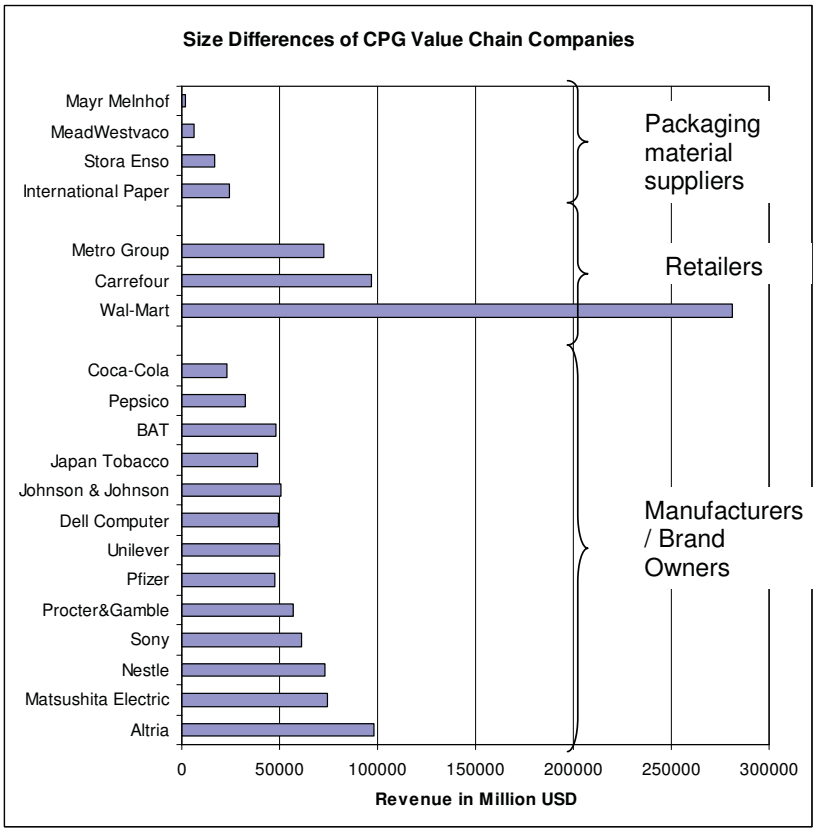


Figure 13. Size differences of CPG value chain companies (information collected from 2005 annual reports of the listed companies)

The main interests of the parties involved vary between company categories. While the packaging material suppliers are interested in developing and innovating new materials and packaging concepts, the package converters focus on cost efficient operations. The manufacturers' interests lie in their brands: enhancing, enlarging, developing and protecting the brand image and value; whereas the retailers concentrate mainly on efficient shelf space utilization and back-store operations. The

consumers' role is to decide which products provide them with the best value for the cost.

In the CPG sector the packaging of products has an increasing importance in many aspects. It offers product information, safety (tightness, purity, origin etc) and branding functions. Concerning relationship intimacy, it can be stated that the increased collaboration between manufacturers and packaging suppliers will also improve the competitiveness of the product. The packaging can even be called a silent salesman.

There are several means and technologies for marking and identifying products moving in the value chain. Most of the marking is done on the packaging, which increases the importance of packaging in the consumer packaged goods value chain. Printed codes like two-dimensional barcodes enable the use of long identifications keys, and digital printing moves this opportunity one step further, enabling the use of unique codes for each printed item or package. Laser technology is also more and more used for marking packages with different information, including variable data like unique identification codes. (Viskari, 2007).

Fast developing technology touches packaging also from other perspectives; the package is seen as an intelligent messenger (Yam, 2000). So-called intelligent packaging applications include functionalities like time-temperature sensoring, oxygen scavenging (which is a process of removing chemicals such as reactive oxygen), gas leakage detecting, self-heating and self-cooling, interactive functions with intelligent kitchen devices and other similar features aimed at improving the packages' protection properties for the product inside, but also information gathering and exchanging with surrounding devices and systems. There exist a great number of research publications of the above-mentioned intelligent packaging functionality areas, but they are not referred to here because of not being in the scope of this research. The purpose of mentioning them at all is to highlight the growing importance and enlarging role of packaging in consumer goods. All these developments together with the logistics functions discussed above increase the

importance and value of the package. The role of being just a cover and cost item *for* the actual product has been replaced by a new role of being a functional part *of* the product.

Research in demand estimation and management in the CPG sector is mostly been done in the downstream of the value chain. Especially the retail business, together with its intermediate partners, has been extensively investigated. Therefore the subject of demand estimation in the CPG sector does not appear fresh for scientific studies. The value chain, however, must be seen to cover upstream parties as well, and the problems they face have not been tackled so far. However, forecasting and demand estimation become more complicated the further one is from the source of demand information, namely the consumer.

When looking at the impact on demand at the retail level, the CPG sector can be divided into two main models of operation:

- The Every Day Low Price (EDLP) model boosted by Wal-Mart and adopted by all other major retailers in the US. The main idea is to keep the prices on a constantly low level utilizing retailer-specific labels, not branded products.
- The promotion-based model existing widely in Europe. In this model the retailer requests the manufacturer for promotion of a certain product. The manufacturer is 'forced' to apply, but as a result forecasting of the demand is destroyed. The demand has a sharp peak, and the availability requires extra effort, and after the promotion the demand usually decreases significantly as a result of consumers buying more than they need. The use of promotion is usually connected to a branded product. However, some studies claim that brand-loyal consumers buy the same brand regardless of promotion.

The above mentioned operational models apply in the lower end of the chain – the retail sector. They are included here, because they have a significant input into the

demand patterns. However, the input is not clearly visible in the upper end of the value chain, because of the structure of the value chain.

3.2 Categories of consumer packaged goods

The business segment of consumer packaged goods includes a variety of goods. The common denominator is that they are used by consumers, as they are available in the retail stores. The following categorization is based on those products that carry paperboard packaging.

The main category of paperboard-packed CPG products is foodstuffs: edible and drinkable products. This category includes several sub-categories, like liquids, dry food, frozen food and chilled food. Product characteristics or storage conditions present requirements for the packaging, and also the supply chain varies. Moreover, the shelf life or storage life time for these products is limited due to deterioration, causing the value chains to be more local than with some other product categories.

Another substantial category is chocolate and confectionaries. This category differs from foodstuffs by its different buying decision factors and also higher requirements for packaging. Chocolate and confectionary products are not considered daily products, and some of them represent high quality gifts, requiring very high quality packaging as well.

Pharmaceutical and cosmetics products form one category, with another different value chain. The value chain of pharmaceutical products has also substantial differences from one country to another, depending on the laws and regulations. They also have more global value chains, because the production is more consolidated, and the nature of the products allows longer transportation distances.

The household goods category includes products like detergents, soaps, personal care products and other similar products. A major group for paperboard-based

packaging comes from detergents and other cleaning powders. These products are often well-known international brands, sometimes with localized features, and their value chain is also often global.

Consumer electronics is a rapidly growing category, and it includes devices such as MP3 players, mobile phones, digital cameras, game consoles, GPS navigators and other similar electronic products meant for consumer use. The life cycle of these products is relatively short, and they also represent the latest trends and published technologies. These products are mostly global, having also regional customization features, such as languages, in their user interfaces.

3.3 The value chain of consumer packaged goods

The value chain of the CPG sector can be described in many ways – there is no one right way to do it. Furthermore, it must be remembered that each party in the value chain belongs to several other value chains, and the term *chain* should be understood as part of a complex value network (Lukka, 2004). Svensson (2003) has introduced an alternative model for CPG products, namely the consumer-driven value chain diffusion model. He describes the value chain as a consumer driven process, rather than being successive or stepwise. This means that the value chain only receives its full value at the final consumer market. How the companies involved in this value chain receive their share of the value is based on competences, capacities, power, dependence, pricing and negotiations. Figure 14 below describes roughly the parties involved in the CPG value chain.

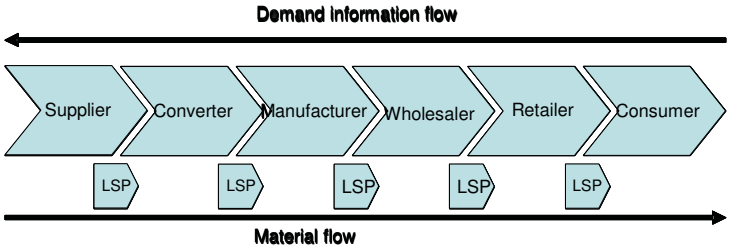


Figure 14. Parties in the CPG value chain

The supplier in the figure above refers to companies supplying raw materials or components for consumer goods manufacturers, including companies from chemical and paperboard industry for packaging materials. Converters are companies processing the materials provided by the suppliers. In some cases the supplier processes the materials to a stage where the manufacturer can use them directly, without the need of a converter in the middle. In the case of paperboard packages, converters are used for printing and converting of the packaging material.

Manufacturers are companies producing consumer goods. Wholesalers are not involved in all value chains, as sometimes the manufacturer can deliver the goods directly to retailers; sometimes retailers also operate as wholesalers. Retailers are the last industrial-type entity in the value chain.

The material flow refers to the physical distribution of goods between the consequent supply chain partners. The structure described above represents an example of a basic structure, but sometimes the material flow might skip certain supply chain partners: for example the logistics provider might take the role of the wholesaler, delivering the goods from the manufacturer (brand owner) to the retailer.

The information flow described in Figure 14 only points at the direction of the demand information flow. Naturally, information concerning deliveries and the like also goes in the same direction as the physical material flow. Another point worth

mentioning is that the arrow showing the direction of the demand information flow is very rarely solid, but rather consists of shorter arrows between two consequent supply chain partners. Also, in many cases the demand information flow arrow might be totally missing between some parties. This will be discussed more in the empirical part of this thesis.

There are some distinct features in the CPG value chain, which make it interesting by nature:

- The nature, size and power of the parties in the supply chain vary greatly. The consumer is by far the smallest party, but is the main source for demand information. Major retailers have significant power in controlling the chain (some talk about chain captaincy). The manufacturers can also be global corporations, but the converters are often very small privately owned companies. The supplier end of the chain often consists of capital intensive industries, such as chemical or paper/board industries.

- When looking from the upper stream end, the product changes significantly when it goes down the value chain. Therefore the logistics issues even in transactional planning cannot be compared to distribution logistics when seen throughout the whole chain.

- The market laws reflecting the demand in the chain are driven by consumer behavior, thus reflecting economic cycles. Therefore the demand fluctuations for the packaging material supplier do not reflect the changes of the market pulp price as much as in other paper industry sectors.

The CPG industry operates with different co-operational models. In the retail, wholesale and manufacturing parts of the industry, more advanced collaborative solutions are implemented, as described in Chapter 2.1.4. The main reason for this is that this particular part of the value chain distributes the final consumer product,

only the distribution lot size and frequency varies. So the problem settings and challenges are related to managing distribution logistics.

4 Empirical Studies

The empirical studies consist of three parts: interviews, participant observations and a proposition for an operational model – each consisting of individually collected information. The sources of information as well as the methods used to collect the information are different. As described in Chapter 1.5.1 about the approach, the purpose for choosing triangulation was to get three independent sets of results from three independent sources and time dimensions.

The empirical study was conducted during 2003 and 2004, with the most recent update for the operational model proposition made in 2007, but as the literature review showed, the same problems are relevant even today. This also shows that even though new models have been developed since the time of the empirical study, the business world faces the same implementation and collaboration issues as four years ago. The empirical material also indicates that technology development is not the main driver for collaboration in the value chain, but the adaptation speed of new methods is more related to the change acceptance of the organizations operating in the value chain.

The target of the first part of the empirical research is to shed light to the research questions of this thesis. As described above, it was conducted as interviews based on a questionnaire developed for this purpose. The second part of the empirical research involved a large group of participants, who gave their input in structured and managed group sessions using brainstorming methods and group decision support system (GDSS) technology. These two parts provide similar findings for the research questions, and show that there is interest for collaborating in the consumer packaged goods value chain, but it is still not reality. The findings also show that the barriers to collaboration are very much the same as mentioned in earlier studies conducted in the retail sector.

The third part of the empirical research, a proposed operational model, is the most important part in the empirical study of this thesis. It consists of a practical solution proposed for a real-life business situation, aiming at a significant business process change in practice. The main objective of this operational model case was to test in a real situation if a process change towards a collaborative forecasting model could be conducted, starting from a situation where technological barriers are non-existent. The findings of the first two empirical parts list lack of trust, lack of business case and lack of commitment as the main barriers to collaboration. The operational model also aims to overcome these barriers by tackling them beforehand and defining the business case with tools to implement it. The first two parts also mention cost reduction, increased efficiency and visibility as the drivers for collaboration. The operational model aims to provide these mentioned benefits to the parties involved.

4.1 Interviews with the help of a questionnaire

A technical description of the first empirical part is presented in table 2. It summarizes the conceptual issues regarding the questionnaire-based interviews.

Table 2. Technical description of the first empirical part

Criteria	**Description**
Objectives and relation to the research questions	• Collects information on demand management from the brand owners' purchasing staff • Aims to find answers to research questions on collaboration drivers and barriers
Selection of interviewees	• Interviews with 5 persons • The interviewees were selected in co-operation with Stora Enso Packaging Boards sales people • The interviewees represented the main European consumer

	product brand owners • All the interviewees were in a managerial position in purchasing organizations
Protocol	• The author designed a questionnaire (see Appendix 1) which was given to the sales people of Stora Enso Packaging Boards • The interviews were conducted as a part of a regular sales meeting • Three interviewees filled in the questionnaire during the meeting, two interviewees sent their answers via email after the meeting
What data was collected	• The collected data was grouped in three categories ○ Sources and methods of demand information ○ Processing demand information ○ Giving forecasts of raw materials and services
How the data was analyzed	• Data analysis was done manually with an Excel spreadsheet due to the small number of respondents
Validity	• The respondents represented different large companies from the same industrial sector • The questions were designed to show whether there are similar patterns in the answers of the respondents
Researcher's role	• The researcher designed the questionnaire and received the answers for analysis

The objective of the questionnaire was to collect information on the demand management from the brand owners' purchasing staff: where and how they receive the information, how they process it and how they transfer it to their suppliers. The interview was made with 5 brand owner representatives from different multinational consumer goods manufacturing companies. The interviewee selection was based on their representation of global brand owners and responsibility for the packaging material purchasing as key decision-makers.

The questionnaire for the interview included both closed and open-ended questions. The questionnaire consisted of three parts: sources and methods, processing the demand information, and giving forecasts for raw materials and services. The questionnaire form can be found in Appendix 1. The interviews were conducted by the salespeople of Stora Enso Packaging Boards during their meetings with these key people. The reason for this procedure was to get input in the questionnaire in a normal meeting situation without having external people present. As discussed by Stuart et al. (2002), a problem in case research is related to building trust between the interviewee and the interviewer. Using existing personal relationships between the supplier and the customer was meant to provide the trust and acceptance required for the interview. This approach also produced limitations, as the interviews were conducted by different people.

4.1.1 Sources and methods of demand information

The questions in the first part of the questionnaire handled the primary sources and methods of getting demand information concerning the company's own products. As the interviewees were from purchasing, these questions included both company-internal demand information and information coming from their external customers. This part also included questions about the systems used for getting the demand information and the importance of the demand information for the planning of the companies' production and purchasing processes.

None of the interviewees named forecasts from customers as their main source of demand information. The answers varied notably, but internal knowledge and past behavior were on the top of the list. Some listed received purchase orders as their main source, indicating a very short-term planning horizon. Internal planning systems (like SAP) were also mentioned as a source of demand information. This reflects the organizational hierarchy, where departments have very strictly defined roles and responsibilities.

Even though the respondents did not name customer forecasts as their main source of demand information, most of them stated that their customers send forecasts when required. In other words, even if the customers sent forecasts, they were not used as the basis for demand estimation. Some said that they generate their forecasts from the industry trends. They also listed various methods for receiving the demand information, among which were file transfer, fax, own extranet, but also the company-internal SAP system.

The demand information was seen as somewhat important for the planning processes. When asked why the importance was not higher, most respondents stated that they either never received it or that even if they received it, it was not reliable or accurate enough. The respondents also ranked their main customers' ability to forecast from poor to mediocre, mainly because of being too inaccurate, of a too high level or too late.

4.1.2 Processing the demand information

The processing of the demand information was mostly done with a PC and spreadsheet software or manually. The respondents believed that the forecasts they had calculated were quite reliable and followed the realized demand. The main reason for the inaccuracy of their calculated demand was that the source information

was too inaccurate, too late or changed too much. This indicates the hierarchic structure of the organization, where departments are focused on their own activities, and have relatively little trust or respect for the information they receive from external sources.

Most of the interviewees used the calculated demand information, stating that it had influence on their raw material or service requirements. One interviewee, however, stated that this is only done in case they are fully booked. This also implies that the purchasing staff rely on their traditional, proven methods and procedures.

4.1.3 Giving forecasts for raw materials and services

Most interviewees said that they give their forecasts to their suppliers. The interview did not reveal the level of these forecasts, so their usability to the next supply chain level cannot be evaluated. However, half of the respondents stated that they give demand forecast information to their suppliers only at the time of contract negotiations, mainly once a year. Only one interviewee answered that they pass the demand estimates to their suppliers once a week or once a month, depending on the partner. The methods mentioned for sending the demand information were very similar to the ones used in receiving demand information. These results indicate that the traditional business procedures are in a dominating position, and demand estimation is mainly used for sales negotiation purposes, not as an operational tool.

When comparing the respondents' own ability to estimate demand with their customers' respective ability, most of the interviewees believed themselves to be better than their customers. This indicates again departmental thinking, but also lack of trust towards the information and demand estimation capabilities of the customers.

4.1.4 Summary and conclusions of the questionnaire

According to the interviewees, there are not very systematic collaborative models to exchange demand information. Their answers revealed several company internal issues, mainly related to departmental hierarchies and strict boundaries between departments. In these cases the demand information received from the customers was processed internally first without the input of the purchasing department. When the information was received at purchasing via internal systems, it was still re-processed, because of the low reliability and accuracy.

The relevance of this information for getting an overall picture of the situation in the industry is not high enough. The number of interviewees, how well they represented their companies' overall opinions and their objectivity regarding the evaluation of performance of their models not high enough for making scientific conclusions. However, the main contribution of this survey is to give first impressions on the empirical part of this thesis. When receiving and evaluating these results, it became clear that this area must be investigated more, using a larger group of people as well as other research methods. The limitation of the survey is that the respondents answered pre-defined questions, and even when using open-ended questions, it was difficult to get free-formed opinions.

4.2 Smart forums

A technical description of Smart Forums is presented in table 3. Similarly to the first empirical part, the table summarizes the conceptual issues of the second empirical part.

Table 3. Technical description of the second empirical part

Criteria	**Description**
Objectives and relation to the research questions	• The target was to find the drivers and motivations, as well as barriers for collaboration within a large number of industry representatives • The objective refers directly to the first and second research question
Selection of participants	• 5 different Smart Forums were included in this part, having in total 270 participants • The sessions were invite-only forums, to which the organizers had invited participants from the major European companies acting in the consumer product supply chain • The participants had managerial positions in their companies, some were from the corporate level
Protocol	• The Smart Forums were facilitated by the organizers • All input was given via the Mindshare system • The sessions started with listing barriers, drivers or other similar issues related to the topic of the session • Initial information input was grouped by the participants, and the groups were given a more general heading • The participants voted for the importance of each group, and the most important groups were discussed in order to reach a practical level for actions • All input was delivered in electronic format (pdf) to all participants
What data was collected	• The author made notes on the personal observations • The session organizers provided all the input the participants

	gave during the sessions as white papers and verbatim reports including quantitative voting data
How the data was analyzed	• All qualitative data was grouped both during the sessions, and by the researcher in order to find the main categories of drivers and barriers for collaboration • The quantitative voting data was analyzed with descriptive statistical calculations, like average and standard deviation
Validity	• The Smart Forum participants represented the European CPG sector as well its supply chain partners widely • Data collection was done using the Mindshare system • The same approach was used in various Smart Forums in order to find similar patterns in different participant groups
Researcher's role	• Participated in the Smart Forum sessions as a packaging material supplier representative • The researcher also acted as an observer

The second part of the empirical study was based on so-called Smart Forums. The author participated in them as a representative of a packaging material supplier, but also as an observer. The outcome, comments and results of these events represent both the author's personal observations about the events, but also the summaries and reports provided by the event organizers. At the time of participating in these events, this research had already started, and the observation work in the Smart Forums was done in tight connection with the research. The author also had an active role in these events: acting as a packaging material supplier representative with the aim to increase the awareness of the situation of the upstream parties to the other supply chain parties.

The Smart Forums were targeted to the members of the CPG supply chain: retailers, wholesalers, manufacturers, raw material (like chemical) suppliers, packaging companies, logistics companies and technology providers. Each event had a specific product segment or supply chain functionality in focus, but the common denominator for all of them was collaboration, and especially why it is so difficult and rare to collaborate and how this situation could be improved.

The Smart Forums consisted of several events organized by Netmarkets Europe. For this thesis the following events and their output was chosen: Innovations in the European HPC (Home and Personal Care) Supply Chain, Re-engineering the European Food Supply Chain, Boosting New Product Development, Beyond Collaborative Working and the 3rd Annual CPG Summit. All these forums were invitation-only events with representatives from over 80 major companies in the CPG industry (retailers, manufacturers, upstream processors, logistics service providers, packaging and chemical suppliers etc).

The participants in the selected Smart Forums are presented in table 4, categorized according to the company category and organizational category inside the company. As can be seen, the majority of the participants represented brand owners and technology providers. The brand owners' supply chain management people were the single largest group to participate, but overall the supply chain management and sales & marketing were the main organizations the participants belonged to. This is natural, as the topics of the sessions concerned collaboration involving suppliers, customers and supply chain issues.

Table 4. Smart Forum participant categorization

	Supplier	Logistics provider	Brand owner	Retailer	Packaging	Technology	Total
Sales & Marketing	6	2	16	5	6	34	69
Supply Chain Management	10	1	48	22	7	7	95
Research & Development	3	1	14	2	5	10	35
Collaboration		1	3	1		1	6
Adminstration, Corporate Functions	7	5	15	5	3	30	65
Total	26	10	96	35	21	82	270

The sessions consisted of stimulus presentations and guided sessions to enable the participants to give their input. The participants were assigned virtual groups of their company's category, namely retail, manufacturer, supplier, packaging or logistics. The participants were asked to give their answers in the category of their companies, but within the categories the individuals and their answers remained anonymous.

A Group Decision Support System (GDSS) called Mindshare played a major role in these sessions, enabling simultaneous peer-group interaction. A facilitator operated the sessions, taking care of the progress from ideas and comments to voting and evaluating. The system included a laptop computer for each participant, connected to the Mindshare system via a wireless network connection. All input was given via this system, and all participants could see immediately all input from the other participants, but anonymously. Commenting and voting was also done with the same system and anonymous approach.

4.2.1 Innovations in the European Home and Personal Care Supply Chain

The first selected event was targeted at the Home and Personal Care (HPC) supply chain. The participants of this event represented major European companies involved in the manufacturing, distributing and selling of detergents, personal care and similar consumer products. As a summary of the comments, the manufacturers seemed eager to assist the retailers, and the retailers were willing to collaborate, as long as it served their purpose. The upstream suppliers, logistics providers, packaging suppliers, as well as the software and services providers seemed powerless to intervene.

There were different motivations for participating in the event: the chemical manufacturers were looking for ways to add value to the supply chain, but this was more in terms of solving their own inconsistencies in production and downstream supply. The logistics providers were eager to facilitate collaboration in the hope of benefiting from increased traffic. The packaging companies approached each subject practically, simply wanting short-term tangible answers. The stimulus speakers raised the question of whether the packaging suppliers should be included in collaborative activities more often. Raising the awareness of the upstream participants' role in the value chain was one of the objectives for participating in this event.

In terms of seeking opportunities for stronger supply chain collaboration and effectiveness, the retailers sought better communication standards to aid the collaborative process and delivery accuracy, but it was also suggested that the current promotion practices drive poor on-shelf availability. On-shelf availability is one of the top problems for manufacturers and retailers, but they look at the problem from opposite angles. Many retailers claim that manufacturers bring problems on themselves by expanded range variants and endless promotional activities. This requires constant realignment on store shelves. In addition, inflexible supply options

mean that stock has to be held at the back of the store where space is limited and conditions may not be ideal for the goods.

One participant said: "*The next evolution of savings can only come from understanding the physical and virtual interactions between the trading partners and work to make these efficient*."

The participants gave votes on the supply chain collaboration barriers listed in earlier parts of the event. The vote results are presented in table 5.

Table 5. Voting results for barriers to the HPC supply chain collaboration (Netmarkets Europe, 2002)

10-Point Scale (1 = no barrier, 10 = huge barrier)

Nr	Description	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)	8 (8)	9 (9)	10 (10)	Total	Average	STD	n
1	Trust between partners			4	3	2	3	2	4	6	9	242	7.33	7	2.55	33
2	Top-level buy-in and understanding	1	2	3	2	2	4	5	4	4	6	219	6.64	7	2.70	33
3	Power play - external			2	3	10	4	3	4	3	4	212	6.42	6	2.12	33
4	Differing internal priorities	2	1	3	4	4	2	2	7	6	2	205	6.21	6	2.67	33
5	Lack of standards		2	6	2	8	1	3	4	2	5	197	5.97	6	2.62	33
6	Poor visibility of costs		2	2	6	7	3	6	5	2		187	5.67	6	1.95	33
7	Skill availability - right skills, right place, right time	3	1	4	6	2	5	4	2	2	4	183	5.55	6	2.74	33
8	Power play - internal	2	2	5	3	5	3	6	4	3		177	5.36	5	2.37	33
9	Business case definition	2	5	3	6	2	3	6	3		3	169	5.12	5	2.64	33
10	Fragmented business processes	2	4	5	5	4	2	4	5		2	165	5	5	2.54	33
11	Lack of tangible metrics	2	5	4	2	6	6	4	3		1	160	4.85	5	2.29	33
12	Poor IT process support	3	7	4	5	2	4	1	3	2	2	152	4.61	5	2.76	33
13	Complexity - SKU proliferation	4	4	6	3	9	4	2	1			133	4.03	4	1.91	33

The manufacturers believed that they could perform better if the retailer was more aligned to provide feedback on potential stock-out information and learn more about

the constraints within the supply chain, which are sometimes brought on by the retailers' demands. Both parties – the retailers and the manufacturers – began the session miles apart with some heated discussion about price pressure and mistrust. By the end of the day, the parties seemed to find a more common ground and clearly showed willingness to collaborate further.

The chemical companies believed that there is a need for supply chain collaboration rather than a buyer-seller relationship, which is far too slow. They would like to collaborate directly with retailers to bring in innovation and improve the retailers' brands. The technology providers would like to help the retailers by understanding the real processes to help them achieve their objectives, and deliver simple solutions to enable these processes once they are properly defined. CPFR was seen as a good example of a process that technology providers have tended to overcomplicate and over-engineer. Many basic processes could be dramatically improved with very simple 80/20 solutions.

4.2.2 Re-engineering the European Food Supply Chain

Much of the talk around supply chain collaboration focuses on the manufacturer-retailer relationship.

According to a Smart CPG Forum member, "S*upply chain concepts seem to only extend to the next business in the chain - doesn't that have the inevitable result that consumer messages will be less accurate the further up the chain a business is positioned?*"

The retailers and manufacturers aligned themselves with each other on some issues, but still remained divided especially in relation to the issue of trust. The food manufacturers did not seem to believe that the retailers were really changing their spots. Whether the volatility of the food market or the power-play between the parties

is the reason, it seems that whilst the food supply chain is one of the most diverse and fast changing, the parties have not yet worked out how to get along.

The existence and importance of collaborative opportunities was not doubted. However, there are several obstacles to it, and the forum listed the following:

- *No business case*. Food companies understand that there are benefits in collaboration, but there is a lack of sheer will and of a way to identify clear goals and develop business cases.
- *No trust*. The food industry is very confrontational and the members are split into bitterly hostile camps. In practice, customer-supplier relationships work with a very narrow agenda - "price, price, price".

  One Smart Forum participant said, "R*etailers could communicate consumer requirements more accurately up the supply chain. Current signals that it's all price are unhelpful in terms of meeting real consumer and hence retailer requirements*."

- *No collaborative working at the project definition stage*. Activities between companies are in the form of requests for one-way "data dumps" with no explanation of the intended purpose or larger frame. This is a major lost opportunity to build trust and to find really valuable knowledge. Even worse, many food companies admit they lack the processes and culture for cross-departmental working even within their own organizations.
- *Inappropriate role definitions and performance measures*. Even if there is a vision and a sound business case, collaboration is effectively prevented by the food industry's traditional models for defining, rewarding and measuring jobs. The goals are often measured and related to an individual even at the expense of providing the business with a bigger benefit.

  One Smart Forum participant stated: "*Supplier relationships are still dominated by buying department margin considerations*."

- *Wrong culture and lack of senior management awareness*. Given that collaboration requires "changing the rules" significantly, it is vital that the senior management is fully committed. For example, there is a need to improve understanding and support when moving to common industry standards, short-term pilot programs for practical collaboration and mid-long term development of critical collaboration capabilities. There are subtle but powerful cultural forces working against collaboration.

The listed barriers for collaboration were given votes on how big a barrier each of them is. The vote results are presented in table 6.

Table 6. Voting results on collaboration barriers in the Food Supply chain (Netmarkets Europe, 2003a)

Vote on Barriers (1=not a barrier, 10 = biggest barrier)

Nr	Description	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)	8 (8)	9 (9)	10 (10)	Total	Average	STD	n
1	Trust between partners	2				1	3		4	5	9	192	8	8 2.64	24
2	Powerplay - External	1	2		1	1	1	4	5	3	6	175	7.29	7 2.71	24
3	Differing internal priorities	2		2	2	3	3	3	3	5	1	149	6.21	6 2.59	24
4	Poor view of actual costs	2	2	2	1	3	1	5	2	5	1	143	5.96	6 2.80	24
5	Fragmented Business Processes	1	1	2	1	6	3	3	3	4		142	5.92	6 2.28	24
6	Poor IT process support	1		2	5	3	4	4	4	1		135	5.63	6 2.00	24
7	Powerplay - Internal	2	1	2	2	5	4	2	4	2		131	5.46	5 2.34	24
8	Lack of tangible KPI's	4	3	5	2	1	3	2	2	2		104	4.33	4 2.66	24
9	Complexity - SKU proliferation	2	2	6	4	5	2		2	1		102	4.25	4 2.09	24
10	Skill Availability	3	5	3	2	3	5	2		1		98	4.08	4 2.24	24
11	Lack of Pan-Euro 3 PL's	7	3	5	1	2	4		1		1	84	3.5	4 2.50	24

The participants also listed key steps that should be taken in order to increase the level or even start of collaboration. The main ones are listed below:

- Raise understanding of the business opportunities available through collaboration and set out a modus operandi for collaborations. Specifically, senior management should be visibly supportive and involved.
- Identify a small number of pilot projects to develop practical collaboration. It should be possible to start these projects at short notice with minimum analysis or investment. Whilst tackling "quick wins", the projects should be specifically designed to become wellsprings of best practices for future projects.

  One Smart Forum participant pointed out that "*if there is a weakness in internal cross-departmental working, it will make sense to select an internal project for the first pilot*."

- Undertake a comprehensive analysis of collaboration opportunities – use the widest search landscape and then home in on selected target projects. The analysis team should first encompass the entire supply chain in the search for candidate business opportunities, and then select a manageable number against predetermined criteria.
- Review and develop the critical capabilities for collaboration, such as relationship management, team working, program management and cost/value analysis.

4.2.3 Boosting New Product Development

The reason for choosing this event as a part of this thesis was that the area of new product development has a tight connection to the future demand. If and when the value chain partners can participate in the new product development process, they establish a collaborative network and can also influence the decisions made for example for the packaging of new products.

Most of the participants in this forum reported to have collaborative models and tools for new product development, which they used inside their own company to get the different functions involved. Several companies also involved their direct customers (retailers) in the development process, but only one participant mentioned including their first tier suppliers in new product development.

The participants were asked to define the existing barriers to collaborative new product development (NPD). One of the barriers mentioned was the leadership (executive buy-in): the lack of C-level commitment and sponsorship makes it difficult to allocate resources and funding. Another barrier were the cultural differences across functions and especially between companies. The department-oriented organization was seen a big barrier to inter-company collaboration: there is no cohesive alignment of the functional objectives both within the business and across the value chain, and there are insufficient complementary goals and understanding across the value chain. Large globally distributed companies were seen to have competing internal business units – a single focused approach is needed before progress is possible.

The lack of B2B strategy alignment was also seen as a barrier to collaboration. This refers to a low level of information and knowledge sharing, including the alignment of long-term goals and shared short-term benefits. Collaboration with suppliers was feared to lead into too high dependency on chosen partners, making the change of partners complicated. The role of NPD was seen to be not clearly defined by the leadership, resulting in confusing and conflicting organizational structures.

The participants formed several improvement action categories as objectives for a more collaborative-oriented new product development process. The main categories were:

- *Supplier relationships*; a clear need for enhanced supplier collaboration was stated. The suppliers were seen to be able to give more new insight into raw

material development and possibilities, and the forming of strategic alliances and joint ventures were seen as possible ways to tighten the co-operation.

- *Customer information and insight*; the fast speed of trend changes is a challenge for new product development, and the retailers have access to the most current information of consumer demand. Access to this information, as well as transfer of this information throughout the value chain were seen as critical issues.
- *Extended team or enterprise*; the vision was a virtual team including manufacturers, suppliers and customers working together with the help of modern B2B tools. Overcoming cultural differences both inside companies and between companies was stated as the biggest challenge, but also as a major enabler for building trust.
- *Competitive environment*; the industry is consolidating and there are fewer and fewer companies operating in the global business environment. This should make collaboration easier, but at the same time competition becomes fiercer. Also the constantly tightening regulations for environmental and sustainability issues pose challenges for new product development in the form of non-controllable variables.

Five key development areas were defined for proceeding with collaboration in new product development. The first one was breaking down the long-term vision into a short-term ROI. This could be done by clear communication of the strategy, defining both hard and soft ROI, and effective project management, by establishing a culture of openness, trust, as well as by tolerance of difference and elimination of blame. The second area was the alignment of organizational structures, strategies and leadership. This could be done by ensuring the fit of the project with corporate and business strategies, by involving project steering groups more tightly to the development work, and by establishing information platforms to ensure access to project information.

The third area was the creation of complementary goals across the value chain. This could be done by setting market map objectives and defining the needs of

consumers, retailers and all suppliers in the value chain, by identifying overlap and therefore scope opportunity, by developing a joint business plan, and by assuming success and expanding overlap.

The two last areas were closely related to the overall development of the new product development process. One of them was maximizing the market opportunity, and the other was practical reduction of the time to market. The issues enabling these two target areas included continuous drive to efficiency, empowerment throughout the value chain, increasing decision speed, and clear prioritization.

The participants voted for the opportunities for collaboration by expressing which areas produce most overall ROI and which areas are easiest to implement. These two dimensions are presented in a graphical form in figure 15. Table 7 lists the voting results. Both are based on the input of 27 participants of this Smart Forum.

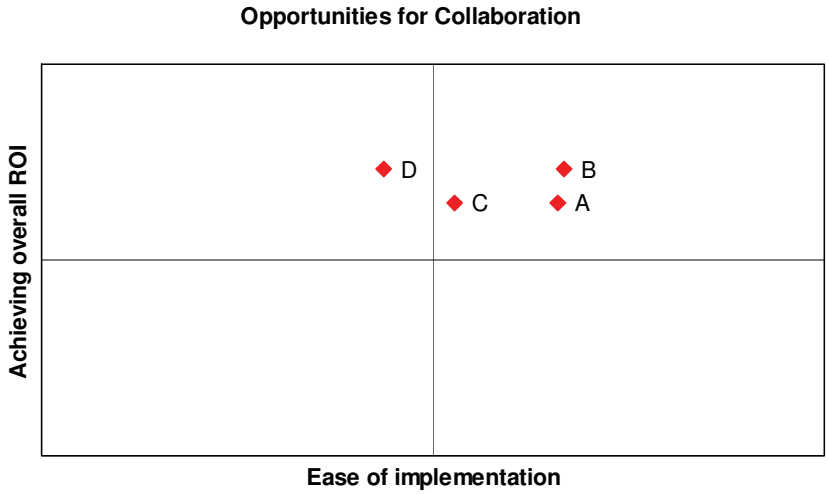


Figure 15. Opportunities for collaboration in new product development (Netmarkets Europe, 2003b)

Table 7. Voting results on the ease of implementation and overall ROI of the collaboration areas (Netmarkets Europe, 2003b)

Recommendation	Ease of implementation (mean)	STD	Overall ROI (mean)	STD
A. Sourcing & Procurement	6.6	2.56	6.47	2.29
B. Customer Service & Demand Planning	6.67	1.76	7.33	1.59
C. New Product Development	5.27	2.43	6.47	2.07
D. Strategic Business Planning	4.37	2.25	7.33	2.38

4.2.4 Beyond Collaborative Working

As a summary of the output of this particular Smart Forum, the main reason for holding collaboration back was the poor quality of data. The manufacturers of consumer packaged goods have no clean product data for collaborating with customers, or clean material and packaging data for collaborating with suppliers. Many leading CPG companies now implement corporate-wide specification to provide 'one version of the truth' in the form of a common data model that can be used to facilitate trading partner relationships. Data synchronization projects are the core of this process, and as these initiatives involve more than just the industry leaders, collaboration will become more widespread.

Three types of collaboration defined by the Supply Chain Council were discussed:

- *Data exchange*: This is the basic form of collaboration, and very transaction-based. It is a simple exchange of information between specified partners, with or without a confirmation.
- *Co-operation*: This is the next level up. It involves sharing and synchronizing of information. There should be a shared process objective, such as improved delivery times. Companies may also

share systems and tools to access the shared data or shared function better.

- *Cognitive*: This is the most extreme form of collaboration. It involves sharing the intellectual framework of a business, common strategic elements and the analysis of data and processes.

There is a threat that the CPG companies raise the obstacles to collaboration just to avoid facing the hard work. Perhaps seeing quantifiable benefits and real life best practices would motivate them for the effort. The Smart CPG Forum workshop highlighted some live working examples, with the target of building interest towards collaborative initiatives. Small one-off projects are a good starting point and they can lead to the all-important goal of creating trust.

The Smart CPG Forum members identified specific examples of possible collaboration:

- Outsource non-core services that are common to multiple companies, like
  - Pallet provision and consolidation
  - Developing and maintaining standard product catalogue data
  - Vehicle fleets
  - Nielsen store data
- Develop packaging systems targeting the 'last 50 yards' obstacle to on-shelf replenishment.
- Re-engineer the shelf replenishment logistics process via best practice e.g. of the logistics approaches successfully used in regional distribution centers:
  - Focus on the challenge of promotions
- Identify variety rationalization opportunities at the level of stock keeping units (SKU) towards downstream and components towards upstream.
- Implement new standards through collaborative pilot cases.
- Design and implement consumer market research studies.
- Develop and apply intelligent models to identify cost-saving and profit-sharing measures.

The global management consulting, technology services and outsourcing company Accenture highlighted their experiences of collaboration benefits including higher visibility, improved forecast reliability and better production efficiency. According to a survey of collaborative planning, forecasting and replenishment (CPFR) pilots presented by Accenture, companies had achieved significant improvements. Most of these pilots had measured three key performance indicators which could be compared:

- Forecast accuracy improvement
- Inventory reduction
- On-shelf availability improvement

The pilots were conducted by including companies in the retail-manufacturer part of the value chain. Also distributors were involved in some pilot cases. None of the pilots had participating companies from the upper part of the value chain.

Very similar reasons as in the earlier Forums were mentioned by the participants in this Smart Forum for not implementing collaborative practices:

- *No business case*. Companies lack the motivation to define a way to set common goals and benefits.
- *No trust*. Hesitation towards opening the company's information to other value chain partners was clear. It was clearly stated that the companies are suspicious about the other companies truly committing to the common initiatives and sharing of benefits.
- *No collaborative working at the definition stage*. This refers to both internal and external working, leading to one-off activities with no clear continuity.
- *Inappropriate role definitions and performance measures*. Departmental and product-oriented organizations and reward systems lead to sub-optimization. Even when the management level has a collaborative vision, the lower levels of the organizations are still working towards one.

- *Lack of senior management awareness and wrong culture*. Change resistance and fixed thinking is very common in organizations. Without clear and strong senior management involvement, successful pilots and common standards the organizations continue to work against collaboration.
- *Exclusive focus on cutting prices*. This barrier has close connection to above-mentioned lack of business case and lack of trust. Especially this affects the thinking of manufacturers, as they see the retailers as having a highly price-obsessed focus.
- *Lack of a specific action plan*. For some time already, companies have been told about the benefits of online collaboration. Some executives will probably always remain skeptical, and those that do believe in collaboration are often afflicted with understandable paralysis – it is one thing to understand the general theory and another to take the first concrete step. To do so means overcoming insecurity and inertia, as well as actually knowing where to start. Executives are uncertain, and often afraid, of where to start. Many have been left disenchanted by previous technology waves.

4.2.5 3rd Annual CPG Summit – How to Create a Demand-Driven Supply Network

At the 3rd Annual CPG Summit there were two workshops: one for Global Data Synchronization (GDS) and another for New Product Development and Introduction (NPDI). They are discussed separately in their own chapters below, as the key topics in each were different. The outcome and main findings, however, were very close to each other. The findings will be summarized with the findings of other Smart Forums in Chapter 4.2.6.

Global Data Synchronization

The participants of the GDS session defined five main barriers to implementing GDS. The first one was the *lack of a trust*: the GDS was seen as just an additional cost item, information sharing was seen as endangering the competitive edge, and the GDS was seen as a profit improving item for large multinational companies, not for smaller domestic players.

The second barrier listed was *technology*: the ERP map is still very fragmented, and many companies are still struggling with their internal IT system improvement projects.

The third mentioned barrier was the *organization*: getting top executive level commitment to GDS initiatives was seen to be very difficult. Other issues related to organizational barriers were process ownership questions, resource availability problems and the lack of knowledge on GDS. Adoption was also seen as belonging to organizational issues: how to overcome the silo mentality, getting the agreement to data standards across all functions and where to get the spark from, as there is little external pressure.

The fourth barrier mentioned was how to get the *data standards to be global*. There are several initiatives which have gained ground, but not one that has been accepted globally. Also emerging new technologies confuse companies.

The summary barrier statements which the group worked on, were then turned into the following statements. These were then taken into a vote, where the group expressed their views on the scale of 1–10 (10 being high) about the barriers they most wanted to work on. The results of the vote are shown below.

Table 8. Voting results for the interest level of collaboration barriers (GDS) (Netmarkets Europe, 2004a)

Nr	Description	1	2	3	4	5	6	7	8	9	10	Total	Average		STD	n
1	BC - How to quantify real benefits	1			1	1	1	1	5	2	9	171	8.14	8	2.41	21
2	ORG - How to convince senior management to support this initiative	1	1			1	1	4	3	6	4	160	7.62	8	2.46	21
3	TECH - How do we set up internal processes and technical capability for the information flow		1	1		3	3	3	4	4	2	147	7	7	2.17	21
4	ORG - How to ensure you have the "organisation" for execution		2	1	1	2		8	2	4	1	139	6.62	7	2.31	21
5	Adoption - How to ensure critical mass participation	1	1	2		2	3	3	6	1	2	135	6.43	6	2.5	21
6	Standards - How to ensure that GDS and standards are aligned to business processes		2		1	4	4	2	6		2	134	6.38	6	2.18	21
7	Adoption - How to meet local needs with global initiative	1		2	4	6	1	1	5		1	116	5.52	6	2.2	21
8	Adoption - How to move forward in light of competing standards	3	1	2		4	6	2	1	1	1	108	5.14	5	2.54	21
9	BC - How to define a phased implementation plan	2	3	2	2	2	2	1	6	1		108	5.14	5	2.69	21
10	BC - How do we plan the cost of resources		4	5	3	1	2	2	3		1	100	4.76	5	2.45	21
11	TECH - How to make GDS affordable for SMEs	2	2	4	4	4	1	1	3			91	4.33	4	2.15	21

The group defined solutions for overcoming the above-mentioned barriers by choosing four most voted areas from the table above. To be able to quantify real benefits the group suggested using pilots as proof on concept. Also, limiting the scope of the data to be synchronized – like product attributes only in the beginning – would help tackling the big issue. The steps involved would be the identification of savings and benefits for each party, communicating them and getting acceptance, to be able to build the foundation for collaborative work. The key success criteria identified included the adoption of trading partners, quick wins and proof of payback and reductions in inventory and costs.

To convince the senior management to support the GDS initiative, several issues were mentioned. Increased on-shelf availability, having the right inventory in the right

place and presenting positive pilot results were mentioned. These would enable the building of a convincing win-win scenario as well as using alliances with other customers and trading partners to build support for the idea. Lobbying and involvement of key stake holders and bringing in an external pressure point were also seen as tools for getting the senior management committed.

Overcoming the internal issues of IT for adopting a harmonized use of product data was said to require an integrated view across the whole company. Investigating the capabilities of existing systems, setting up cross-functional teams and starting a project to adopt GDS were suggested as concrete steps towards this target.

The fourth problem area chosen for further discussions was how to form the organization for GDS execution. Cross-functional teams, choosing champions for the project, and setting a vision with clear targets and goals were mentioned as ways to reach this target. Training and internal road-shows were also mentioned as means to increase interest and improve communication.

New Product Development and Introduction session

In the beginning of the session the participants listed additional opportunities of collaborative New Product Development and Introduction (NPDI). These included collaboration with suppliers, specification control and re-use, gaining competitive edge via faster launches and the re-use of intellectual property. Moreover, involving the logistics providers as well as the packaging companies already in the development phase was seen to reduce the need to re-design.

The group listed barriers to collaborative NPDI, including *lack of will to change* the existing processes, not having enough expertise to manage complex projects and learn from past experience, and old-fashioned departmental thinking. The *lack of executive ownership* was seen as another barrier, as NPDI is often not high enough

in the company's executive agenda. Having access to the results of successful case studies within the CPG industry would lower the threshold and increase executive interest. *IT* was also seen as a barrier, as many IT investments and projects have oversold their technological aspects and thus hidden the business reasons and commercial benefits behind them. *The constantly changing consumer demand* poses a challenge to NPDI; it was seen difficult to predict which kind of products would have demand.

Also in this session, a vote was organized to find out which barrier areas were seen as the most interesting ones to tackle. The voting results are shown in Table 9.

Table 9. Voting results for the interest level of collaboration barriers (NPDI) (Netmarkets Europe, 2004b)

Nr	Description	1	2	3	4	5	6	7	8	9	10	Total	Average		STD	n
1	How to align business processes and ownership across the extended collaborative enterprise with NPDI activity (Process change).						2	3	2	3	6	136	8.5	**8**	1.5	16
2	How to create a compelling business case that expresses the ROI and success metrics in terms that the business are willing to accept and therefore invest properly in. (Poor Quality Business Case)				1		2	1	6	2	4	129	8.1	**8**	1.7	16
3	How to interpret consumer demand correctly so that the new products you develop and introduce are the right ones.				2	2	1	4	1		6	120	7.5	**8**	2.3	16
4	How to position NPDI within the organisation that has become cynical and overwhelmed with seemingly similar outcomes (e.g. PLM, ERP, NPDI) or previous cross-functional projects where the ROI was not realised. (Acronym Fatigue)		1	1	2	2		1	3	4	2	110	6.9	**7**	2.6	16
5	How to overcome the lack of publicly available, quality success stories? (Case studies)		2	3	2	5	1		2	1		77	4.8	**5**	2.1	16
6	How to overcome the belief that the increased process discipline will stifle creativity? (Creative)		3	2	3	4	3		1			70	4.4	**4**	1.7	16
7	How to overcome the scepticism that IT always oversells and under delivers on benefits? (IT)	1	2	4	5	1	2		1			62	3.9	**4**	1.8	16

The group continued to define solutions for the three most voted items from the above table. Getting sponsors, running a pilot and tying third parties into the development process were seen as ways to enable process change and align business processes and ownership across the extended collaborative enterprise with NPDI. In order to create a compelling business case, a well-defined step-by-step process was seen necessary, showing the achievable benefits and the cost of inactivity clearly. The suggested ways to interpret consumer demand correctly were test marketing, defining the concepts to the focus groups, and estimating the potential market size and profitability.

4.2.6 Summary of the Smart Forums

Some parties see that utilizing the point-of-sales (POS) data causes more volatile reactions in the supply chain. This is true especially when the POS data is used for refilling the retailers' warehouses, for supply requests from the manufacturers, and furthermore for ordering of packages and packaging material. The main concern in this chain is that the information comes late for the chain to react. It seems that the POS data is not enough, but a more long-term forecast (partially based on historical POS data) would be needed to support it.

The seasonality of some products was also seen as a factor making the forecasting more difficult. Some products are very vulnerable to factors like the weather, which cannot be predicted very much in advance, and therefore no long-term planning is possible. It can be argued, however, that by demand smoothing – separating artificial demand volatility from true volatility – the seasonality effects could be reduced.

Trust and the external power play between supply chain partners remains the highest barrier to supply chain optimization. New emerging technologies, like RFID, are offered as solutions for demand visibility and product traceability problems, seen

as the silver bullet changing the very structure of the supply chain. The bar code is not a strong enough identification throughout the value chain – or even between two parties. The implementation of these technologies is constantly lagging behind the prospects, so the realized benefits are based on few existing cases.

Similar reasons were named as the barriers to collaboration in all Smart Forums, regardless of the participants or the discussed topic – whether it was data synchronization, new product development, supply chain, or innovation. Existing (and even proven) technology models alone cannot initiate or accelerate the implementation of collaborative working models.

To summarize the findings, the author has chosen to aggregate the barriers further. The main barriers to collaborative working can be grouped in three categories: lack of trust, lack of business case and lack of senior management awareness and commitment. Table 10 below lists the subheadings included in each of these categories. This categorization has been done by the author, and can be criticized as providing only one interpretation of the findings. However, the categorization aims to provide a simplified overall view of the barriers, offering a tool for positioning the barriers into a larger context.

Table 10. Summary of the results of the Smart Forums

Lack of trust	Lack of business case	Lack of senior management awareness and commitment
Departmental thinking Traditional bonus schemes Competing or local standards	How to find publicly available references How to create win-win scenarios How to quantify benefits	Traditional organizations Company culture How to align business processes

Inappropriate role definitions "The retailers only want to reduce the prices" Information and knowledge sharing External and internal power play Differing priorities	Who takes the lead How to create a phased implementation plan Lack of tangible metrics	Allocation of resources Allocation of funding From costs thinking into benefit thinking Knowledge of where to start from B2B strategy alignment Fragmented business processes

The results of the Smart Forums support well the earlier findings for why collaboration has not proceeded further. The value of the Smart Forum results comes from a wide selection of participants: they represented the main European companies operating in the CPG sector and also all the entities in the CPG value chain. Some companies and even individual participants engaged in several events, which shows how the thinking towards collaborative work developed as the events continued. In the first event the members were quite far apart in their opinions, but towards the end of the event series the opinions of the various value chain players came closer.

The results of the Smart Forums are mostly related to the reasons why collaborative working is not implemented more widely. Some effort was also made to analyze potential ways to initialize more collaborative activities. Having best practice type case study results available was seen as one way to increase the awareness of the potential benefits of collaborative working in the eyes of top management. This would increase management commitment and enable resource allocation for further

implementation projects. Another important aspect was raised several times: collaboration is often seen as too big an area to tackle. Breaking the initiatives into smaller, more easily manageable projects would enable better target setting and benefit the analysis.

4.3 Comparing the empirical findings with the literature

This chapter evaluates the empirical findings of the interviews and Smart Forums against the literature and previous research discussed in Chapter 2. The purpose of this evaluation is to highlight the similarities and differences between the results of the first two empirical parts and the findings from the literature and previous research. Another target for this evaluation is to build a foundation for the business case, which tests and verifies the findings of the two earlier case studies, as well as earlier research and literature.

The literature and earlier research present several models, standards and tools to improve collaboration, joint planning and information exchange between the parties in supply chains. They have been proven to *reduce costs* (Zhao et al., 2002; GMA 2005 Logistics Study, 2005,), *lead times* (McKenney & Clark, 1995; de Kok et al., 2005), *inventory levels* (Friscia et al. 2004; Berger, 2003; Askegar & Suleski, 2003; McKenney & Clark 1995) and *inventory obsoleteness* (Fine, 1998; de Kok et al., 2005; Berger, 2003), as well as to provide mutual benefits that can be quantified. Similarly, the empirical material, especially the Smart Forums highlighted the importance of collaboration in order to reduce supply chain costs and obsolete inventories and to avoid out-of-stocks.

As the literature describes collaborative initiatives like VMI and CPFR, and also tools and ICT systems that have been shown to support the implementation and usage of these initiatives, a conclusion can be made that the immaturity or unavailability of technology cannot be blamed for the low level of implementation of the mentioned

methods. This conclusion has also been suggested by Paik & Bagchi (2007); Wu & Katok (2006); Bowersox et al. (1999); McGuffog & Wadsley (1999) and Berger (2003). The findings from the questionnaire in chapter 4.1, as well as the results of the Smart Forums further support this claim and show evidence that *technological issues are not the main barriers* for collaborative initiative deployment.

The third main conclusion arising both from the literature and the empirical results suggests that the most significant reason for the low level of collaborative method implementation and industry usage is the *human factor*. The human factor can be divided into three categories, all related to the impact of how individuals within the participating organizations act. The first category is *lack of trust*, which was claimed to lower the motivation for starting practical collaboration by all the Smart Forums, as well as Lee et al. (1997); Kaipia et al. (2002); Berger (2003) and Fliedner (2003). Also the interviews in the first empirical part presented similar findings, as the trust towards the forecasts of both internal and external partners was found to be low. Trust has also been listed as a critical factor for a successful business partnership by Lambert et al. (1996); Lemke et al. (2003); Rindfleisch (2000); McCarthy & Golicic, 2002 and Perry et al. (2004).

The second human factor category is *motivation* in the form of a business case. In order to establish and maintain beneficial collaborative relationships and related activities, a mutually beneficial business case is required. The definition of a successful business case describes the responsibilities as well as the expected benefits for all parties involved, helping to build motivation for possible investments and process changes. All Smart Forums mentioned the lack of business case as a barrier for collaboration, and the importance of a business case has also been discussed by Berger (2003); Netmarkets Europe (2003a); Nguyen et al. (2007); Kaipia et al. (2002); Disney et al. (2003) and Ravichandran (2006). The lack of publicly available success stories reduces the motivation to take the lead for new collaboration initiatives. This was mentioned by Vereecke & Muylle (2006) as well as in several Smart Forum results.

The strategic commitment of senior management and especially the lack of it form the third human factor category. The importance of strategic commitment to support the organization adapting to collaborative process change has been highlighted by Wagner et al. (2002); Svensson (2003a); Ravichandran (2006); Bowersox et al. (1999); McGuffog & Wadsley (1999); Borchert (2002); Kotzab & Teller (2003) and Skjoett-Larsen et al. (2003). The Smart Forum results show very similar evidence of *low level management commitment* slowing down or inhibiting the changes needed to motivate organizations to become more collaborative. Successful initiatives of collaboration (McKenney & Clark, 1995 and De Kok et al., 2005) have had a strong managerial support.

4.4 Suggested operational model for collaborative demand information exchange

In the same way as for the first two empirical parts, this chapter begins with a table describing the technical concepts regarding the third empirical part (table 11). As the third part consists of an operational model introduced to a real business situation, also the technical criteria are different than in the earlier two empirical parts.

Table 11. Technical description of the third empirical part

Criteria	**Description**
Objectives and relation to the research questions	• Suggests a new operational model to enhance collaborative demand information exchange between the supply chain partners in a chosen business case • Aims to answer the research question of how an

	operational model can produce benefits and overcome barriers of collaboration
Selection of the case companies	• Three companies forming a three-entity value chain were selected • Earlier experience on collaboration was one selection criteria; it was thought to lower the threshold for the implementation of the new model • The size differences of the case companies represented a typical situation of a packaging value chain
Protocol	• Representatives from all three case companies were chosen with the view of having comprehensive expertise on operational supply chain activities • All representatives were interviewed in order to gain understanding of the starting point situation • Operational level data was analyzed to discover the potential area for implementing the new model in order to gain clear and tangible benefits • Potential benefits were described • The new model was introduced to the participants, including tools and training
What data was collected	• Operational level data of deliveries, inventories, specifications and orders was collected
How the data was analyzed	• Operational level data was analyzed in Excel format combining the data from the manufacturer, converter/printer and the packaging material

	supplier • Analysis of the starting point was the basis for the suggested new model
Validity	• The case companies were selected in order to have a business case representing a typical situation in the packaging value chain • The findings from earlier empirical parts were also utilized when defining the operational model for the third empirical part
Researcher's role	• The researcher conducted all the in-depth interviews • All data collection was done by the researcher • The researcher also suggested the new operational model for the parties involved

The third part of the empirical study in this thesis is an operational model introduced to a selected business situation. As mentioned above, the target was to implement a pre-defined collaborative forecasting model into a real-life business situation. Another objective for this third empirical part was to get yet another point of view to the research questions, and specifically to answer the third research question. The two previous empirical parts listed the same reasons for not collaborating with the supply chain partners. However, there are collaborative practices existing in some parts of the CPG supply chain, where the exchanging of demand information has proven successful. One main finding in the Smart Forums was that there is a lack of best practice studies, which could provide guidance for further implementation. The third empirical part is aimed at determining if a collaborative model can provide enough motivation to overcome the barriers of collaborative working.

Lack of best practices was mentioned as a barrier for collaboration in the earlier parts of this thesis. This operational model aims to examine if an existing collaboration model can be generalized as a best practice. The chosen business situation already included some experience in collaborative demand information management, but did not cover the length of three consequent parties. It can be argued that extending a model in the same value chain is not enough to prove the generalizability of the model. However, as discussed above, the consumer packaged goods value chain is heterogeneous when looking upwards from the brand owner. The products in question, the industrial types of the respective organizations, the physical dimensions of the product, and other characteristics have great differences between them. Therefore utilizing the same collaborative model in another business relationship within the same value chain can be regarded as one form of generalizing.

One way of testing if an existing collaborative demand information exchange model could be used by other companies is to copy the model to another part of the value chain. This would test the suitability of the model and give tools to implement and measure the collaborative forecasting. To be able to also utilize the output of the working model directly, another research approach was chosen, and the business case study was chosen to test whether the proven best practices could be extended further in the same value chain.

4.4.1 Conceptual definition for the re-organization of contracting and planning processes

The third empirical part defines a conceptual collaboration model and introduces it to a practical business situation. Aiming to answer the third research question of "*How a collaborative operating model can produce benefits and overcome collaboration barriers in a real business environment*", this chapter defines the model by reorganizing the business processes related to forecasting. The objective of the

model is to define a practical tool to introduce drivers for collaboration, such as reduction of costs, increased efficiency and improved visibility. It also aims to tackle the earlier mentioned collaboration barriers, such as lack of a business case and lack of trust. In order to define a practical model, the scope of the model is relatively limited. This is a conscious choice, as a simple model concentrating on a selected set of issues provides a concrete starting point.

This thesis has discussed the importance of global product identifiers and data synchronization. In a distribution supply chain, demand information sharing could be organized by using standard identification and coding structures, which is the target in initiatives like CPFR and the Electronic Product Code (EPC). When moving upstream in the supply chain, common standards do not create a similar basis for information exchange, as the product in question changes after each party. So from a technical point of view, global product codes would not solve the collaboration issues when moving upstream from the manufacturers.

If the same methods and tools cannot be applied in the upstream of the consumer packaged goods supply chain, should other approaches be used instead? In the upper parts of the value chain, the demand information coming from the manufacturer is not usable as such for the second next party upstream, the paperboard supplier, but has to be manipulated by the middle party, the converter/printer. Very often the converter/printer is an SME, having the need to protect its position and thus possibly creating a barrier to the implementation of a collaborative model. An independent situation in the value chain is important for the SME, and all proposals bearing the risk of endangering that situation are seen as threats.

Each supply chain consists of parties doing business transactions with the next ones both up- and downstream. Regardless of the industry branch, the basic transactions in the order-to-delivery process are the same. Wouters et al. (1999) suggest a reconstruction to the supply chain, which starts from the argument that the transaction should be done by the party who does it best. The aim is to reduce the

number of similar transactions, which in the traditional model are carried out repeatedly along the chain. The reconstruction model is shown in Figures 16 and 17, highlighting the possibilities to reduce basic transactions and therefore gain operational efficiencies and reductions in costs.

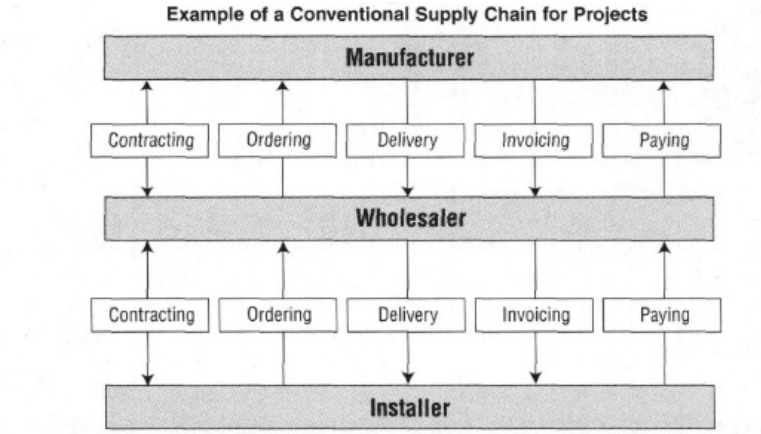


Figure 16. The conventional supply chain (Wouters et al., 1999, p. 87)

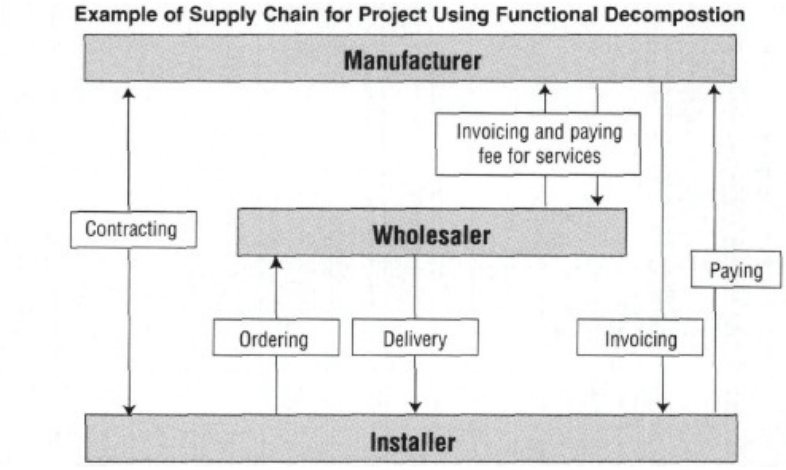


Figure 17. Supply chain with functional decomposition (Wouters et al., 1999, p. 88)

The model only suggests a new way of managing the transactions; it might not be suitable for all kinds of supply chains, products or customer segments. However, the basic idea of reducing the number of reoccurring transactions also represents a form of collaboration in a three-echelon supply chain. The collaborative process is here limited to the basic business transactions, but hidden behind them are more demanding processes. *Contracting* and *Ordering* are tied to forecasting and planning, *Delivery* to replenishment processes. The situation of Figures 16 and 17 can be found in the empirical parts 1 and 2 in this thesis. The traditional business relationships follow the model of Figure 16, where all parties conduct the same transactions. Figure 17 represents the situation where the independent position of the party in the middle has been replaced by the role of a service provider. This change is not easy to accept, and most probably will be declined if proposed to a converter/printer.

The implementation of VMI in a three-echelon (or longer) supply chain can utilize the basic idea of the model described above. The *Contracting* process would include the budget level forecasting of demand from the manufacturer, the business terms of the contract depending on the nature of the contract. The budget level forecast should be shared with the converter so that the converter and the supplier would commonly agree on the raw material forecasts based on the manufacturer's forecast. The VMI model should be based upon a harmonized forecast where each party is included, thus providing the needed transparency to the forecasting process. The budget level forecast is connected to capacity planning on a rough level, and it offers a tool for smoothing the demand. It should also be monitored against the previous year's corresponding figures to eliminate any speculation.

The *Ordering* process represents the operational level forecasting connected to production planning and inventory planning. This rolling forecast creates the impulses for order reference creation, production allocation and transportation planning. The only mandatory input for this process should be the short-term forecast – orders should be created internally in the IT systems. Actually *Ordering* as the process name is misleading, because the main idea of VMI is to avoid order

administration. The process map in the VMI process with three parties is depicted in Figure 18. The figure also includes the more downstream parts of the value chain, showing that the same analogy could apply there also.

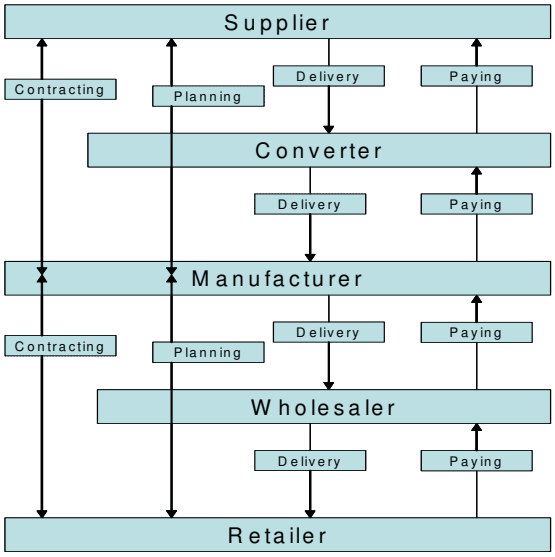


Figure 18. The process map in a three-echelon VMI model

The *Contracting* and *Planning* processes are defined between the major players in the supply chain: the supplier, the manufacturer and the retailer. In an extremely collaborative supply chain, these processes should go through the whole chain. The key point in these processes is the internal planning and collaboration at the manufacturer. If the forecasting and planning at the manufacturer is made jointly with the sales, marketing, production planning and purchasing, the arrows could be merged.

The process model described in Figure 18 respects the traditional commercial relationships at the operative level, but moves the contracting process away from the

converter/printer as well as from the wholesaler. This kind of process structure already exists in some segments of consumer packaged goods, but these segments are very restricted and consistent, like the cigarette industry. The products in these segments have usually a longer life cycle than the majority of consumer products, and also their packaging structure has remained similar for a long time. The companies operating in the value chains are well known and have long relationships, and therefore there is very little dynamics in these value chains.

Introducing the process model described in Figure 18 to other consumer packaged goods product segments would most certainly cause resistance. The main barrier to acceptance has been discussed several times in this thesis: the fear of losing the independent position in the value chain. In order to overcome this problem, the converter/printers should be included in the contracting process, and not just by-passed. Also, in order to respect the commercial relationship between the manufacturer and the converter/printer, as well as between the converter/printer and the supplier, the contracting process should be divided into two: monetary contracting and quantity/specification contracting. Monetary contracting would be left to be done as in the traditional model, but quantity/specification contracting would involve all three parties in a tri-lateral way, including long-term planning. The quantity/specification contracting process should be linked tightly with the planning process in order to implement a rolling forecast function and collaborative demand information exchange.

Figure 19 describes this idea in a graphic form. The main target of this model is to include all the parties involved in a natural way, but to remove the barriers of the demand information flow. In this proposed model the original demand information starts from the manufacturer, and both the converter/printer and the supplier receive it in a similar form. The converter/printer can use this information for their capacity planning and raw material sourcing, and the supplier can use this information as a rough trend indicator. After the converter/printer has processed the demand information, they should forward the information to the supplier. An important aspect is that the converter/printer should use the same time scale for the demand

information, and only modify the quantities and rough specifications to more detailed levels.

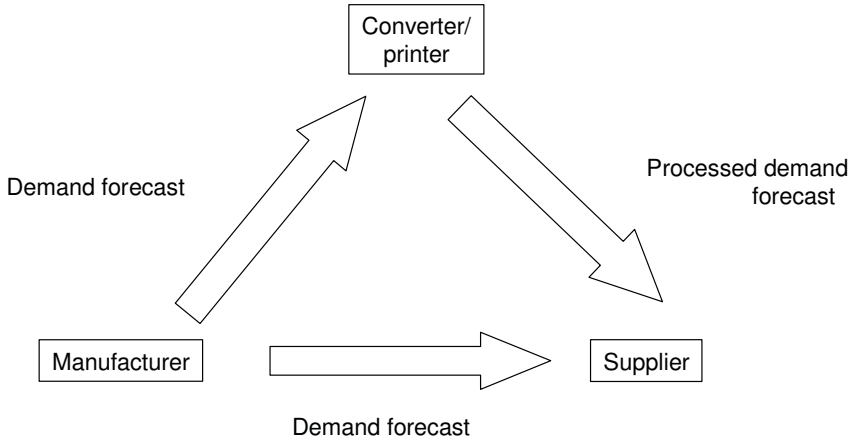


Figure 19. Collaborative contracting of quantities in a three-entity supply chain

The model described above contains some of the challenges that have been listed as barriers to collaboration earlier in this thesis. In order to implement this model, the converter/printer should be willing to change the conventional purchase ordering process, and commit to the sharing of the demand information on a contractual level as well as in the form of a rolling forecast. The process would not have a big impact on the manufacturer, except that their demand forecast would also be shared with the supplier. The supplier would benefit from the manufacturer's original forecast in the form of capacity allocation and rough level production planning and scheduling.

The challenges rising from change resistance and lack of trust also exist in this model. The main barrier exists at the converter/printer, the SME between two multinational companies. Their fear of losing their independent decision-making position has potential for leading to a situation where they will not accept changes. In

the model presented in this chapter, the combined negotiating power of the customer and the supplier would enable a stronger proposal to the converter/printer. In a contracting model, where all three are involved simultaneously, it might be easier to initiate the collaboration.

The suggested new structuring of value chain activities was developed on basis of the findings of earlier research, as well as of the first two parts of empirical research in this thesis. The objective of the new model was to act as the basis for the operational model to be implemented in a selected business situation. One of the main ideas behind the model was to tackle the spoken barriers of collaboration with a tangible solution, also offering concrete benefits.

4.4.2 Description of the business situation

The operational model was introduced to a real business situation, with existing supply chain partner companies involved. The identities of the companies are not revealed in this thesis. The information for this business situation was collected from acting professionals in these three companies through in-depth interviews. One person from the packaging material supplier, three from the converter/printer side and one from the brand owner domain were interviewed. These persons also provided the author with reports, Excel sheets and other similar material which supported the case, and also reinforced the author's understanding. Parts of this business case were published in the proceedings of the International Conference on Logistics, held in Beijing in 2004 (Viskari 2004).

The business situation was in the packaging value chain of a consumer product manufacturer and involved three parties: three individual companies, representing a brand owner (consumer product manufacturer), a 1st tier supplier (package converter), and a 2nd tier supplier (packaging material provider). The purpose of this selection was to evaluate the potential benefits of an operating collaborative

forecasting business model in a three-entity demand chain. The target was to extend the collaborative business model to include all three partners, with the key area in demand and supply information management and its efficient transfer.

The evaluation of the key improvement processes concentrated on planning and forecasting, as well as transfer from traditional order-to-delivery processes. In the traditional process, the purchase order is the key impulse for the supplier, whereas in the collaborative forecasting model the key input is the rolling forecast. The main differences of these two models for the supplier are in the effects on the supplier's internal planning and capacity allocation. In the order-to-delivery process the supplier, whose process is made-to-order -based, cannot plan their capacity utilization very far, as the order life cycle depends solely on the customers' time frame for placing orders.

In the collaborative forecasting model, the customer gives a rough demand allocation for a longer time frame, refining it as the estimated delivery time approaches. In this model the supplier can adjust their capacity to match the possible demand variations by using for example build-ahead inventories. Other benefits come from the possibilities to use inexpensive but slower transportation, and also by combining deliveries instead of last-minute rush order deliveries.

The challenges of implementing a collaborative forecasting model come from change management, forecasting capabilities, openness and trust. Changing from an order-to-delivery process to the rolling forecast process requires a new mindset and more long-term thinking in the customer side. The forecasting capabilities can be improved by practicing, but are not often easy to manage, if the personnel is used to operating on a short-term basis. Openness requires sharing the long-term vision of future demand, and thus reduces (but does not eliminate totally) the possibility of speculation between suppliers. It also requires sharing the inventory information, which in some cases reduces the possibility to speculate about price and timing. Trust is included in all the above-mentioned three challenges. Trust can be well supported with good contracts and agreements, but at the end of the day it must be

earned by both parties with reliable operations and mutual respect. Utilization of modern ICT technology can also create some challenges, but could be regarded as less challenging than the ones mentioned previously.

As stated above, there are examples of business models where collaborative forecasting is implemented between two parties. Therefore the selected starting point for this business case study was that the collaborative forecasting business model existed already between two parties, and the model was to be extended one step further. In this particular case, the collaborative model existed between the brand owner and the packaging converter, and the extension was to be made towards upstream, namely to the packaging material supplier. This choice of upstream extension was made because that is the natural direction of demand information, and the party in the middle – the package converter – already had access to their customer's demand information. This extension was targeted to give a pull effect on the demand information to the package converter by the packaging material supplier.

As the demand forecast is the main impulse for the supply chain, its accuracy and relevance have significant importance. In a two-entity chain the forecast of the customer affects the supplier. In this case study, where the packaging material supplier was aimed to be included in the same model, the initial forecast from the brand owner had an impact one step higher in the upstream. Also the package converter's planning process, where the brand owner's forecast was processed into a raw material forecast to the packaging material supplier, would play a key role. This transformation process included the package converter's own production planning of multiple stages, internal inventory management and delivery time calculations.

A general description of the extended collaborative forecasting business model is shown in figure 20.

Figure 20. Collaborative forecasting business model between three parties

One important detail to be mentioned in this introduction is that the intention of this extended model was not to draw a straight line for a rolling forecast, starting from the brand owner and ending at the packaging material supplier. In a delivery-type value chain, where the same physical product is moved between parties, this would have been the objective. In a manufacturing/converting type of a value chain the initial forecast can serve as a trend indicator for the packaging material supplier, but the proposed model was limited only to operational processes. Therefore the definition of workflow did not include direct communication between the brand owner and the packaging material supplier.

4.4.3 Starting point

As the business situation involved three companies, it meant that the collaborative cross-enterprise relationships consisted of two parts: the relationship between the brand owner and the package converter, and the relationship between the package converter and the packaging material supplier. The two relationships had differences in the forecasting and purchasing process, but also in issues like distance, warehousing, transportation, and the replenishment mode.

The products themselves were also different with each party; they varied from paperboard reels and pallets to printed, die-cut and pre-glued package blanks and to packaged consumer products. The brand owner's products could be roughly

categorized into two groups: mass products and variants. The mass products had a longer life cycle and the variants were often tied to campaigns. Demand information was shown as a number of items using pre-specified codes. The codes included instructions for the package converter on the size, shape and printing of the package. When the package converter ordered packaging material, the specifications included quality, basis weight (g/m2), and depending on whether it was in reels or sheets, also the reel or sheet dimensions. The demand information from the brand owner was in pieces, but the demand for the paperboard was specified in kilos; the transformation calculation included the approximate cutting and other process waste.

Some of the codes from the brand owner were of similar physical sizes, so the package converter was able to combine them when defining the demand for paperboard. This meant that the demand could not be determined directly by the number of packages forecasted by the brand owner. Still, as the printing information varied, the production planning at the package converter had to consider them separately. There were also other situations where the same paperboard material specification could be used for several brand owner codes, but overall the package converter's aim was to reduce the cutting waste in their process, so they mainly specified the dimensions according to the brand owner codes.

Also, the production in the three parties was different; it varied from process industry to converting and to manufacturing/packing. This means that the capacity planning and production cycles varied significantly, as did the life cycle of the products of each party. One main factor was that the package converter used significantly less SKUs in their raw material inventories than in their finished goods inventories. This means that the demand forecast coming from the brand owner was significantly more fragmented than the raw material need of the package converter (also because of the factors explained in the paragraph above).

The process industry is capital intensive, and profitability comes from the efficiency of capacity utilization. Receiving rolling forecasts from customers would enable more

advanced capacity planning and allocation or rough level production planning. Printing and converting production requires efficient raw material management and up-to-date information about the customer demand. In CPG manufacturing, where the production cycles are shorter, the working capital tied in the process has a higher impact on profitability. This resulted in a situation where the key drivers for effective planning in each party were not the same, and could not be compared as such. It also meant that measuring the benefits with same key performance indicators (KPI) was not relevant.

The brand owner had an existing procedure, where they shared their expected customer demand with their immediate suppliers. The brand owner had developed an extranet application, which used the manufacturer's MRP system as the demand information source and shared it with secure and restricted access. The extranet provided the suppliers with an easy access to the demand information, also including inventory and shipment information, which were daily updated for the following two weeks. Longer term forecasts were also available, but on a rougher level of accuracy. The brand owner did not use purchase orders, and expected their suppliers to deliver according to the rolling forecast and agreed practical terms.

The model between the package converter and the packaging material supplier was traditional: based on deliveries against confirmed purchase orders. The purchase orders were initiated by the planning people at the package converter after processing the demand information from the brand owner. On top of the demand information, existing package blank and packaging material inventories, the production plan of the package converter, the production schedule of the packaging material supplier, as well as the delivery lead time from the packaging material supplier were used in an Excel-based model for calculating the needed order quantities and timing. As some of the packaging materials needed by the package converter were not produced very frequently, the planning included speculation of demand variations vs. inventories to ensure the availability of such materials.

Some parts of the material flow from the packaging material supplier to the package converter were delivered to a consignment stock, and only invoiced according to consumption informed by the package converter. The packaging material supplier had no direct visibility to the consignment stock, and was operating on the basis of the information received from the customer. The consignment stock did not cover all the material flow, as rush orders, odd specifications and certain fast-moving specifications were invoiced when delivered. This setup created a situation where the packaging material supplier had partial visibility to the raw material inventory of their customer, but did not know the whole truth.

Purchase orders played a key role in the model between the package converter and the packaging material supplier. This meant a very limited view of the real demand and longer term capacity allocation. It also meant that the production and delivery process at the packaging material supplier could start only when the purchase order was received from the package converter. For the package converter this kind of model meant that they needed to keep safety stock of raw materials for managing exceptions either in customer demand, their own operations or hick-ups in package material deliveries.

Even though the brand owner's demand information was daily updated, the production planning at the package converter was done on a weekly level and weekly basis. Therefore the demand information was utilized only once a week and any unexpected changes during the week were not noticed automatically. This was yet another factor prohibiting seamless demand information utilization, as the planning frequencies and horizons did not match.

4.4.4 Analysis of material flows

The material flow information included a large variety of different specifications, and some of them had a relatively small impact on the overall material flow. Each

specification was analysed separately by entering information of a time period of 12 months into a table and calculating their impact on the total material flow. First a connection was built between the specifications of paperboard materials and the brand owner codes. This was needed for analyzing the correct and respective pairs of information together and viewing whether there were similarities in the patterns. The information used in the analysis included information on

- deliveries from the converter to the manufacturer (quantities)
- inventory levels of paperboard materials
- number of orders from the converter to the supplier

A more in-depth analysis of the material flows revealed that 3 paperboard specifications represented some 75% of the total material flow, specification A having twice the volume of B or C. These 3 specifications were used by the package converter for several brand-owner codes. They were selected for detailed analysis as being potential candidates for the pilot proposal. Figures 21, 22 and 23 below present the starting point analysis for these three specifications, covering a time period of 12 months. The values have been masked due to confidentiality reasons. They highlight the estimated demand of the brand owner, including those codes for which the specific paperboard specification was used for a time period of one year. The inventory level includes both un-invoiced and invoiced inventories of that particular paperboard specification. As can be seen in the figures, the demand information had little systematic effect on the inventory in the form of providing a possibility to build stock for expected demand peaks or increases.

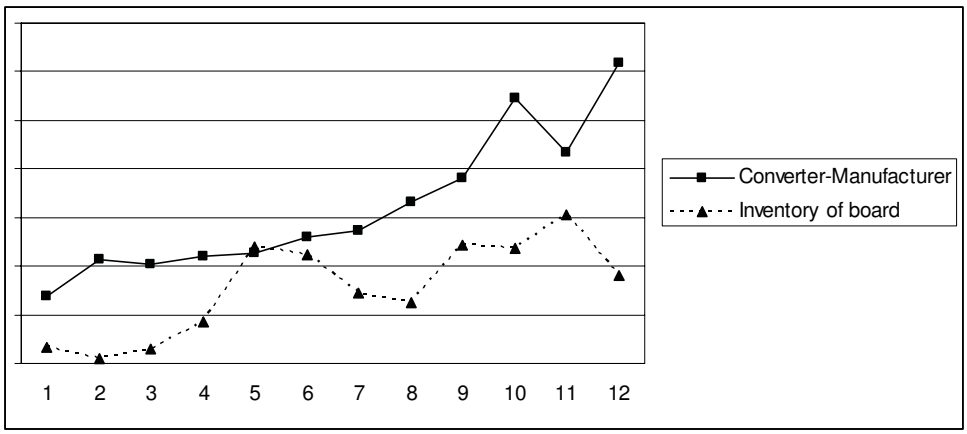


Figure 21. Estimated demand from the manufacturer and inventory of paperboard, specification A

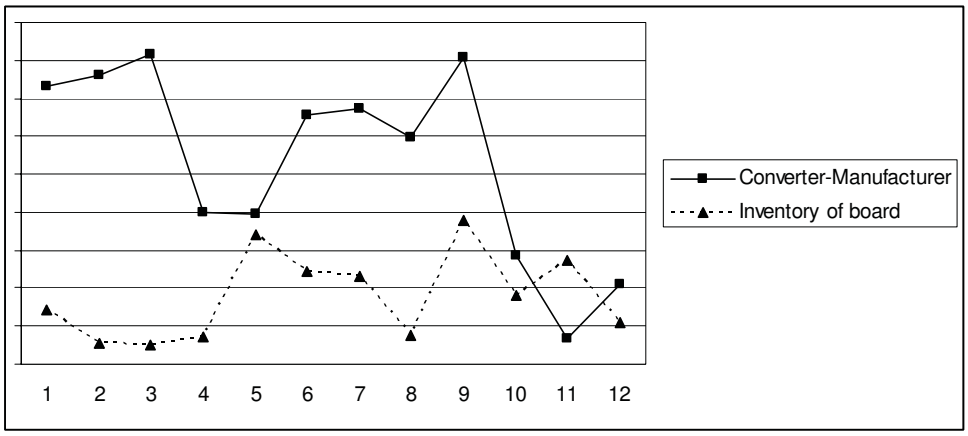


Figure 22. Estimated demand from the manufacturer and inventory of paperboard, specification B

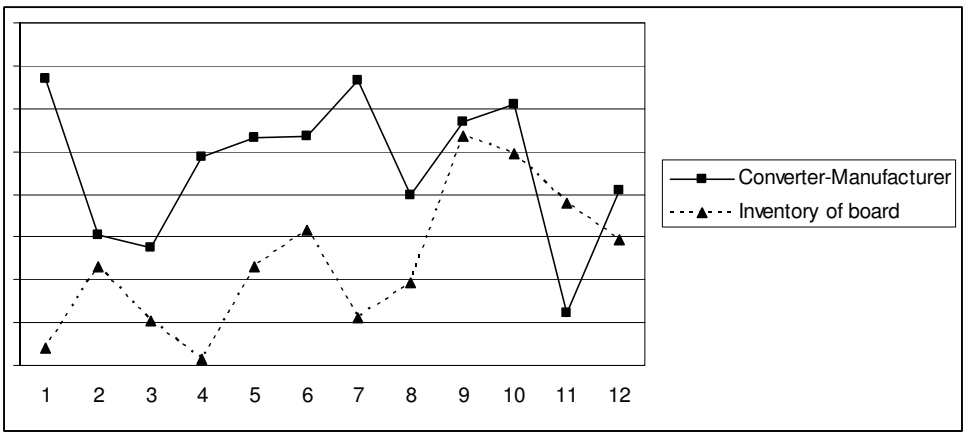


Figure 23. Estimated demand from the manufacturer and inventory of paperboard, specification C

The inventory levels in the figures above are not specified in exact values due to confidentiality reasons, but the overall inventory level was not the main reason to strive for change. As the paperboard specifications were quite established – even though their percentages of the overall demand varied a lot and they were many in number – the problem of obsolete inventory was marginal. The main issue in the inventory area was getting the right balance of paperboard specifications to match the demand from the brand owner. Having an inventory, but in wrong specification, caused rush orders and expedited deliveries of the needed specifications, which increased the delivery costs. In other words, the main problem was the order variability, which according to Disney et al (2005), could be reduced with a slight increase in the safety stock.

As every request from the package converter to the packaging material supplier was made in the form of a purchase order, another viewpoint to the starting point was to look at the development of the number of purchase orders per month. The purchase order process was based on a starting point of having one purchase order per one full truckload. In principle this aims at controlling the transportation costs and keeping

them on an optimal level. Another viewpoint was to have manageable sized purchase orders for the manual ordering process to keep the manual workload on a reasonable level. Figures 24, 25 and 26 below show the development of purchase orders in relation to the material flow. Each purchase order requires manual work in several steps, both by the package converter and by the packaging material supplier, and therefore requires resources for routine work which could be automated.

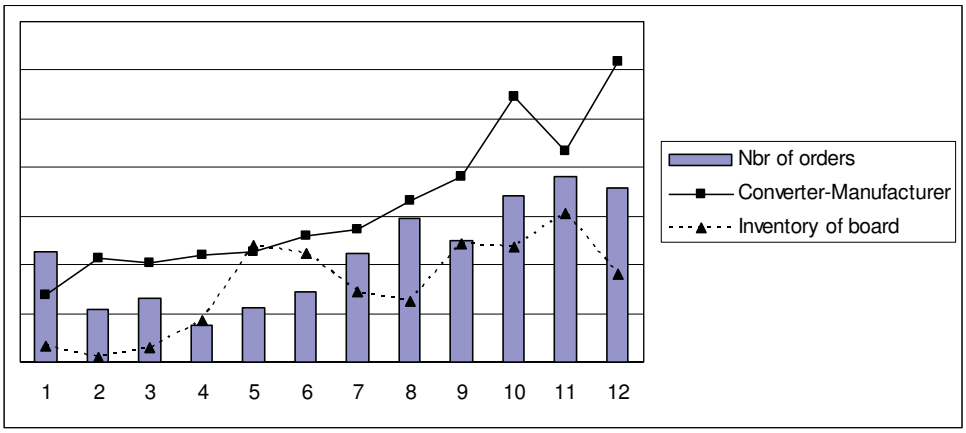


Figure 24. Purchase order amount vs. material flow, specification A

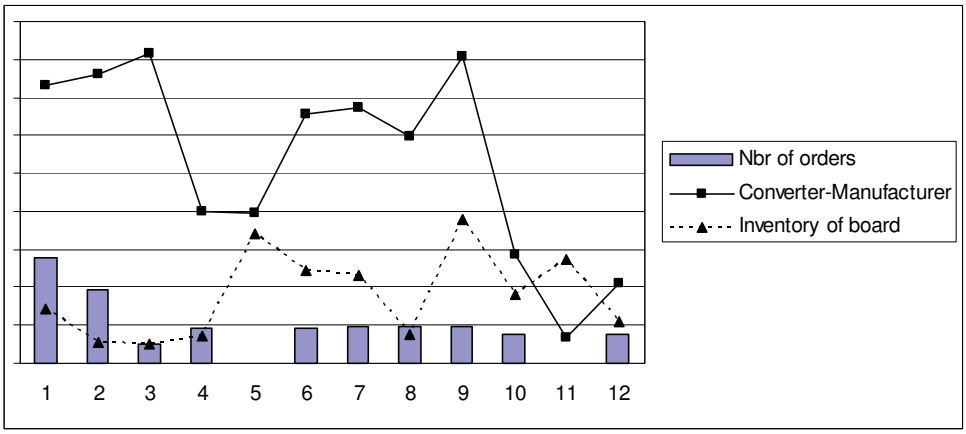


Figure 25. Purchase order amount vs. material flow, specification B

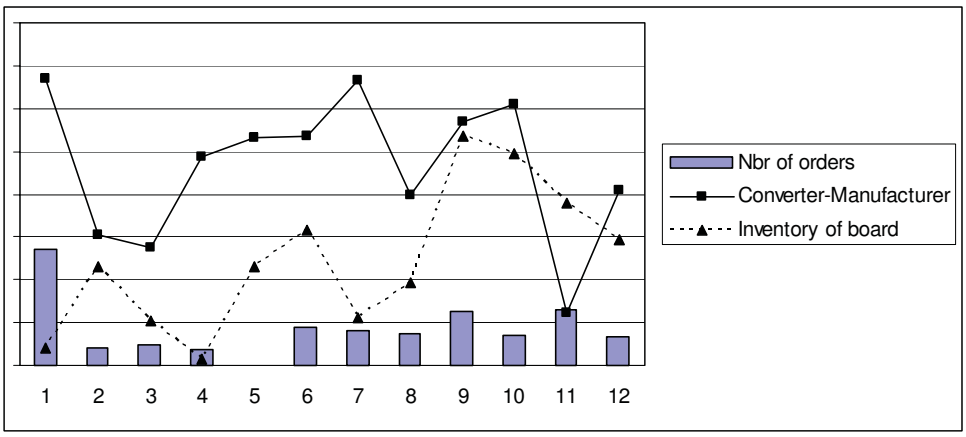


Figure 26. Purchase order amount vs. material flow, specification C

For specification A the number of paperboard orders correlates well with the demand from the manufacturer. It indicates the direct workload increase in purchase order processing when the manufacturer demand increases. The number of paperboard purchase orders for specifications B and C do not follow the manufacturer's demand changes in the same way as with specification A. They vary somewhat monthly, but the variations are relatively small, and do not follow the demand variations. This indicates that there is more ad-hoc decision making and inventory speculation when deciding the timing and quantity of purchase orders.

4.4.5 Suggested extension of the collaborative forecasting model

At the starting point of this business situation, the collaborative forecasting model between the brand owner and the package converter was already in place. Therefore evidence from the model between the brand owner and the package converter was used as a best practice when defining the targets for the part between

the packaging material supplier and the package converter. The objective was to utilize the good experiences and acceptance of the collaborative working model when establishing a similar model in the next value chain node upstream. The package converter was used to working without purchase orders from their customer, relying solely on the demand forecast they pulled from the extranet.

The packaging material supplier offered a system for managing and exchanging the demand information via an extranet solution, but toward their customers. To be able to understand the background of this setup, one must bear in mind the size differences of the parties involved (see Chapter 3.1 and Figure 13). Being global companies, the brand owner and the packaging material supplier had the possibility to invest more resources and funding in developing ICT systems and to integrate them both internally and externally. Package converters often (and also in this business case) represent SMEs, and therefore have a higher level of manual processing steps in their operations – meaning here mainly office functions, not manufacturing. By offering easily available solutions like extranet applications, the global companies aim at lowering the threshold for their smaller supply chain partners for tighter collaboration. Another target is to eliminate the technology barrier to collaboration.

The suggested model included the brand owner - package converter relationship as is, but changing of the order-to-delivery model between the package converter and the packaging material supplier to a forecast-based model. In practice the objective was that the planning and purchasing personnel at the package converter would give a rolling forecast to the packaging material supplier's extranet using the same basic approach as the demand forecast the package converter received from the brand owner. This may sound like a simple change, but in practice the proposed change included a totally new way of operating. It also included a big mental change from being totally responsible and in control of the paperboard material flow, towards letting the supplier take the responsibility. To be able to understand the importance of this mental change, one should again remember the size differences of the players involved. As the package converter is a relatively small company, their

importance in the overall planning of the packaging material supplier was also relatively low, and their fears were related to giving the planning solely to the hands of the supplier.

The proposed model was not aimed at eliminating the manual planning and transformation processes conducted at the package converter, but the main workload-related change was the reduction of the frequency of paperboard production, the delivery time and paperboard inventory management calculations. Also, the decision-making of when to order and which delivery times to request was meant to be covered with the proposed new model. As manual processes always include the possibility of human error – or misinterpretation – the proposed model was also meant to reduce those threats. As a summary, the objective of the model was to move some of the calculation and decision-making tasks from the package converter to the packaging material supplier.

As the packaging material supplier had an ICT system that was capable of processing the demand information into production orders, taking into consideration the transportation times and production frequencies, this proposed change did not increase the workload of the packaging material supplier. So in fact the proposed model did not transfer operative tasks from one party to another, but it offered to automate them by utilizing ICT capabilities. The targeted benefit of this proposed new model was to reduce the manual workload related to purchase order processing for both parties in question.

From commercial perspectives the suggested new model included harmonizing the ownership change point of the goods. At the starting point, part of the material went through a consignment stock and was invoiced once used, and part was invoiced when delivered. The suggested new model would move all the materials into a VMI, where the ownership was changed when the material was taken from the stock (or in exceptional cases when the agreed warehousing time was exceeded).

4.4.6 Expected benefits

The proposed new model offered several benefits to both parties involved in the change. By automating manual operative tasks at the package converter, a clear reduction of workload was foreseen. This workload was an on-going weekly operation, where the planning process ended in purchase orders that were e-mailed to the packaging material supplier. The exact amount of time consumed in this part of the planning process was hard to define, because it was tightly connected to the whole process. Furthermore, the people involved were not able – nor very willing – to quantify this time, as it varied, depending on the week, as well as inventory and business situation.

Changing the material flow into a VMI model was expected to reduce the inventory level and increase the inventory turnover, but the main reduction was expected in the order variability. The reduction in order variability was seen as a possible cause of slight safety inventory increase, in order to improve the availability of needed specifications. By utilizing the available demand information from the brand owner better, the manual purchase order processing work could be affected. As seen in figure 24, the increasing brand owner demand caused an increase in the number of purchase orders. By sharing the expected demand information with the packaging material supplier, the increased material flow could be included in the VMI model with no additional manual workload. The same applies also for specifications B and C, where – even though having smaller overall impact on the manual workload – the brand owner demand variations could be covered well in advance with the VMI model, and the speculation of purchase order timing could be avoided.

Also, postponing the invoicing from delivery to usage would cause a decrease in the package converter's working capital. The main benefit of the VMI model was the increase of inventory visibility to the packaging material supplier. It is difficult to quantify this particular benefit, as it at the same time meant the postponement of invoicing. However, the increased visibility was intended to decrease the obsolete

inventory caused by speculation, and also to simplify the inventory management process. Having the entire paperboard inventory in the same ownership and model was intended to eliminate the double safety stock building caused by the lack of visibility on both sides.

The availability of longer term forecast offered several significant benefits for the packaging material supplier. To be able to manage the production process in an efficient and profitable way, long-term planning and capacity allocation are necessary. As the package converter in question was relatively small, the impact of their forecast for the overall master plan was not very high. However, to be able to maintain a good level of delivery reliability and customer satisfaction, the role of small customers is as important as that of larger ones. As the order sizes of small customers are also relatively small, it is in some cases more profitable to produce future demand into inventory than run each small order separately. The inventory costs compared to the benefits gained from production efficiency are marginal, if the inventory is known to be used at a particular point in the near future. The only way to guarantee the relevance of the inventory is to have a longer term forecast from the customer.

Another benefit from the forecast availability was the possibility to decide the timing of production and delivery to a warehouse close to the customer. The enhanced transportation planning possibility produced several easily quantifiable benefits: using full truckloads or train transports, reducing the need for express deliveries, and combining several deliveries. Managing a VMI located close to the customer creates a natural pull effect on the delivery, production and planning process, and defines a time frame for it. This pull mode has been proven by for instance Kaipia et al. (2002) and Disney et al. (2003) to reduce the number of stock-outs, delayed deliveries and other similar non-conformances, which can have serious effects forward in the supply chain.

4.4.7 Summary and findings of the operational model

The piloting of the new operational model was initiated by the packaging material supplier. As the existing collaboration involved the brand owner and the package converter company, the initiative coming from the other side of the supply chain caused challenges. The package converter was not open to the change, as they had a working model, and were able to satisfy their customer with tightly managed internal planning and paperboard purchasing. The relationship between the package converter and the packaging material supplier had some areas of improvement, which are discussed in Chapter 4.4.3, but for the package converter the proposed change was difficult to accept.

The proposal to move from an internal planning and purchase order process to a model concentrating on demand forecasting and longer term planning was not accepted by the package converter. Their internal processes and independent status in the value chain had a well established role and position, and the company was not willing to change that. This decision clearly proves the findings mentioned in earlier chapters of this thesis to be the main barriers to collaborative planning in the value chain. The technology or the implementation costs were clearly not the main reasons for the decision of the package converter, but it was the human factor, namely resistance to change. The impact of change resistance was so strong or that the proposed benefits were not lucrative enough.

Resisting change has naturally deeper reasons behind it, but they were not examined in this thesis due to lack of time and resources, and because of not being directly in the scope of this study. One natural underlying fact is that the package converter is a small company surrounded by a multinational customer and a multinational supplier. The package converter's independent status as a contract party is important for them, and keeping the planning and purchasing decision-making processes in their own hands strengthens their situation. By opening their paperboard planning towards the supplier, the package converter might weaken their

independence and ability to speculate with the purchasing timing and inventories. They might also feel more tied to one supplier, which might weaken their negotiation position further on. Another fact was that the proposed model would cover only one of the package converter's packaging material suppliers, so in order to gain the benefits from the overall process change, the other packaging material suppliers would have needed to be included in a similar process change. Similar findings were found by Holmström et al. (2003).

As described above, this business case involved companies from different industrial areas: a process industry company, a converter/printer company and a manufacturer. Therefore the value chain and demand forecasting for each party concentrated on different kinds of products. This is one major cause for why the internal planning is more complicated than in a distribution-type value chain. It also is the reason why the demand forecast from the brand owner to the packaging material supplier cannot be used for operative planning. In a retailer-wholesaler-manufacturer case the initial forecast from the retailer would be useful to the manufacturer as such, but in this particular business case the forecast from the brand owner would only provide trend change type of information to the packaging material supplier.

The business case also showed that initiatives coming from customers have a higher importance and lower acceptance threshold than the ones coming from suppliers. There is a clear reasoning for this in the roles of the parties in the value chain. Customers, especially large and/or important ones, create the market and the source of income, but suppliers – even though being big and/or important – do not have a similar status. There is also a kind of protectionist attitude towards big suppliers, which is a result of vertical integration activities that have taken place. In those cases the big suppliers have acquired smaller converter/printers in order to get under the skin of multinational brand owners and closer to the source of the demand information.

Even though the proposed demand forecast sharing processes were not realized and the changes not implemented by the package converter, one concrete change

was accepted and made in the purchasing process. Earlier the package converter sent the purchase order by fax to the paperboard supplier, and after the business case exercise the package converter started to use the extranet purchase order entry functionality provided by the packaging material supplier. The benefits from this change were not as significant as they would have been from the rolling forecast process, but the decrease of human typing errors and decreased manual workload at the packaging material supplier were clear benefits. Moreover, the package converter gained access to the real-time production plan of the packaging material supplier. There were also other benefits from introducing the extranet application, but they were not connected to this study.

The main conclusion of this piloting of the proposed operational model was that even though collaboration is offered as a ready-made solution with tools and applications and does not require monetary or resource investments, it is not enough to justify the change. If the proposed benefits are not big enough or if the initiative does not come from a major customer, it is hard to convince another company to change their processes. Also, in a small company – like in this case - the internal capacity and purchasing planning is in the hands of one person, who has long and deep experience and “touch” of how things should be done. Calculating benefits with a new process model might also be perceived as mistrust towards the planning person’s capabilities.

5 Summary and Findings of the Empirical Evidence

The literature review listed several drivers and barriers of collaboration, mainly discovered from the downstream part of the CPG value chain. The empirical parts of this thesis showed that the same drivers and barriers exist also in the upstream parts of the same value chain. Furthermore, the empirical research revealed new additional findings as barriers of collaboration. Those mentioned were the size differences of the companies in the value chain and the different nature of products and production among the value chain partners. To be able to look at the research problem from multiple angles, triangulation of empirical research was used. All three empirical parts focused on the same part of the consumer packaged goods' packaging supply chain, from the brand owner to the package converter and to the packaging material supplier, having the viewpoint at the end of packaging material supply.

The number of business representatives involved in the empirical parts was close to 300, representing the major companies involved in the European consumer packaged goods industry, as well as local companies. Their input can be evaluated as representing a general understanding and opinion of the consumer packaged goods industry, taking into consideration that they represented different functions in their companies: sales, marketing, purchasing, and planning, to name but a few. Therefore the findings can be claimed to present a commonly agreed picture of the practical situation of collaboration in the consumer packaged goods industry.

Especially the Smart Forums showed that the downstream companies in the CPG value chain consider collaboration as a downstream issue, initiating from the retailers. Some of the comments from the forum participants expressed that the interest in collaboration among the upstream companies was unexpected. The empirical parts also showed that there is interest and value in sharing demand

information also in the upper parts of the consumer packaged goods value chain, but it is not easy to implement.

As a summary, the collaboration models offer benefits and drivers to motivate companies to implement them. The benefits are mostly related to cost-reduction (e.g. Zhao et al., 2002; GMA 2005 Logistics Study, 2005,), efficiency improvement (e.g. Friscia et al., 2004; Boute et al., 2005) and increased visibility (e.g. Carlsson & Fullér, 1998; de Kok et al., 2005; Ouyang & Daganzo, 2005). However, these drivers, even in combination with the technological offering do not motivate the companies enough. The barriers related to human factors – such as suspicion, change resistance and lack of trust – remain strong and decrease significantly the implementation speed in the consumer packaged goods value chain.

This chapter summarizes the findings of the empirical evidence structured according to the three research questions.

5.1 Drivers and motivations for collaboration

The first research question was related to the drivers for collaboration:

1. *What are the drivers and motivation for using collaborative models in the value chain of paperboard-packed consumer goods?*

The first empirical part showed that even in multinational companies, the internal planning utilizes demand information through manual processing. However, the respondents acknowledged that the demand information supports the planning activities. The Smart Forums listed several drivers for collaboration, such as clearly scoped pilots and improved relationships. Best practices and success stories were named as ways to increase the interest of the decision-makers in order to get the approval for starting collaborative initiatives. Cost reduction and improved efficiency

were seen as clear motivators for collaboration, but require more concrete definitions for implementation.

In the third empirical part the packaging material supplier saw the potential for cost reduction, improved visibility and improved efficiency as drivers for collaboration. These were introduced to the package converter, but with little success. The cost reduction came mainly from reduced manual work, improved visibility was seen to lead to enabling better planning and improved efficiency, resulting from more coordinated material flow and transportation.

5.2 Barriers of collaboration

The second research question concerned the barriers of collaboration:

2. *What are the existing barriers prohibiting a wide use of existing and developed collaboration models?*

The interviews in the first empirical part showed that the interviewed people did not trust the information they received from their customers or other departments of their own company. They also expressed clear need for keeping the existing working models alive, thereby retaining the independence and decision-making responsibility as is. All the findings of the second empirical part stated that technology or methods alone cannot convince companies to implement collaborative business models. There are human factors like lack of trust, lack of senior management commitment and lack of business case that limit the number of new initiatives for supply chain collaboration.

The operational model in the third empirical part included three companies from the same supply chain – three consecutive supply chain partners. The selection of these companies was a combination of large and small companies, all with experience

from collaboration in one way or another. One interesting finding was that the SME in the middle had experience of sharing demand information with their major customer, but was not willing to extend this model upstream to the supplier. The supplier also had experience of collaboration with their other customers, but could not convince the SME customer to implement it. The technology or models were not the barriers in this case either, nor was inexperience in collaboration. The main barrier was lack of trust towards the future and the company's independent position in the supply chain between two large companies. Furthermore, the tangible benefits the SME would have received from the new model were not lucrative enough.

All of the empirical parts showed the same results: the main barriers to collaboration are not in the technology of models, but in the organizational and human behavior areas. Not being able to quantify the benefits creates mistrust and speculation if the other parties involved will gain more than their share of the benefits. The empirical research offered experience from a real business environment, from several different perspectives.

5.3 Producing benefits and overcoming barriers of collaboration

The third research question discussed a "how-to" situation in relation to the collaboration drivers and barriers:

3. *Based on the findings of the first two empirical parts, how can the collaboration barriers be overcome and benefits implemented by introducing a collaborative operating model into a real business environment?*

Answering the third research question concentrated mainly on the third empirical part, the operational model. The model started from earlier listed drivers and

barriers, aiming at developing a concrete operational model that would be introduced into a real business situation. The proposed model included tools and clear operational rules that were intended to lower the acceptance threshold and identify the benefits for each party in a precise way. The drivers and barriers involved in the model definition were summarized in chapters 5.1 and 5.2.

The introduction of the operational model did not succeed as planned, as the human factor -related barriers remained stronger than the proposed benefits. Especially the resistance to changing the existing roles and responsibilities from the traditional order-to-delivery model to a collaborative forecast-based model was very strong. The size difference of the companies seemed to have reinforced the change resistance, with a fear of loosing independence in the background.

6 Discussion

6.1 Theoretical contribution

The sharing of demand forecasts and downstream sales information towards the upstream parties of the supply chain has been studied in the retailer-manufacturer area. Småros (2005) suggests in her dissertation that further research should be conducted to see if the sharing of sales data has value to the suppliers of the manufacturers. The empirical parts of this thesis showed that the suppliers, especially the ones further up, are interested in the information. The sales information may not be usable as such, especially if there are converting companies in between. However, the long-term planning and sharing of demand information has value for the upstream suppliers.

Småros (2005) furthermore suggests that it might be easier for smaller local manufacturers to utilize their agility to match the demand signals coming from the retailers, especially in the cases of new product introduction, because their production structure is easier to adjust than with the specialized production facilities of multinational manufacturers. The same applies to the next step upwards in the supply chain, the converter/printers. The smaller converters usually have more flexibility and eagerness to adjust their production to match the demand coming from the manufacturers. However, as the proposed operational model of this thesis showed, the small entities of the supply chain are often slower and more hesitant to make process changes towards collaborative working. This decreases the possibilities of the next parties upstream to access the demand information, and leave them dependent on purchase orders.

The reasons for not collaborating more intensely can be divided into two main categories:

- No business case. Consumer packaged goods companies understand that there are benefits in collaboration, but the motivation raising from these benefits is not high enough. The problem of defining a win-win situation is a major issue in defining the business case. Many operators also claim that there is not enough empirical evidence available of successful implementations of collaboration with realized and measured impacts and benefits.
- No trust. The customer-supplier relationships are very transactional, where both parties are mostly concerned with their own margins and the discussion mainly concerns price. Especially the retailers are claimed to be too much focused on the direct price issue instead of building beneficial collaboration. Trust is seen as a fact to be tackled before technology or any other tool or system.

Because of the above facts and the legacy of negative experiences, concepts like "collaboration" and "sharing" are interpreted with suspicion. Collaboration is viewed as a way to shift more power and value to the player with the strongest will, often the multinational retailers. This creates a resistance to making the important first moves, even though the basic interest for collaboration exists.

It was also clearly stated that a new business model needs to be developed to really leverage joint value from collaborative working. The models presented in the literature or by consultants are often over-simplified or do not get to the heart of how collaboration can be exploited to deliver hard benefits. Also, most of the definitions and presentations offered for collaboration concentrate too much on systems and technology issues rather than being business-oriented.

The lack of wide implementation of a throughout-the-value-chain common product identification causes an extra level of difficulty for collaboration. When all parties conduct their own models for comprising the bar code, the information content of the code varies, and does not produce information on a reasonable level. This leads to the fact that if the bar code is to be used as a product identifier, the content and

structure should be more standardized. The same principle also applies if RFID or other identification technologies are implemented, demonstrating that the technology without strong standards is not enough.

In particular the retailers see the chain from the downstream point of view only. In their view, the suppliers are not the right people to drive changes and movement towards more collaborative working models. However, manufacturers have successfully engaged in supply chain integration with their suppliers, which shows that role play and 'channel captain' thinking can be considered as another reason for not being more collaborative. Increasing the visibility of supply chain has been proven to create benefits on several levels. Auramo (2006) categorizes the benefits into operative benefits, direct strategic benefits, and enhanced long-term strategic benefits, and suggests that in order to realize these benefits, a multi-perspective view be utilized, including both transactional and resource network viewpoints.

The concept of Collaborative Planning, Forecasting and Replenishment (CPFR) is based on tools offered by the modern ICT technology. However, this is also one of the most critical factors for the slowness of CPFR implementation. The technology requirements are claimed to be still too high for many companies. Moreover, the marketing of CPFR along with other collaboration tools has been heavily based on ICT technology, rather than offering lighter alternatives. Since collaboration involves human aspects as well, change management related to collaboration should have a higher prioritization when starting collaboration projects.

Collaborative projects always include a new way of managing processes related to the supply and delivery chain. The collaboration should start from defining the targets, agreeing on the ways of working and responsibilities, among others. The second step should be implementing a manual model or an informal new way to collaborate. After the change has been accepted, the implementation of the ICT technology is easier, because the desired functionalities, inputs, outputs and business rules have already been agreed upon. The manual phase also creates an

extra time horizon, so that the parties involved can prepare themselves to cover the technological needs.

In one of the Smart Forums in the second empirical part of this thesis it was stated that the further the company is from the demand information source – the consumer – the more distorted the information is. Studies conducted on the bullwhip effect confirm this, but still most collaboration models have been developed to the most downstream parties of the consumer packaged goods supply chain. CPFR is a good example of a model that is applicable for a distribution kind of supply chain, meaning in the case of consumer packaged goods the chain downstream from the manufacturer. The main technical problem of applying these methods in the upper parts of this supply chain is that the product changes after each party. Therefore the sharing of the original demand information – from the retailers' POS - does not create similar value as in the downstream supply chain. The demand information needs to be processed by each party involved to include the production and manufacturing-related factors.

6.2 Managerial implications

This thesis has suggested a new model for collaborative working in a three-entity value chain, targeting to reduce the traditional barriers of collaboration. The main idea of the model is to divide the planning process into commercial (contracting, pricing etc) and demand forecast parts. When sharing the demand forecast in a tri-lateral way, all the parties possess the same initial demand forecast for their planning basis. For the converter/printer it offers a tool for planning also operational activities, and for the packaging material supplier it provides a trend-setting basis for long-term planning.

The increased visibility at the packaging material supplier can have a significant impact on the capacity utilization planning, provided that this kind of visibility would

cover a large enough scope of the overall business. For the converter/printer the collaborative format would give a more stable position in the value chain, but still retain their negotiation situation untouched. When combined with VMI, the model would provide a basis for smooth and well-planned material flow and reduce the amount of rush orders and out-of-stock situations caused by order variability.

Efficient use of existing and operational ICT tools like extranets and data transfer methods in combination with a three-level VMI model would significantly reduce the manual work related to purchase order and delivery management. The cost of manual work may not be the main issue, but the benefits would be targeted towards a more sensible use of manpower, and also a reduced number of mistakes caused by human error.

It is also notable that all the drivers for collaboration require a case-by-case definition, stating clearly how each company involved is influenced. Top management commitment can only be gained with reliable and concrete specifications, including also the needed investments and other related requirements, like training. Managers should not neglect or undermine the strength of the organizational cultures within their own company; collaboration should start inside each company.

6.3 Validity of the research

The questionnaire survey conducted as the first empirical part of this thesis was quite limited with regard to the number of respondents. Also the method of conducting the interviews resulted in very short and restrained answers. Still, all the answers showed a need for this kind of research, that the research questions are important, and that the business area of this thesis – the packaging value chain of consumer packaged goods - is rather undeveloped as regards collaboration and not

very much studied, either. Therefore the questionnaire had value and significance for the further empirical parts of this thesis.

The second part of the empirical research covered a large selection of participants in the consumer goods value chain. The pitfall of the Smart Forums was that the participants were all from large or very large companies, and the input of SMEs and/or local companies was not included. The Smart Forums showed similar findings about the drivers for and barriers of collaboration as the literature findings and earlier research in the retailer area.

The lack of SME input in the Smart Forums created the demand for a third point of view, where also the SME factor would be included. Also the strong role of a practical pilot did not emerge in the earlier research. This showed that there was a need to go to a more detailed level and involve selected companies on an individual level in order to evaluate the practical impact of proposals to change the business processes into a collaborative model. A theoretical approach to drivers and barriers is not enough to encourage the companies in implementation.

There has been a lot of discussion of the validity and relevance of case study research, as it only looks at one case at a time. Is it possible to generalize the findings to other cases or business areas? How can the case-specific features be taken into account on a level that ensures objectivity and neutrality? Perhaps they cannot in detail, but when looking at the results from a larger perspective, the problems, causes, opinions, attitudes and behavior can be compared and generalized. Yin (1989) refers to analytical generalization as the relevant generalization approach when using case studies. When doing applied research using real business entities and situations, case study is very productive, and it also gives deep insight into the case involved.

Stuart et al. (2002) discuss the use of case study research in the operations management area, and state that the complex environment of operations management favors the use of case studies. Compared to disciplines with wider

applicability of common metrics, operations management is heterogeneous with constantly changing situations, and therefore the case study method enables in-depth research. The purpose of this thesis has been to validate the existing theory by extending it to a new area in the value chain.

The proposed operational model in this thesis demonstrated that even with clearly defined benefits and easily accessible technological tools, it is not always possible to overcome the existing barriers related to trust and change resistance. Having a chance to implement the proposed model and tools would have provided a chance to measure the realization of expected benefits, and thus provide evidence for other companies interested in collaboration. Sadly, this was not the case, and it is impossible to say if the reason for denial was the barriers alone or also a too low level of motivation from the expected benefits.

6.4 Future challenges and suggestions for further research

The supply and demand chains are moving towards more interactive and collaborative value networks. This applies at least in theory – how fast the adoption rate will be, depends on the business and the readiness of people to adapt to the changes. E-business has forced many companies to re-think their customer and supplier interfaces and the working processes related to them, including the value-adding activities. Moreover, the ICT systems implemented internally in companies should be able to adapt to and communicate and interact with the systems of other parties in the chain.

In order to leverage the benefits offered by the technological solutions, operational processes and organizational hierarchies need to be changed to match the proposed solutions. These changes are of significant importance, but also of fundamental nature, and have a huge impact on the business relationships and supply chain

operations. As seen in this thesis, the human-related process changes and development needed to implement the technological solutions are expected to be slower and more demanding than the technological implementations.

As the markets are getting more global, local markets will cease to exist, business relationships change their nature and the companies involved in the consumer packaged goods industry will face new challenges. In the global market the home front advantage will not exist, as the global market will be the home market. At the same time – and in connection with globalization – competition in the consumer packaged goods market is becoming more intense. All companies involved in the CPG industry will at some point of time be forced to take collaborative demand management into their agenda in order to be relevant players. It remains to be seen, what the pain point of the most reluctant, change resisting companies will be – the pain point that is required to give the spark that leads to business model changes and collaborative operation.

This chapter proposes two new directions for further research, and suggests a few research questions to define the directions in more detail.

Consumer goods manufacturers' internal planning

Collaborative demand information management and exchange has been studied in retail, and Småros's dissertation (2005), among others, lists benefits gained by collaborative forecasting. As the present thesis has shown, the interest for the downstream sales data in the form of demand forecast also exists in the upstream of the value chain. As Småros points out, the manufacturers' internal planning has an impact on the use of downstream sales data. When looking from the upstream point of view, the manufacturers' ability to process and transfer forecast information to their suppliers has a significant effect on the quality of the forecasting and planning processes of the upstream parties. In a way the manufacturers have a key role in

this respect, as they often get access to the POS data from the retailers, and therefore can process the original forecast information.

The following research questions suggest the areas of future research in more detail:

What indicators could evaluate the internal planning processes of consumer goods manufacturers?

What kinds of effects could the improved planning have on the forecast process of the value chain upwards?

How could the other upstream value chain partners utilize the results of the improved planning of the consumer goods manufacturers?

Power relations and the impact of collaboration initiation on them

Going even further in changing the supply chain into a more collaborative one, Fine (1998) has launched the term “extended organization”. He suggests that instead of working in order to increase collaboration between companies operating in the same value chain, companies should work for assembling chains of capabilities. Fine claims that as no competitive advantage lasts forever, companies have to be constantly on the move. The increase of value chain dynamics also points to the same direction; constant structures are becoming rare and relationship life cycles shorter.

As seen in this thesis and in earlier research in the field of retailers, there are big differences in the ability and willingness to collaboration. It can be stated that the major initiators of both demand information and collaborative models are the retailers and manufacturers of consumer packaged goods. It can also be stated that there are major suppliers further upstream with willingness to collaborate, and also tools to offer for the companies between them and the manufacturers.

The following research questions highlight the potential future research topics in this area:

Could the collaborative forecasting function be organized by those players who have the best capabilities for it?

Would this kind of model eliminate the disturbance in the demand information flow caused by the traditional barriers?

Would a company taking clear initiative towards collaborative working increase its power in comparison with its value chain partners?

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Appendix 1 (1/6)

Questionnaire for Interviews

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DEPARTMENT OF INDUSTRIAL ENGINEERING AND MANAGEMENT
LOGISTICS RESEARCH LABORATORY
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20 QUESTIONS ON FORECASTING AND DEMAND ESTIMATION

This questionnaire is a part of the research project called Pipeline Management, which is funded by TEKES (the National Technology Agency in Finland), Stora Enso and TietoEnator. The project belongs to a larger project group VALOSADE (Value Added LOgistics in Supply And DEmand chain).

The outcome of this questionnaire will be used in the research project to gain information of the current forecasting and demand estimation methods and processes used in the Consumer Packed Goods industry. All answers to this questionnaire will be handled confidentially and anonymously. No individual answers will be published as such or so that they might disclose any company confidential information. All company names and identifying information will be hidden in the published reports.

The target of this research project is to develop a business model to facilitate the transparent flow of demand information in the value chain – also called collaborative planning. Special attention will be paid on utilization of the modern ICT technologies. As the main researcher in this project, my personal target is a Doctorate Thesis in Logistics. This research will be conducted as a case study, as it is very tightly bound to the business world, and in the CPG business especially.

Thank You for Your valuable contribution to this research. I hope to be able to contact you again later in the research process.

Kirsi Viskari
Researcher
Pipeline Planning project
Lappeenranta University of Technology

Questionnaire for Interviews

PART 1 – SOURCES AND METHODS

1. What are Your primary sources for the demand information of Your products (please click the grey box for the appropriate choices and select its importance, 1=most important etc.)?

Forecasts received from the customers
Purchase orders from the customers
Industry forecasts
Trends of actual sales from previous months/years
Internal knowledge within the company
Other, please specify below

2. What are Your primary modes for getting the demand information of Your products (please click the grey box for the appropriate choices and select its importance, 1=most important etc.)?

Customers send it to us automatically/regularly
Customers send it to us when we require
We generate it from the industry forecasts
Other, please specify below

No specific mode

3. What are Your primary systems, places or channels for getting the demand information of Your products (please click the grey box for the appropriate choices and select its importance, 1=most important etc.)?

Internet
Your own Extranet
Your customers' Extranets
Industry hub or portal, please specify which
File or message transfers from your customers
E-mail
Telefax
Other, please specify below

4. How long is the average forecast period You receive from Your customers?

Questionnaire for Interviews

5. How important factor is the demand information in Your planning processes (sales, production, logistics planning), please select only one?

- ☐ It is the main factor, our whole planning is based on demand information
- ☐ It is quite important, but it does not cover all our planning
- ☐ It is somewhat important, but does not have big impact in our planning
- ☐ We don't use demand information in planning, they are only informational

6. If Your selection in questions number 5 is something else than the first box, please specify with your own words what are the main reasons for having other basis for planning than the demand information

7. How would You rank Your main or most important customers' abilities to forecast in a scale of 1-5)?

Non-existent	Poor	Mediocre	Good	Excellent
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

8. If Your selection in question number 7 is 1, 2 or 3, please describe in Your own words the main reasons for Your ranking

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PART 2 – PROCESSING THE DEMAND INFORMATION

9. What kind of systems or processes do You have for using the demand information within Your company's planning processes (1 or several can be chosen)?

- ☐ a CRM (Customer Relationship Management) system
- ☐ an ERP (Enterprise Resource Planning) system
- ☐ PC software (spreadsheet programs etc)
- ☐ Manual

10. How would You rank the accuracy and reliability of the forecasted demand information or Your products when comparing it to the actual demand in a scale of 1-5?

Very bad	Quite bad	Mediocre	Good	Excellent
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Questionnaire for Interviews

11. What are the main factors deteriorating the forecasts?

- ☐ Incorrect quantities
- ☐ Incorrect timing (time of the demand)
- ☐ Forecasts do not cover everything
- ☐ Forecasts do not cover long enough future
- ☐ Forecasts change too much
- ☐ Other, please specify below

12. Does the demand information of Your products have a direct effect on Your raw material or service requirements in your planning processes?

- ☐ Yes, please specify how
- ☐ No, please specify why

PART 3 – GIVING FORECASTS FOR RAW MATERIALS AND SERVICES

13. Do You forecast Your demand of the raw materials and/or services and send it to Your suppliers?

☐ Yes ☐ No

14. If Your selection in question number 13 was No, please name the main reasons for it

15. If Your selection in question number 13 was Yes, how do You do it (how often, what timeframe, which systems/processes/channels do You use) ?

Questionnaire for Interviews

16. What are the primary systems, places or channels for sending the demand information to Your raw material or service providers (1 or several can be chosen)?

- ☐ Internet
- ☐ Your own Extranet
- ☐ Your customers' Extranets
- ☐ Industry hub or portal, please specify which
- ☐ File or message transfers from your customers
- ☐ E-mail
- ☐ Telefax
- ☐ Other, please specify below

17. How long is the average forecast period You provide to Your raw material/service suppliers?

18. How would You rank the accuracy and reliability of the forecasts of demand information You give to Your suppliers when comparing it to the actual demand in a scale of 1-5?

Very bad	Quite bad	Mediocre	Good	Excellent
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

19. How would You compare Your own raw material and/or service demand forecasting accuracy and reliability against those of your customers regarding Your products?

☐ Better ☐ Equal ☐ Worse

20. Please describe in Your own words the main difficulties in forecasting

Questionnaire for Interviews

If Your wish to give additional comments to above topics or to the forecasting in general, please use the space below

Thank You for Your answers!

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