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Criteria, approaches and key enablers for a segmented supply chain – a study of Swedish industrial manufacturing companies

Master thesis

Industrial Engineering and Management
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Supervisor: Kostas Selviaridis

Key words: supply chain strategy segmentation, supply chain segmentation enablers, supply chain segmentation criteria, supply chain segmentation approaches, supply chain segmentation concept

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ABSTRACT

Title: Criteria, approaches and key enablers for a segmented supply chain – a study of Swedish industrial manufacturing companies

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Problem definition: Supply chain segmentation is a topic which in later years has received increasing attention from supply chain managers of companies in industrial settings. To members of the supply chain research community the ideas and theoretical contributions underlying the concept of supply chain segmentation are hardly new, but have evolved ever since the beginning of the 1990s. However, as general definitions and well-documented approaches from industrial settings are scarce it is understandable that the concept is not that wide-spread and that supply chain managers struggle not only with the concept as a whole but also with its implementation in and applicability to a particular company. This research suggests a framework for supply chain segmentation, developed from investigation of criteria, approaches and key enablers for a segmented supply chain.

Purpose: The research purpose is, firstly, to summarize criteria for segmentation of supply chain strategy. Secondly, it is to summarize approaches taken in research case studies where an actual criteria analysis has been conducted and supply chain segmentation executed. Thirdly, it is to summarize key enablers that companies must have in place to execute a segmented strategy. In all three subsets, the purpose is to investigate and compare theory and practice.

Methodology: Data was collected through a qualitative interview study comprising fifteen interviewees from twelve Swedish industrial manufacturing companies. Before that, a thorough literature review was conducted for acquisition of deep theoretical understanding.

Conclusions: While there are differing views regarding what supply chain segmentation really entails, the customer requirements and/or the customer demand patterns must be the starting point. The framework for a segmented supply chain describes one way to approach and execute supply chain segmentation, taking customers, constraints and organizational readiness in key enabling areas into account.

Key words: supply chain strategy segmentation, supply chain segmentation enablers, supply chain segmentation criteria, supply chain segmentation approaches, supply chain segmentation concept

PREFACE

The work and research connected to this master thesis started in fall of 2013 and ended in the winter of 2014 with the printing and publishing of the report you are holding in your hand (or gazing at on the computer screen). As the final step of my Master of Science degree in Industrial Engineering and Management from the Faculty of Engineering at Lund University, this thesis proved just as challenging, engaging and educative as I could have ever been prepared for.

First and foremost I would like to thank my supervisor Jan-Uwe Hilger at Triathlon Consulting Group for your input, expertise and guidance during our many discussions throughout this project. I would also like to express my gratitude to you for identifying the need for a study such as this one – I have learnt so much.

I would like to direct a special thank you to Kostas Selviaridis, my supervisor at Lund University, who from the very start set the bar high and provided much appreciated feedback and advice during the entire project.

To the company, business area and business unit representatives from all companies participating in the study – Alfa Laval, Atlas Copco, Camfil, Husqvarna, Lindab, Perstorp, Sandvik, SKF, SSAB, Tetra Pak, Trelleborg and Trioplast – I want to express my deepest gratitude for sharing your experiences, ideas and opinions and for giving me new interesting angles and motivating feedback on a topic we are all interested in; supply chain. Without you this master thesis would be nothing. You know who you are.

Last, but by no means least, I would like to thank my family and friends for your never wavering support and love, for sharing my happiness during peaks and my frustration during lows. I would never have gotten this far without you.

Lund, February 2014

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Hanna Andrén

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LIST OF ABBREVIATIONS

LTH: The Faculty of Engineering, Lund University
SCOR model: Supply Chain Operations Reference Model
MRP: Material requirements planning
JIT: Just-in-time
ZI: Zero inventory
WIP: work in progress
MW: Market winners
MQ: Market qualifiers
OW: Order winners
OQ: Order qualifiers
DWV^3 variables: Duration of life cycle, time Window for delivery, Volume, Variety, Variability
SKU: Stock keeping unit
4PL: Fourth-party logistics provider

1. INTRODUCTION

This chapter introduces the reader to the topic and background of the research project. It discusses the practical problem, presents the purpose and its breakdown into research questions, and delimits the problem and research focus. Definitions of important concepts are provided before the chapter ending which consist of a presentation of the disposition of the report.

1.1. Background

When publishing the article "What is the right supply chain for your product?" in 1997, Marshall L. Fisher put words on his long-time experience of supply chain research and field work. The article, suggesting that if the nature of the products within a portfolio differs, then so should the supply chain strategy for the different products (Fisher, 1997), set something big in motion. He might not have been the first to express the view that a company pursuing only one strategy for the entire supply chain may be missing out. For example, in 1993, similar views were presented by Fuller, O'Conor and Rawlinson in their article "Tailored Logistics: The Next Advantage" where it was stated that when it comes to supply chain management "one size doesn't fit all" (Fuller et al., 1997, p. 88). Nevertheless, after Fisher's article the research published on supply chain strategy and how it can be tailored to match specific products, customers, markets, life-cycle stages etc. snowballed and numerous frameworks and guidelines have been presented since.

Now, 20 years after the publication of the article by Fuller et al., and 16 years after that of Fisher, one of the buzz words frequently used in industry newsletters and forums such as Supply Chain Quarterly, E2open, Supply Chain Digest, Supply Chain Brain, and IDC Manufacturing Insights is supply chain segmentation (Thomas, 2012; Becks, 2012; Bordner, 2013; Supply Chain Brain, 2012; Ellis, 2011). While the exact interpretation of what supply chain segmentation really implies is somewhat unclear, the basic thought in the newsletter articles is very much the same as in the published research literature; managing every supply chain pipeline and part of a supply chain in the same way is neither an efficient nor an effective approach. The interest in the topic from industry representatives seems substantial. In the words of Sean Rollings, vice president of product marketing of consultancy company E2open, as he put it in the aftermath of the Gartner Supply Chain Executive Conference in 2012; *"Segmentation was the hot topic of the year"* (Rollings, 2012). One cannot help but wonder; why has the industry in general needed almost two decades before adhering to the thoughts of supply chain segmentation?

1.1.1. Problem discussion

To assume that the industry in general manages supply chains thinking that "one size does fit all" is probably neither a fair nor an accurate assumption. However, most companies do to some degree struggle with supply chain decisions when trying to manage the risk of under-serving specific customers and the cost of over-serving others. Fisher calls the costs arising from lost sales (i.e. the risk of under-serving) and from holding too much inventory (i.e. the cost of over-serving) market mediation costs. He argues that any supply chain strategy must be aimed at balancing the market mediation costs with the physical costs of actually producing the product (Fisher, 1997). The logic behind this statement cannot really be questioned; matching supply with demand to satisfy customers at the least cost possible is of obvious importance to any company.

The difficulty arises and confusion might cloud the decision-making process when considering *with which strategies* and *how* this can actually be achieved. A brief literature scan shows that while Fisher (1997) suggests supply chain strategies be developed based on the criteria of whether the product produced by the supply chain is functional or innovative, Christopher and Towill (2002) suggest criteria based on product *and* demand, Lee (2002) suggests criteria based on supply and demand uncertainty, Frohlich and Westbrook (2001) suggest criteria based on degree and direction of supply chain integration, Heikkilä (2002) suggests complete focus on the situation and need of the customer, Aitken et al. (2003) stress the impact of a life-cycle perspective and so on. The number of possible strategies is, as well as the ways to identify which are appropriate for a specific company, obviously numerous. When also considering enablers and barriers for actually executing the segmented strategies within an existing supply chain network the complexity grows further. Add to this the various models and theories presented by consultancy firms and industry authorities and one can understand that it is difficult for company supply chain managers to know where to start and which approach to take. To quote Dr. Janet Godsell of Cranfield University; *"A major inhibitor to the more widespread adoption of SC segmentation is the confusion caused by the vast array of complicated models presented by consultants and academics to address the issue."* (Godsell, 2013, p. 3).

The partners and management consultants of Triathlon Consulting Group, the initiator of this research project, have first-hand experience of industrial companies struggling with their supply chain operations. In some cases the problems are due to unclear and un-segmented supply chain strategies and in others to an inability to execute the segmented strategies decided upon (Hilger, 2013). A large portion of the research articles on supply chain segmentation is built on case studies of companies producing and selling fast-moving consumer goods (FMCG), why Triathlon Consulting Group saw the need for increased academic and empiric knowledge of the topic and its spread in the more industrial setting of Swedish manufacturing industry.

1.2. Purpose and research questions

In the light of the problem discussion above, the research purpose is threefold; firstly, it is to summarize key criteria for segmentation of the supply chain strategy and to investigate to which extent these criteria are used in a sample of Swedish manufacturing companies. Secondly, it is to summarize the approaches taken in research case studies where an actual criteria analysis has been conducted and supply chain strategy segmentation has been executed. Once the approaches from the research case studies have been summarized, the purpose is to compare these to potential approaches used in the sample of Swedish manufacturing companies. Thirdly, the purpose is to summarize the key enablers that companies must have in place to be able to successfully execute a segmented strategy. Also in this case, the purpose is to investigate how these enablers are perceived in the sample of Swedish manufacturing companies.

More precisely, the purpose will be fulfilled by researching the following questions.

- Based on which criteria can end-to-end supply chain segments be identified within an existing supply chain network?
- Which approaches can be taken to the process of supply chain segmentation?
- Which are the key enablers for a successful execution of a segmented strategy?

1.3.Demarcation

Although the term supply chain segmentation is not clearly defined, it is obvious that supply chain segmentation issues stretch across several interconnected fields. Starting by segmenting the supply chain strategy, it moves on with executing the strategy, through to managing the supply chain and measuring its performance. Due to the limited time frame of this research project the scope of the fields connected to segmentation issues have been delimited to include supply chain strategy segmentation and enablers and approaches for execution.

Furthermore, delimitations regarding the scope of the data collection have been made, also because of the limited time frame of the project. The initial goal for the number of companies was set to include no less than ten and no more than fifteen companies, resulting in a final delimitation of twelve companies represented by altogether fifteen interviewees.

A further demarcation connected to the data collection was to focus the study on Swedish industrial manufacturers, or industrial manufacturers with a strong connection to Sweden, partly because most of the previous research within the supply chain segmentation area has been concerned with producers of fast-moving consumer goods and partly to provide focus in the study. The background to why the manufacturers should be Swedish or have a strong connection to Sweden was that the persons responsible for strategic supply chain issues were more likely to be located near their company headquarters, and therefore would be easier to get in touch with.

Moreover, all issues connected to supply chain segmentation have throughout this research project been delimited to a focal company perspective.

1.4.Target group

While the empirical study in this research project is delimited to Swedish industrial manufacturers, the findings, analysis and conclusions are considered to be of interest also for industrial manufacturers outside Swedish borders. The project in its entirety is also of interest for those researchers concerned with supply chain segmentation in the fast-moving consumer goods environment, wanting to broaden their horizons of supply chain segmentation into a more industrial setting. Therefore, the target groups of this research project are supply chain managers of industrial manufacturing companies, and researchers on supply chain strategy in general and supply chain segmentation in particular, wanting to gain deeper knowledge of the topic in an industrial setting.

1.5.Definitions

In order for the reader to be able to follow the logic of the research conducted in this project, some definitions of important terms and expressions are presented below. Further elaborations and motivations regarding the adopted definitions can be found in sub-chapter 3.2. Definition elaboration.

Definition of supply chain

The Supply Chain Council (2006, p. 3) defines a supply chain as;

"All product (physical material and service) transactions from your supplier's supplier to your customer's customer, including equipment, supplies, spare parts, bulk product, software etc.".

Within the company they further define the four supply chain processes plan, source, make and deliver and the backward process return, and argue that there are product transactions not only in between

companies but also between the different supply chain processes within a company (Supply Chain Council, 2006).

The same definition is adopted in this research project, but with a scope limitation according to what Mentzer et al. (2001) calls the direct supply chain. The scope of the supply chain is visualized in Figure 1 below.

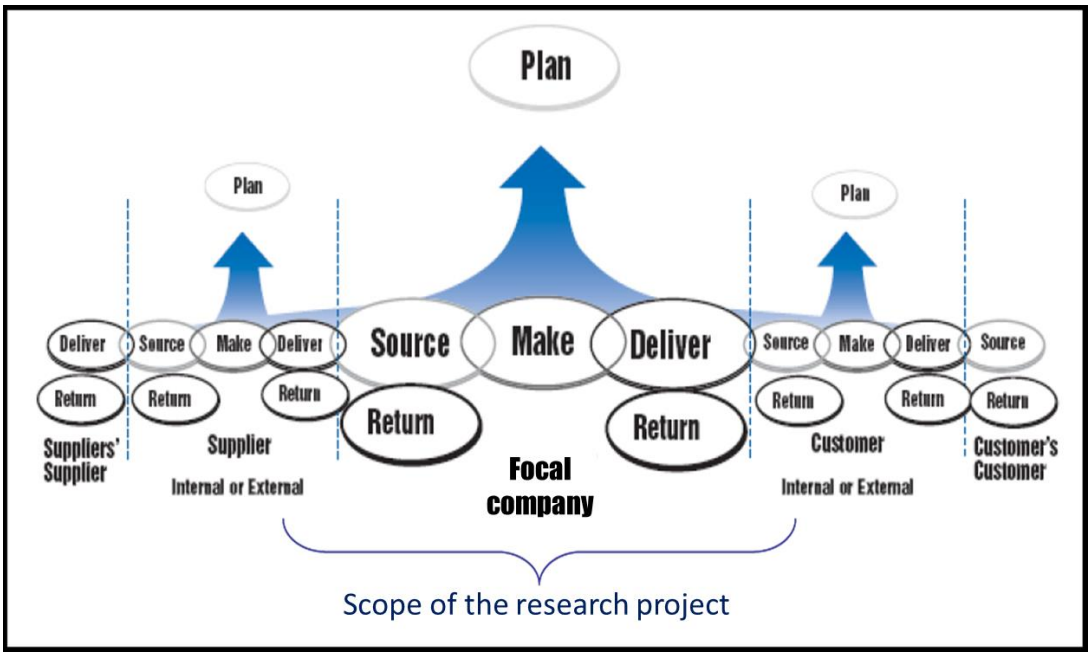

Figure 1: The scope of the research project, adapted from Godsell (2008, p. 21).

Definition of supply chain management
Stock and Boyer (2009, p. 706) define supply chain management as;

"The management of a network of relationships within a firm and between interdependent organizations and business units consisting of material suppliers, purchasing, production facilities, logistics, marketing and related systems that facilitate the forward and reverse flow of materials, services, finances and information from the original producer to final customer with the benefits of adding value, maximizing profitability through efficiencies, and achieving customer satisfaction."

The same definition is adopted in this research project but with the narrower view of the original producer and final customer rendered by the definition of the supply chain given above.

End-to-end
The definition of "end-to-end", as in the "end-to-end supply chain segments" mentioned in the first research question, is defined to align with the definition of supply chain further above, i.e. an end-to-end supply chain covers the same scope as in Figure 1.

1.6.Disposition

An overview of the report disposition and a brief introduction to the content of each chapter is given below.

Chapter 1: Introduction
This chapter introduces the reader to the topic and background of the research project. It discusses the practical problem, presents the purpose and its breakdown into research questions, and delimits the problem and research focus. Definitions of important concepts are provided before the chapter ending which consist of a presentation of the disposition of the report.

Chapter 2: Methodology
This chapter starts by familiarizing the reader with research approaches and strategies as well as providing a motivation for the approach and strategy chosen. The reader is then taken through the research process and design and the stages therein. Lastly, the credibility of the research is discussed through the angles of reliability, validity, objectivity and criticism of sources.

Chapter 3: Theoretical framework
In this chapter the reader is firstly introduced to the theoretical foundation and the connections between the different theoretical areas therein, through the presentation of a theoretical framework. Secondly, the different subsections of the theoretical framework are investigated deeper, starting with the elaboration of definitions and an introduction to supply chain strategy. Thereafter it continues with criteria for the development of a segmented supply chain strategy, suggested approaches and frameworks from research case studies, and enablers for the execution of a segmented strategy.

Chapter 4: Findings
This chapter introduces the findings of the interview study, starting with findings regarding the concept of supply chain segmentation. The chapter continues with findings directly connected to the research questions, i.e. findings on approaches and frameworks for supply chain segmentation, supply chain segmentation criteria and enablers for supply chain segmentation.

Chapter 5: Analysis
The focus of this chapter is to provide the reader with an analysis of the findings from the interview study. Each finding is compared to the theoretical framework and discussed from different angles. The chapter starts with the analysis of findings connected to the concept of supply chain segmentation and continues with analysis of findings connected to approaches, criteria and enablers consecutively.

Chapter 6: Conclusions
This chapter presents the overall conclusions of the research project. The conclusions are drawn from the comparison of the findings of the interview study and the theoretical framework which was made in the analysis chapter. The conclusions are connected to the research questions and implications for future research and managers are suggested.

2. METHODOLOGY

This chapter starts by familiarizing the reader with research approaches and strategies as well as providing a motivation for the approach and strategy chosen. The reader is then taken through the research process and design and the stages therein. Lastly, the credibility of the research is discussed through the angles of reliability, validity, objectivity and criticism of sources.

2.1. Research approach and method

Choosing an appropriate research strategy is crucial to the success of any research project (Denscombe, 2003). Particularly for small-scale research it is important to get it right the first time, as there may not be enough time for the execution of a Plan B. There is a variety of alternatives to choose from, each alternative resulting in a certain set of assumptions about the world and in a certain set of research advantages and disadvantages. The researcher must therefore be aware that every decision connected to the research strategy will bring gains in one direction and losses in another (Denscombe, 2003).

First of all, there is the matter of epistemological considerations. An important aspect in these considerations is what is viewed as acceptable knowledge and what is not (Bryman and Bell, 2011). A question very central to epistemology is, according to Bryman and Bell (2011, p. 15), *"whether or not the social world can and should be studied according to the same principles, procedures, and ethos as the natural sciences"*. According to Bryman and Bell (2011), there are three main epistemological positions, namely positivism, realism and interpretivism. While there are some differences from one author to another regarding what a positivistic position really entails, it does involve the general idea that it is important to imitate the methods of the natural sciences when studying the social world. Realism is connected to positivism in two important ways. Firstly, researchers taking a realistic position agree with those taking a positivistic position on that the methods used in the natural sciences should also be applied in the social sciences. Secondly, they agree on that there is an external reality that researchers turn their attention to. Simply put, realism proclaims that the reality can be understood by the use of appropriate methods (Bryman and Bell, 2011). There are several different kinds of realism. Miles and Huberman (1994) for example, state themselves as coming from a position of "transcendental realism", implying that social phenomena are believed to exist not only in the mind but also in the external reality. It is also argued that reasonably stable patterns exist among these phenomena and that constructs can be derived from these patterns (Miles and Huberman, 1994). An interpretivistic position is an alternative to the positivistic and it implies that the methods used must respect that there are differences between people, which are studied in the social sciences, and objects, which are studied in the natural sciences (Bryman and Bell, 2011).

The epistemological position of the author of this research project corresponds to that of transcendental realism presented by Miles and Hubermann (1994), i.e. that stable patterns, which aid understanding and provide explanations of the external reality, can be discerned once studying social phenomena.

Furthermore, the research approach can be either deductive or inductive (Saunders et al., 2000). A deductive approach consists, somewhat simplified, of the following steps; deduction of a hypothesis from theory, operationalization and testing of the hypothesis and examination of the outcome of the testing. If necessary, the theory can thereafter be modified in accordance with the findings (Robson, 2002). The approach is characterized by the search to explain causal relationships between variables through the collection and analysis of quantitative data using a highly structured methodology. To

explain the causal relationships the different concepts must be operationalized, which makes it possible to measure facts in a quantitative manner. This, combined with sufficiently large sample sizes enables another important characteristic; the generalization of the results (Saunders et al., 2000).

If the deductive approach is concerned with testing theory, the concern of the inductive approach is building theory. Using an inductive approach, data is compiled and analyzed to better understand the nature of a problem and through that either to add to the existing body of theory or to build theory in a new field. Advocates of the inductive approach argue that the cause-effect link between variables so central to the deductive approach cannot always be identified without taking into account how humans interpret the social world (Saunders et al., 2000).

According to Höst et al. (2006), the four methods most relevant to this kind of short-term research projects are surveys, case studies, experiments and action research. In their nature, surveys are wide and inclusive, focused at a specific point in time and inevitably depend on empirical research. The survey approach incorporates the possible use of a range of methods, stretching from questionnaires and interviews to observations and documents (Denscombe, 2003). Case studies, on the other hand, are in-depth studies focusing on one instance of the object that is to be investigated. The case study emphasizes relationships and processes and uses multiple sources and methods to draw general conclusions from deep study of a particular situation (Denscombe, 2003). Experiments incorporate manipulation of certain circumstances; firstly, the manipulation is done to identify significant factors and secondly to find the causal factors. Precise observations and measurements play an integral part in experiments (Denscombe, 2003). As for action research, its defining characteristics are that it deals with real-world problems and issues and that it involves change and participation of the practitioners whose real-world problems it deals with. Action research is a cyclical process (Denscombe, 2003).

Given the highly interactive nature of supply chains in general, and the social nature of supply chain management in particular, an approach of a more inductive nature was taken to the problem at hand. The research purpose and questions were of an investigating rather than testing nature and aimed at increasing the understanding of important criteria, approaches and enablers of supply chain segmentation in Swedish manufacturing industry, which further supports the choice of approach. However, it is important to recognize that although the approach certainly is of an inductive nature, it could be argued that it is not inductive in the literal meaning of the word, since the research does have its basis in previous literature presented on the topic. Moreover, a qualitative interview study with some quantitative elements was chosen as the research method as it was seen as the best means of generating the deep knowledge needed for fulfilling the purpose while at the same time providing some possibility for generalization of the results. An important consideration in the choice of research method was that it would enable the generation of the both deep and broad knowledge needed within the rather limited time frame of the research project. A single case study could perhaps have been used, but it was considered to give too narrow a perspective. The survey method was deselected as it would not render the in-depth knowledge needed to appropriately address the problem within the limited time frame of the project. The solution, one could argue, would be to use a multiple case study approach; however, given the limited time frame, the qualitative interview study was adopted.

2.2.Research process and design

After having decided upon the approach and method, the research process and design were addressed. The research was designed to follow a process consisting of seven main stages; project initiation, method determination, literature review, interview pre study with experienced supply chain managers,

data collection, data analysis and findings, and analysis of findings. In Figure 2 below, the process is illustrated more in detail.

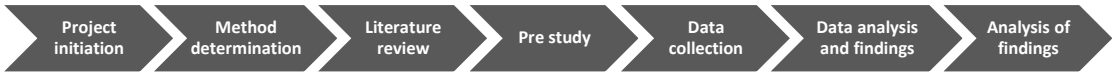

Figure 2: The research process.

2.2.1. Project initiation

The research project was initiated by the management consultancy firm Triathlon Consulting Group. The company, hereafter called Triathlon or the initiator of the project, is a Swedish consultancy firm headquartered in Gothenburg. This project was initiated by and executed with the support of the company's supply chain practice area. The consultants of Triathlon, with their broad knowledge of supply chain work in the Swedish manufacturing industry, have experiences of supply chain segmentation issues in the field similar to those found in the industry newsletters mentioned in sub-chapter 1.1. Background. According to their experiences, many companies struggle with their supply chain operations, in some cases because of unclear and un-segmented supply chain strategies and in others because of inability to execute the strategies decided upon. Therefore, Triathlon saw the need for increased academic and empiric knowledge of the topic and its current spread within the Swedish manufacturing industry.

After the immediate initiation a phase of discussion between the author, the Triathlon supervisor and the supervisor at the Faculty of Engineering at Lund University (LTH) followed, in which the research purpose was narrowed and the research questions were formulated. Due to the complex nature of the problem and the interpretational differences of terms used in the academic and corporate field, this phase was very valuable for the overall understanding of the problem.

2.2.2. Method determination

Once an overall understanding of the problem was gained, the research approach and strategy were determined according to sub-chapter 2.1. Research approach and strategy. Due to the nature of the problem and the aim of the research, a literature review was conducted to acquire in-depth knowledge from the academic field and qualitative interviews were chosen as the principal method of gathering empirical data.

2.2.3. Literature review

The literature review was conducted in several steps and consisted of reviewing several interconnected fields of literature. According to Bryman and Bell (2011), the literature review is one of the most important tasks in a research project, as it provides the basis on which the research questions are justified and the research design built. They further argue that the task of conducting a literature review can be daunting, sometimes because the subject area does not seem to have a defined boundary and sometimes because of the size of the body of existing literature material (Bryman and Bell, 2011).

In the case of this research project, the subject area did not have a well-defined boundary. This is why the literature review was executed in several steps and included several fields of literature. After an initial wide search with the purpose of gaining better understanding of the subject area, the review was focused on identifying criteria, approaches and frameworks for segmentation, and literature within the field of supply chain strategy was covered. Simultaneously, particular parts of the broader field of supply chain management were reviewed for background and contextual purposes. To understand how to execute the strategies developed from the segmentation criteria, the field of supply chain strategy implementation was covered with specific weight put on frameworks and approaches for the execution of supply chain segmentation and enablers and barriers to execution.

The literature review was mostly based on research articles gathered from searches in the university database Summon. Additional sources were found through searches of Google Scholar. In the field of enablers and barriers connected to supply chain segmentation some articles and e-sources from companies and other organizations were included, but the aim was always to prioritize reviewed and frequently cited material. To determine which articles were most frequently cited, citation functions in the databases were used. Once a relevant, reviewed and frequently cited source was found, the list of references in that article was often used to guide further database searches. Typical search phrases used were;

- Supply chain definitions
- Supply chain management
- Supply chain strategy
- Supply chain segmentation
- Supply chain differentiation
- Supply chain strategy segmentation
- Supply chain segmentation enablers
- Supply chain management enablers
- Supply chain segmentation barriers
- Supply chain management barriers

A number of books were also reviewed, particularly for information in the area of supply chain strategy.

Since reviewed research articles on the topic of supply chain segmentation enablers and barriers were scarce, the search was complemented with enablers and barriers for supply chain management as well as with some un-reviewed sources.

2.2.4. Data collection

Qualitative and quantitative data

Data can be of either quantitative or qualitative nature. Quantitative data is characterized by being measurable and is generally used along with a deductive approach to test different theories. Qualitative data is often gathered through interviews and is predominantly used with an inductive approach. Emphasis is placed on the generation of theory (Bryman and Bell, 2011). Seeing as the research method chosen was to conduct a qualitative interview study with some quantitative elements to generate a deeper understanding and, hopefully, to add to the theory in the field of supply chain segmentation, the data collected in this research project was mostly of qualitative nature.

Interviews

According to Bryman and Bell (2011), the interview is probably the method most widely used in

qualitative research. There are three main types of interviews; structured, semi-structured and unstructured. The two main types used in qualitative research are the semi-structured and the unstructured interview. Sometimes the term qualitative interview is used to describe these two methods together (Bryman and Bell, 2011).

In this particular research, empirical data was collected through semi-structured interviews. In a semi-structured interview a list of questions on fairly specific topics are commonly used. This list is referred to as an interview guide. The way in which the interviewee can answer the questions is rather open and the researcher may ask questions that are not included in the interview guide if it is deemed necessary during the interview. However, all the questions in the guide should be asked and similar wording should be used. An important characteristic of the semi-structured interview is that it is flexible and that the emphasis must be on how the interviewee frames and understands issues and events (Bryman and Bell, 2011).

Obviously, there are advantages and disadvantages with using a more unstructured method than the structured interview. According to Denscombe (2003) some advantages are;

- The possibility to gain in-depth information
- The high likeliness of gaining valuable insights
- The flexible nature making it possible to adjust questions during the data collection
- The likeliness of high validity in the data which originates from the possibility to check it for accuracy as it is collected

Some disadvantages are (Denscombe, 2003);

- The time-consuming nature of interviews compared to other methods of data collection
- The likeliness of the interview to produce non-standard responses
- The likeliness of lower reliability as consistency and objectivity are hard to achieve
- The likeliness of the interviewer affecting the truthfulness of the answers of the interviewee

Seeing to the rather undefined and therefore complex nature of the topic of supply chain segmentation the semi-structured interview was considered to be the most appropriate tool for capturing the potentially differing opinions of the interviewees. However, to overcome some of the disadvantages of using more unstructured interviews a slide package was developed to complement the interview guide. This certainly added more structure to the interviews, however, in their nature, they could still be considered to be semi-structured. The generation of the interview guide and the slide package is discussed further in the next sub-chapter.

In total 15 interviews of 1-2 hours duration were held during the study. Two of the interviews were conducted in English and the rest in Swedish.

2.2.4.1. Generation of interview guide

The generation of the interview guide was an iterative process, starting with the theory covered in the literature review. Questions connected to the research questions and topic areas of the literature review were phrased to be guiding but at the same time not too specific. Given the lack of exact definitions of several supply chain topics an important part of generating the literature guide was to assure that all interviewees would understand the questions and topics in the same way. However, as it was considered rather unlikely that questions alone would assure that all interviewees were on the same

page a slide package containing figures and a summary of criteria and enablers from the literature review was developed. The creation of such a slide package was the result of advice and discussions with the company supervisor, who himself has conducted numerous interviews on different complex supply chain matters. The interview guide and the slide package can be found in Appendix 1 and Appendix 2.

Once a first draft of the interview guide and the slide package was finished, a pre study was conducted in which pilot interviews were held with two industry executives, partly to try out the similarity of the answers but also to get their opinion on how easy it was to understand the questions and topics and to get improvement suggestions. The interview guide was also run through the academic and company supervisor to add more to the clarity of the questions. Seeing as the slide package would provide a common basis for discussion throughout the interviews, the initial questions on each topic were designed so as not to be of a leading nature. Regarding for example criteria and enablers for supply chain segmentation a general question was always asked before showing the interviewee the list of research criteria/enablers (compiled from theory through the literature review) in the slide package, so as not to influence the first answer of the interviewee and to be able to capture the interviewee's unbiased opinion, if such an opinion existed. However, the picture in the slide package was always shown, in order to provide a common basis across the interviews and to enable the comparison of the results. At the same time, the interviewees were encouraged to speak freely, and the interviewer did always try to let them do so, a strategy which provided the interviewer with interesting perspectives and angles to several of the topics discussed.

Once the list of criteria in the slide package was shown and the criteria therein explained, the interviewees were asked to grade the importance of the criteria on a scale from one to three, where one indicated high importance, two indicated medium importance and three meant not so important. The same procedure was used for grading of enablers. There were two major reasons behind asking the interviewees to grade the criteria (and the enablers); firstly it was done to ensure that opinions were received not only from those interviewees having an answer to the open-ended first question regarding criteria (or enablers) but also to capture the opinion of the other interviewees, and secondly it was done in order to facilitate the data analysis and the identification of patterns.

Follow-up questions were asked if the interviewer did not understand the interviewee correctly, or simply to control whether or not the interviewer's interpretation of the opinion of the interviewee was accurate. Questions the likes of the ones below were frequently asked during the interviews;

"Have I understood you correctly if I say that your position in this matter is…?"
"Could you elaborate that part a bit further?"
"I did not really follow, could you please explain again?"

2.2.4.2. Choice of interview objects

To acquire as complete a picture as possible of the criteria and frameworks for segmentation and the enablers for execution regarded to be the most important in the Swedish manufacturing industry, interviews were held with fifteen interviewees from twelve companies. To be able to determine which companies and representatives to include in the interview sample, some aspects must be taken into consideration. Firstly, it is important to recognize that the term sampling may not be entirely clear in qualitative research (Marshall and Rossman, 1999). However, Marshall and Rossman (1999) further state that the issue of selecting the "right cases" in a defined way is as present in qualitative research as in quantitative. It is stated that, in qualitative research, the cases to be selected can be anything from

persons and groups of persons to companies and industries. The selection is of great importance if the researcher wants to make statements that can be generalized in one way or the other. Secondly, sampling in qualitative research follows a different logic than the completely formalized, random sampling used in quantitative research (Marshall and Rossman, 1999). In this research project the first step of the sampling consisted of selecting companies and the second step of selecting persons within the companies. Marshall and Rossman (1999) propose the following suggestions for sampling;

- Look for the most extreme or divergent cases. By understanding the extremities, one can understand the field as a whole.
- Look for the particularly typical cases. The field can be understood from its center.
- Look to include maximal variation and keep the sample size small. The range of variation and differentiation in the field can be understood.
- Select cases based on their intensity of interesting features, processes or experiences. Choose either the cases with the greatest intensity or systematically compare those of different intensity.
- Select the cases in which the issues to be studied become especially clear, i.e. the critical cases. The selection can be based on opinions of experts in the field.
- Select the most sensitive cases to effectively illustrate the positive findings of a study. Caution should be taken as this can be problematic from an ethical point of view.
- Select the cases that are most convenient and easy to access. This is a second-best choice if none of the other alternatives can be applied.

Marshall and Rossman (1999) further argue that sampling is often conducted in such a way as to first find the most developed cases for the phenomenon being investigated and then to find cases representing the variation. It is important to look for the people that have a long experience of the particular issue or those who are really in the position to apply the professional practice of interest in the study. When sampling people, which is often the case in qualitative research, it is crucial to find the right persons to address. This may be difficult to know at the beginning of the research, why a specific professional position or function can be part of the background of the sampling decision (Marshall and Rossman, 1999).

The thought behind the sampling plan in this research project was strongly connected to what Marshall and Rossman discuss. Finding some more developed companies as well as those that represent the variation was considered to be important for the purpose of the research project. Furthermore, it was of high importance to find the right persons with sufficient experience within each company.

The actual sampling was divided in two phases. First, the “population” of companies from which the samples were going to be taken was identified. Second, the potential interview objects within each company were identified and an interview proposal was sent. The “population” of companies that was going to be studied was, according to the limitations, made up of Swedish manufacturing companies. Two basic criteria were used;

- The companies should be Swedish or have strong connections to Sweden
- The companies should be industrial manufacturing companies

The background to why manufacturers should be Swedish or have strong connections to Sweden was, as mentioned in sub-chapter 1.3. Demarcation, that the persons responsible for strategic supply chain issues were more likely to be located near company headquarters, and therefore would be easier to get in touch with. The reasons behind the second criterion were partly that most of the previous research

within the supply chain segmentation area has been concerned with producers of fast-moving consumer goods and partly to provide focus in the study.

A criterion stemming from the expert opinions of experienced consultants in the initiator company, and which also was connected to the limited time frame of the project, was that companies usually do not have the need or the resources to think about segmentation before they reach a certain size. Therefore, a criterion of an annual turnover of at least 4 billion SEK was used to narrow the search. To determine to which companies an interview proposal would be sent, the VA500 list[1] for the year 2012 was used (Veckans Affärer, 2013). The search was narrowed by the criterion of a 4 billion SEK turnover and by the search terms "Industrials" and "Basic material".

After this, the second sampling phase commenced. Through different channels, such as company webpages, professional online networks and company telephone exchanges, the specific persons responsible for or involved in supply chain activities within each of the companies in the population were identified. The search was always aimed at finding the person with complete responsibility for supply chain within each company, preferably with a title such as VP of Supply Chain or Supply Chain Director. If this proved impossible, or if a company did not have a specific person responsible, the search was redirected to aim at the person responsible within a specific business unit, or part of a business unit. It was not unusual for individual business units in several of the larger companies in the population to have a turnover of more than 4 billion SEK, why this was not seen as a problem for the study as a whole. The persons were approached either by telephone followed by an e-mail with more detailed information, or directly by e-mail. A minimum target of ten persons representing ten different companies was set to increase the probability of being able to observe trends in the interview data. A summarization of the criteria used for the population identification and the sampling can be found in Table 1 below.

Table 1: Sampling summary.

Criteria	**Motivation**
Swedish companies	Strategic supply chain function more likely to be located near company headquarters and therefore easier to get in touch with
Manufacturing companies	Most previous research conducted in fast-moving consumer goods industries. Provide focus to the study
Turnover > 4 billion SEK	Expert opinion + Limited time frame of project
Professional position	A certain amount of overview is needed for topic insight
> 10 persons/companies	To be able to observe patterns

Altogether, interview proposals were sent to thirty persons representing thirty different companies. Of these thirty companies thirteen confirmed participation and interview meetings were scheduled, resulting in an initial participation rate of 43.3 percent. One of these interviews was later cancelled by the company representative because of unexpected travelling, reducing the participation rate to 40.0

[1] The VA 500 list is a list compiled and presented by Veckans Affärer which consists of the 500 companies registered in Sweden with the highest turnover.

percent. The companies participating in the study compete in a wide range of industrial settings, stretching from plastics and metals to ventilation and heavy machinery.

In one of the companies, three interviews were booked with the supply chain representatives of three different supply chain segments, to get a deeper understanding of their segmentation journey. One company was visited twice, with two interviewees participating in the second interview. Altogether, 15 persons were interviewed during 14 interview meetings. The interviews were conducted between October 25th and November 19th on the sites and in the locations where the interviewees were positioned. One of the interviews was conducted over the phone, since the interviewee was positioned abroad.

Even though the aim was to interview the person with complete responsibility for supply chain in the different companies, the actual titles, responsibilities and hierarchical levels of the persons finally participating varied. A summary of the interviewees' titles can be found in random order in Table 2 below, along with a categorization of the interviewees which was deemed necessary due to confidentiality reasons. The interviewees categorized themselves into one of the following three categories;

- Manager
- Senior manager
- Executive

Table 2: Interviewee titles.

Interviewee titles	**Categorization**
Supply Chain Manager	Manager
Director Operations	Manager
Group Director Supply Chain	Executive
Director Global Planning and Logistics	Manager
Director Group Production	Executive
Inventory and Planning Manager	Senior manager
Director Total Quality	Senior manager
Purchasing Director	Senior manager
General Manager Logistics	Executive
Director Sales & Operations Planning	Senior manager
Senior Project Manager and Team Manager Supply Chain	Manager
VP Supply Chain	Executive
VP Business Systems Planning	Senior manager
Senior VP Group Purchasing	Executive
VP Warehousing and Transport	Senior manager

2.2.5. Data analysis and findings

According to Miles and Huberman (1994) qualitative data analysis is conducted through three concurrent activities, namely data reduction, data display and conclusion drawing/verification. The data reduction activity regards the process of selecting, focusing, simplifying, abstracting and transforming the collected data. The activity is conducted throughout the research project and is even argued to start before the data is actually collected, as the researcher, at this stage sometimes completely unaware of data reduction issues, decides which conceptual framework to use, which research questions to investigate and which data collection methods to choose. The activity proceeds

during data collection through summary writing, data coding, data clustering, memo-writing etc. The importance of avoiding stripping data from its context is especially pointed out as an issue during data reduction (Miles and Huberman, 1994).

The data display activity is concerned with how to organize and compress the information in displays in such a way that conclusions can be drawn. There are several different ways of displaying information and they are all designed to accumulate information into an immediately understandable compact form, to aid the next step of analysis (Miles and Huberman, 1994).

Conclusions drawing and verification is the third activity of qualitative analysis and it is conducted throughout and after the data collection period. Regularities, patterns, explanations, causal flows etc. are noted by the researcher during the entire process. However, it is argued to be important to hold the early conclusions lightly, and to have an open mind throughout the data collection process. The drawing of conclusions is further argued to be intertwined with the verification of the conclusions drawn. Verification means testing the plausibility and sturdiness, i.e. the validity, of the conclusions (Miles and Huberman, 1994). The issue of validity is elaborated on in the section 2.3. Credibility.

The data analysis conducted in this research project largely followed the phases described by Miles and Hubermann. Immediately after each interview the data was either summarized or transcribed into an interview write-up, depending on whether the interview was recorded digitally or not. In ten out of the fourteen interviews audio data was recorded and in the other four detailed notes were taken. Once about four interviews were conducted, an initial set of codes were developed in order to be able to initiate the data reduction. The coding of the transcriptions resulted in additional codes being developed and added to the coding list, a process which went on through the entire data collection and data reduction phase. The final list of codes can be found in Appendix 3.

During the data collection and data reduction memo-writing was a technique frequently used. It was adopted as soon as an indication of a causal link or a certain relationship was found, or when a specific idea ran through the mind of the researcher. Memo-writing strongly facilitated the clustering of data. Once all interviews were transcribed or the notes summarized, the transcriptions and summaries were read through in their entirety to provide overview of the data and to ensure that the bigger picture was never forgotten.

The data display phase of this research project was intertwined with both the data reduction and the conclusions drawing. Some data was easier to accumulate into a compact form than other, which resulted in only part of the data actually being displayed. The other data was simply analyzed by abstracting the sometimes rather large chunks of transcribed text marked with a certain code on to another paper and then reading them through, summarizing the general patterns and directions of the data.

The conclusions drawing and verification was an iterative process going on through all of the data collection, data reduction and data display phases. The verification of the conclusions was greatly facilitated by the coding, making it easier to go back and check a certain chunk of text. The process of actually reading through the transcriptions and summaries in their entirety also helped in the verification. In some cases the data was somewhat unclear, making it necessary to e-mail the interviewees to get clarification. This was done on a couple of occasions throughout the data analysis phase. The conclusions finally drawn from the data were then summarized and presented as the findings of the interview study. Since all but two interviews were held in Swedish, it is important to note that most of the quotes throughout chapters 4, 5 and 6 have been translated.

2.2.6. Analysis of findings

The seventh step of the research project was concerned with comparing the findings from the data analysis with the theory, a process which was aided by the use of the theoretical framework. Matches and mismatches between theory and practice were discussed in order to facilitate the drawing of conclusions and identify areas for future research and implications for managers. Once the analysis phase was completed, the findings, analysis and conclusions were fed back to the interviewees in order to give them a chance to voice concerns regarding the interpretation of their answers.

2.3. Credibility

According to Denscombe (2003), the methods used during a research process and the conclusions drawn from it must be justifiable. Of particular relevance to the credibility and justification of the research are the aspects of reliability, validity and objectivity (Denscombe, 2003).

2.3.1. Reliability

The classic interpretation of reliability is whether the research instruments are unbiased and would render the same results if applied to the same object on other occasions, i.e. whether the results are repeatable. However, in qualitative research the researcher inevitably becomes part of the research instrument and the issue changes somewhat to concern whether or not the same results and conclusions would be reached if someone else conducted the research (Denscombe, 2003). Bryman and Bell (2011) differentiate between external and internal reliability, where external reliability implies the degree to which the study can be replicated and internal reliability implies whether all members of a research team agree about what they see and hear. It is further argued that high external reliability is difficult to achieve in qualitative research as it is impossible to freeze a social situation and the circumstances therein (Bryman and Bell, 2011). However, Denscombe (2003) argues that reliability can be increased by providing a clear description of the aim and the basis of the research, such as clearly stating the purpose and closely describing the theory, as well as explaining how the research was undertaken and the explicit reasoning behind all key decisions (Denscombe, 2003).

This particular research has used 1-2 hours long qualitative interviews with one, two or three individuals in each company as the means of data collection, something which indicates that the repeatability of the exact results is low. However, since the interview guide had a clear disposition, showing the topics and areas covered and was used in all interviews, and since the selection of the sample of interviewees was well-motivated and described, it is likely that a repeated study would find similar patterns and generate the same general conclusions. However, the repeatability would probably be increased further if a description could have been provided regarding the exact number of companies participating from each specific industry, something which unfortunately was impossible due to issues of confidentiality. Nevertheless, the reliability could be considered to be increased by the clear structure of the report, the distinctly stated aim and purpose, the description and motivation of methodology and the extensive theoretical overview presented. Also, the motivation behind all major research decisions further strengthens the reliability of the research. However, since this is qualitative research, the same issues with external validity as described by Bryman and Bell (2011) further above is present and an *exact* repeatability is therefore highly unlikely. The internal reliability is very difficult to assess, since this research has been conducted by only one person.

2.3.2. Validity

According to Bryman and Bell (2011), the concern of validity is the integrity of the conclusions generated from the research. Denscombe (2003) also stresses that validity concerns whether the conclusions do justice to the complexity of the research area being explored. Bryman and Bell (2011) further make a distinction between internal and external validity. The concept of internal validity is argued to imply to which extent the observations that are made match with the theoretical ideas that are developed from them. The other part of the concept of validity is external validity, i.e. how far the findings can be translated to other situations or generalized beyond the scope of the particular research (Denscombe, 2003; Bryman and Bell, 2011).

There are several ways of increasing validity; using triangulation, studying the research object over a longer period of time, feeding research findings back to the sources of information to get their opinion, choosing the instances for investigation on explicit and reasonable grounds and checking to what extent the findings and conclusions fit with existing knowledge in the area (Denscombe, 2003).

Since the topic area explored in this research is rather complex, it is important to critically assess whether the conclusions do the complexity justice. Certainly, the limited number of persons/companies interviewed makes it difficult to completely generalize the conclusions beyond the participating companies or business units within the companies. However, the findings, analysis and conclusions were, as previously mentioned, fed back to the interviewees in order to check the researcher's interpretation of their answers, which could be considered to strengthen the internal validity of the research. Furthermore, showing the slide package and the pictures therein in all interviews does increase the probability of all interviewees interpreting the same things into a topic for which no real definition exists. Although the research in this project is of a qualitative nature it is impossible not to draw parallels to the issue of face validity connected to quantitative research, described by Bryman and Bell (2011) as the extent to which a measure reflects the content of the concept in question. Bryman and Bell (2011) also suggest that a way to increase this validity is to ask people with experience or expertise in a field to judge whether a measure reflects the concept concerned. While no measures were used during this research project, the interview questions is as close to a measure as you would come in this qualitative research project and the pre study which was made with two persons with industrial experience could be argued to further strengthen the internal validity of the questions and the slide package. During the interviews follow-up questions were asked as frequently as needed to ensure that the interviewees were understood correctly. Also, all findings were compared to and analyzed with a well-motivated theoretical framework, something which could be considered to increase the external validity of the conclusions drawn.

2.3.3. Objectivity

Objectivity implies that the values and attitude of the researcher should not affect the research. However, when data is gathered from interviews and personal meetings, a certain amount of subjectivity is practically unavoidable. Nevertheless, Denscombe (2003) argues that this certain amount of subjectivity does not necessarily have to have a severely negative impact on the research as long as it is kept to a minimum and the researcher gives a reflexive account of his or her self and its impact on the research. This enables the reader to critically reflect on the how the researcher's self has impacted the conclusions (Denscombe, 2003).

In this case, the research was conducted only by one person, which suggests that the risk of subjectivity is increased. However, discussions have been made with several different persons within the industry, as well as with the academic and company supervisor, giving the researcher several

different angles of reflection. The objectivity can also be considered to be increased by the fact that the researcher had not, previous to this project, been involved in any of the companies or been in contact with any of the interviewees participating in the study. All problems, persons and interviews were faced with open-mindedness by the researcher. The rather extensive literature review also gave the researcher an objective picture of the area and topics being researched.

2.3.4. Criticism of sources

Important for the credibility of the entire research is to critically consider the sources of information on which the research is based. Regarding the data collection, the identification of patterns in the interview material could have benefitted from including more companies in the study and from interviewing more persons on different levels within each company. The time frame did however put a limit on the number of interviews possible to conduct. Furthermore, it is important to bear in mind that results rendered by an interview are based on the individual interviewee's perception of the issue at hand and they may not be completely representative for the company as a whole.

Regarding the literature review, the sources covered did almost exclusively consist of reviewed and cited research published in acknowledged academic journals, such as Supply Chain Management: An International Journal, The International Journal of Logistics Management, Journal of Operations Management, International Journal of Production Economics and International Journal of Production Research. The few books used as sources were also frequently cited. Some sources came from industry newsletters and consultancy firms, but they were usually not at the foundation of the theoretical framework. However, in the part of the theoretical framework where enablers of supply chain segmentation was covered, information from consultancy firms did to about one fourth make up the sources for the theoretical framework. This could perhaps be considered to decrease the scientific legitimacy of this part of the research project. However, these sources were turned to as reviewed research connected to the topic was very scarce, and since the consultancy firm sources largely confirmed what was stated in the little reviewed research which was actually available, the use of un-reviewed sources could in this case not really be considered to decrease the scientific legitimacy of the research project as a whole.

A summary of the strengths and weaknesses connected to the credibility of this research project is provided in Table 3 below, along with some comments.

Table 3: Aspects of credibility.

Credibility aspect	Strengthened by	Weakened by	Comment
Internal reliability	-	-	Difficult to assess – research conducted by one person
External reliability	- Clearly stated aim and purpose - Detailed description of methodology - Well-motivated choice of companies and interviewees - Clear disposition of interview guide - Well-described theoretical framework	- The nature of qualitative research – impossible to freeze a social situation	Could be increased by closer description of industrial settings of companies and backgrounds and positions of interviewees
Internal validity	- Findings, analysis and conclusions fed back to the interviewees - Development and showing of pictures during the interviews - Interview pre study		
External validity	- Findings compared to and analyzed with well-motivated theoretical framework		Could be improved by including more companies and interviewees in the sample or by studying the companies during a longer time period
Objectivity	- Several different angles of reflection from discussions with experts from different fields - No personal attachment to any company or interviewee in the study - Extensive literature review	- Research conducted by one person - Choice of interviews as the method of data collection	
Scientific legitimacy in theoretical framework	- Almost all information behind the theoretical framework came from reviewed sources	- The enabler part of the theoretical framework is partly built on un-reviewed sources	Reviewed sources for enablers were scarce

3. THEORETICAL FRAMEWORK

In this chapter the reader is firstly introduced to the theoretical foundation and the connections between the different theoretical areas therein, through the presentation of a theoretical framework. Secondly, the different subsections of the theoretical framework are investigated deeper, starting with the elaboration of definitions and an introduction to supply chain strategy. Thereafter it continues with criteria for the development of a segmented supply chain strategy, suggested approaches and frameworks from research case studies, and enablers for the execution of a segmented strategy.

3.1. Theoretical foundation

In order to clarify on which parts of the extensive supply chain literature this research project rests, a theoretical framework was developed according to Figure 3 below. The framework was developed to cover all theoretical areas necessary for fulfilling the purpose of the research project, to explain dependencies and connections between the different areas and to facilitate analysis and conclusions drawing.

It starts with an elaboration of definitions and a general introduction to supply chain strategy, with the arrow in Figure 3 emphasizing the rather obvious connection that depending on how one defines a supply chain, there are different implications for supply chain strategy. For example, depending on which activities are considered to be part of the supply chain, naturally, the supply chain strategy will be designed to cover those exact activities. The framework continues with criteria for the development of a segmented supply chain strategy, consisting of the two major theoretical approaches to supply chain strategy segmentation, i.e. the product driven and the market driven segmentation approach. These segmentation approaches have implications for which frameworks and practical approaches can actually be used to segment a company's products. Once the segments are defined they will need to be differentiated through the use of different supply chain strategies developed around the different concepts of supply chain strategy, a connection which is indicated by the arrow pointing from the big bubble in the middle of the framework and the top right bubble (see Figure 3). Lastly, the framework is concerned with enablers for the execution of a segmented supply chain strategy, and is connected to the approaches and frameworks as a facilitator of their success.

The theoretical framework can be considered to consist of two slightly different parts; the more general part with the introduction to definitions and supply chain strategy, and the more supply chain segmentation-specific part regarding criteria, approaches and frameworks, and enablers. However, the two parts are interlinked, according to the description above.

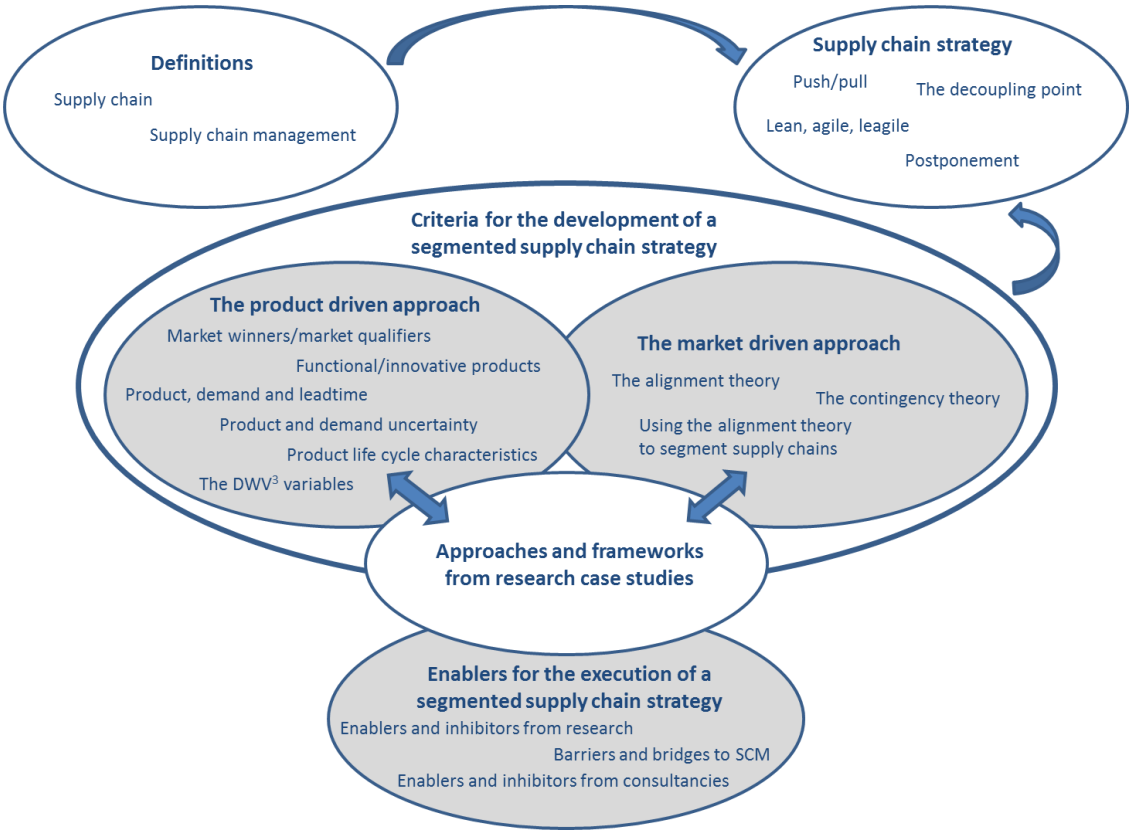

Figure 3: The theoretical framework.

3.2. Definition elaboration

Below some of the definitions presented in the Introduction are elaborated and motivated further.

3.2.1. Supply Chain

Over the years, the term supply chain and what it encompasses have evolved and many different interpretations have been suggested. Still, Mentzer et al. (2001) state that there seems to be more conformity in the research community regarding the definition of the term supply chain than the term supply chain management.

In the 1980's Porter (1985, p. 36) used the term value chain to describe a company's *"collection of activities that are performed to design, market, deliver and support its product"*. Even though the value chain is focused on the internal functions and processes of a company Porter did also mention that the value chain of one company is part of a value system, consisting of the value chains of suppliers, channels and buyers (Porter, 1985). Two years earlier Galbraith (1983) had suggested that the supply chain should incorporate everything from the raw material suppliers to the retailers. In the supply chain operations reference model (SCOR model) of 2006, the Supply Chain Council (2006, p. 3) used a definition somewhere in between the company internal value chain and the entire chain;

"All product (physical material and service) transactions from your supplier's supplier to your customer's customer, including equipment, supplies, spare parts, bulk product, software etc.".

Within the company the Supply Chain Council further defines the four supply chain processes plan, source, make and deliver and the backward process return, and argues that there are product

transactions not only in between companies but also between the different supply chain processes within a company (Supply Chain Council, 2006).

In their review of supply chain literature Mentzer et al. (2001, p. 4) summarize several sources to finally define a supply chain as *"a set of three or more entities (organizations or individuals) directly involved in the upstream and downstream flows of products, services, finances, and/or information from a source to a customer"*. Furthermore, within this definition, three degrees of supply chain complexity are identified. On the lower level of complexity is something called the direct supply chain, on the middle level the extended supply chain and on the higher level the ultimate supply chain, see Figure 4.

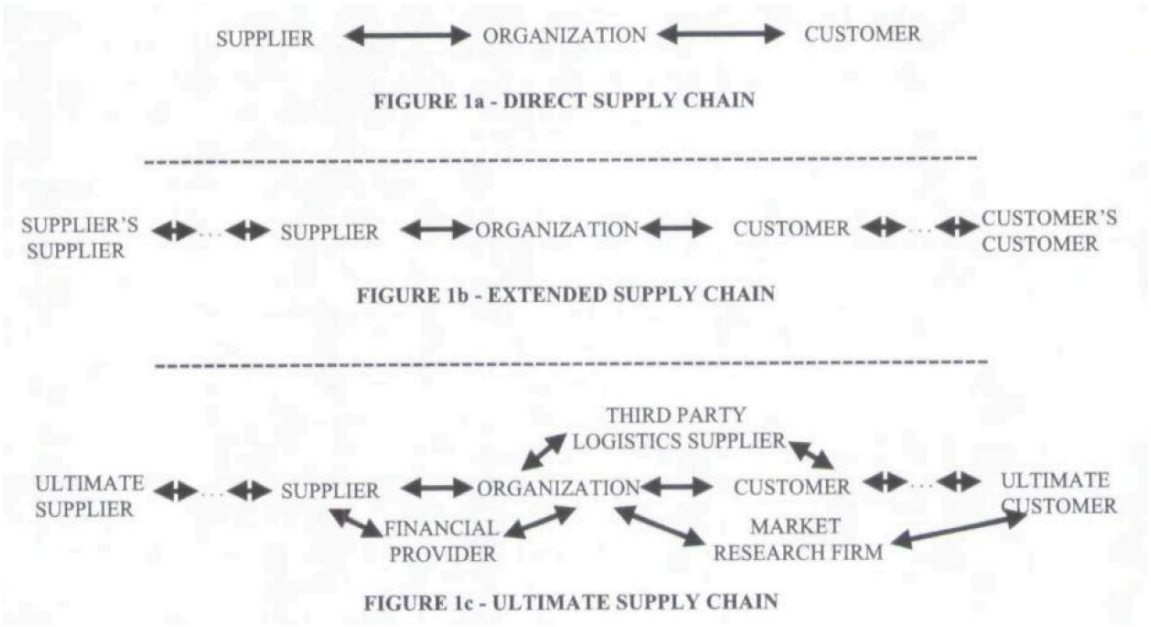

Figure 4: Levels of supply chain complexity (Mentzer et al., 2001, p. 4).

Since this research project focuses on segmentation issues from a focal company perspective, the Mentzer et al.'s (2001) lower complexity level definition is adopted. At the same time, the company internal supply chain processes defined by the Supply Chain Council (2006) and the product transactions between them are of particular importance to the segmentation issues of this research project. Therefore, the final definition of a supply chain in this project covers the narrowest scope of Mentzer et al.'s (2006) definition combined with the view of product transactions between supply chain processes according to the definition of the Supply Chain Council (2006), see Figure 1 in sub-chapter 1.5. Definitions.

3.2.2. Supply Chain Management

Regarding the term supply chain management, numerous definitions have been proposed in previous literature. This is made particularly clear by the fact that Stock and Boyer reviewed 173 definitions of supply chain management in a research paper in 2009 (Stock and Boyer, 2009). Supply chain management has been seen as everything from a synonym for logistics, operations management and purchasing (or a combination of the three) to the management of relationships between companies and between functions within a company (Lambert et al., 2005).

In this research project, the definition adopted is the one presented by Stock and Boyer (2009), because their definition is based on a synthesis of a wide range of suggestions from both practitioner and academic sources (Näslund and Williamson, 2010);

"The management of a network of relationships within a firm and between interdependent organizations and business units consisting of material suppliers, purchasing, production facilities, logistics, marketing and related systems that facilitate the forward and reverse flow of materials, services, finances and information from the original producer to final customer with the benefits of adding value, maximizing profitability through efficiencies, and achieving customer satisfaction." (Stock and Boyer, 2009, p. 706).

However, the original producer and the final customer mentioned in the definition are in the case of this research limited by the definition of the supply chain according to above.

3.3. Supply chain strategy

The number of ideas, research articles, books and practitioner insights on the field of supply chain strategy can, without exaggeration, be considered to be substantial. Ever since the interest of the academic community was sparked in the 1980's, the body of research in the area has grown rapidly (Burgess et al., 2006). Different approaches have been suggested, frameworks have been developed, reviews have been conducted and guidelines have been proposed. Even though the researchers involved during these decades have had different approaches and sometimes very different opinions on the matter of how to actually develop supply chain strategies, a large portion of the research does more or less rest on the foundation of "one size doesn't fit all". Or, to elaborate; if a company produces and sells more than one product to more than one market segment, using only one supply chain strategy will probably not render satisfied customers. The strategy, and through that the supply chain, needs to be segmented to fit different contexts.

But, before elaborating further on different approaches to supply chain strategy segmentation, some basic but highly relevant topics concerning supply chain strategy will be covered to provide necessary insights.

3.3.1. Push and pull

According to Spearman and Zazanis (1990) the terms push and pull are used to describe two opposing ways of how a job can be released into a production facility, but the terms are relevant also when used in a supply chain context. The following description sheds light on the difference between the concepts (Spearman and Zazanis, 1990, p. 521):

In a push system, a job is started on a *start date* that is computed by subtracting an established *lead time* from the date the material is required, either for shipping or for assembly.

A pull system is characterized by the practice of downstream work centers pulling stock from previous operations, as needed. All operations then perform work only to replenish outgoing stock.

Push systems have their roots in the Western way of planning production, i.e. in material requirements planning (MRP), which in turn is built on the reorder point system. A system that utilizes push aims at controlling the throughput by the establishment of a master production schedule and to measure WIP to detect problems in meeting the schedule. Pull on the other hand, stems from just-in-time (JIT) and zero inventory (ZI), or the so-called Japanese manufacturing techniques. In a pull system it is the work

in progress (WIP) that is being controlled and the throughput that must be measured to meet the demand (Spearman and Zazanis, 1990). Basic understanding of the push and pull concepts is necessary in order to comprehend the meaning and importance of the decoupling point.

3.3.2. The decoupling point

When controlling and planning the flow of goods through a company or a supply chain, the issue of the decoupling point and where to place it is absolutely central (Hoekstra and Romme, 1992). The formal definition is as follows (Hoekstra and Romme, 1992):

"The decoupling point is the point in the material flow streams to which the customer's order penetrates. It is here where order-driven and the forecast-driven activities meet. As a rule, the decoupling point coincides with an important stock point – in control terms a main stock point – from which the customer has to be supplied."

Or, in the words of Naylor et al. (1999, p. 112):

"…the decoupling point separates the part of the supply chain that responds directly to the customer from the part of the supply chain that uses forward planning and a strategic stock to buffer against the variability in the demand of the supply chain."

Naylor et al. (1999) further argue that the position of the decoupling point is connected to the longest lead time an end-user can accept and the point at which variability in product demand dominates. All products downstream of the decoupling point are pulled by the end-user. This makes the supply chain market driven, as opposed to upstream of the decoupling point, where it is mostly forecast driven (Naylor et al., 1999). Figure 5 shows how strategies for controlling the material flow depend on the position of the decoupling point.

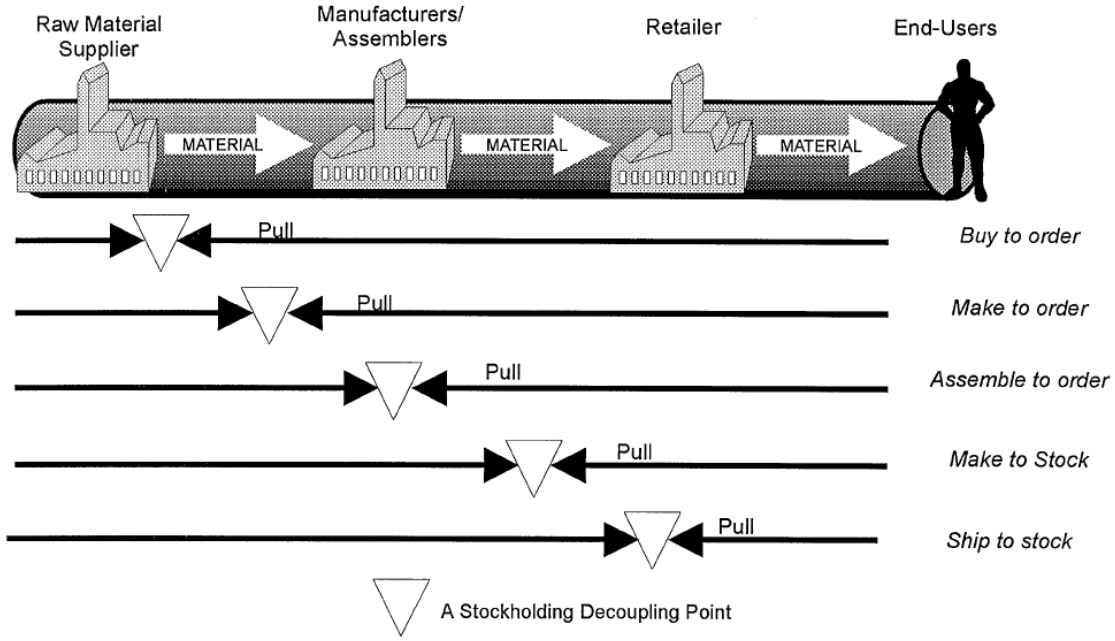

Figure 5: The position of the decoupling point (Naylor et al., 1999, p. 113).

The position of the decoupling point is of major importance in the leagile supply chain paradigm.

3.3.3. The lean, agile and leagile paradigms

In 1990 Womack, Jones and Roos published their first edition of the book The Machine that Changed the World. The focus of the book was the Toyota production system and the authors were the first to describe Toyota's way of working with waste elimination as "lean" (Womack et al., 1990). The concept was later expanded to include not only the manufacturing system but also the supply chain. Naylor et al. (1999, p. 108) relate the lean manufacturing paradigm to supply chain strategies as follows:

"Leanness means developing a value stream to eliminate all waste, including time, and to enable a level schedule."

Some years later the agile manufacturing paradigm was suggested as an alternative to the lean (Richards, 1996). In agile manufacturing, as well as in agile supply chains, flexibility is the key characteristic. However, agility is considered to be more of an organizational orientation, covering mindsets, structures, information and logistics processes (Aitken et al., 2005). Naylor et al. (1999, p. 108) relate the agile manufacturing paradigm to supply chain strategies as follows:

*"Agility means using market knowledge and a virtual corporation to exploit profitable opportunities in a **volatile** market place."*

Naylor et al. (1999) describe that in 1999, there was a concurrent view that manufacturers first should strive to adopt the lean paradigm and then try to become agile. Accordingly, Mason-Jones et al. (2000) state that it has sometimes been suggested that once leanness is achieved, agility should be the sole goal of the enterprise. However, Naylor et al. (1999) do, as well as Mason-Jones et al. (2000), continue with stating that this type of discussion severely oversimplifies the matter and that while the concepts of lean and agile are different, they are not necessarily mutually exclusive. The concepts are certainly different, and agility is best suited when demand is fluctuating while lean both requires and promotes a level schedule (Naylor et al., 1999). Yet, supply chains and organizations are often faced with a reality where demand is fluctuating and, at the same time, the need to eliminate waste to cope with increased cost pressure is high. These supply chains obviously need the capability of combining the lean and agile paradigms. Naylor et al. (1999) were the first to describe this combination as the leagile paradigm. Mason-Jones et al. (2000, p. 4065) define leagile as:

"Leagile is the combination of the lean and agile paradigms within a total supply chain strategy by positioning the decoupling point so as to best suit the need for responding to volatile demand downstream yet providing level scheduling upstream from the marketplace."

It is logical to apply the lean paradigm upstream of the decoupling point and to adopt the agile paradigm downstream (Naylor et al., 1999), see Figure 6 below.

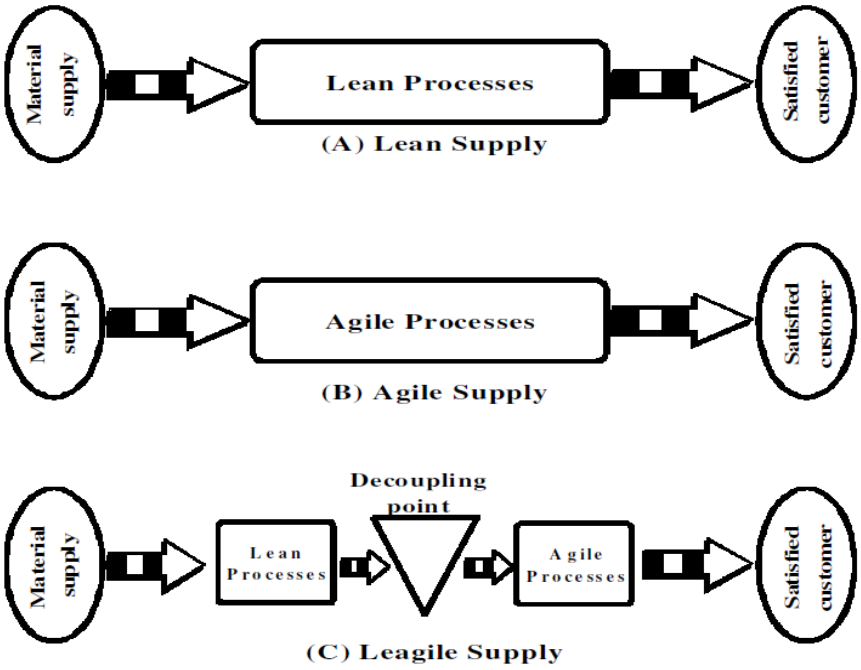

Figure 6: The lean and agile paradigms and the decoupling point (Mason-Jones et al., 2000, p. 4065).

3.3.4. Postponement

Connected to the positioning of the decoupling point there is the issue of postponement. According to Naylor et al. (1999, p. 108) *"the aim of postponement is to increase the efficiency of the supply chain by moving product differentiation (at the decoupling point) closer to the end user".* They further argue that postponing the decoupling point reduces the retailer's risk of long period stock-outs as well as the risk of holding too much stock. Especially for products that have, or are likely to have, short product life cycles postponement can be crucial (Naylor et al., 1999).

3.4. Criteria for development of a segmented supply chain strategy

The choice between push and pull, whether to use postponement or not, where to position the decoupling point and whether to implement the lean, agile and/or leagile paradigm are crucial considerations in the differentiation and segmentation of supply chains. But how to know where to start and which criteria to take into consideration?

In 2011, Godsell et al. (2011) presented one of the most recent frameworks on how a company can segment its supply chain and supply chain strategy. It was argued that (Godsell et al., 2011, p. 297);

"The challenge is to create a supply chain capability that combines both market segment considerations and product characteristics."

According to Godsell et al. (2011), the criteria used for segmentation stem from two different baseline theories; the theory of lean-agile and the theory of strategic alignment. Both theories are said to try to link market segment considerations and product characteristics to bridge marketing and supply chain strategy concerns. Furthermore, it is argued that the approach to supply chain strategy segmentation taken on the lean-agile side is product driven whereas the approach of the strategic alignment side is considered to be customer driven (Godsell et al., 2011). However, the lines between the different sides

are somewhat blurred, and stating that one side only takes customers into consideration and the other only products could be argued to be rather an exacerbated simplification. Nevertheless, the model presented by Godsell et al. (2011) does, as well as most of the existing research on supply chain strategy segmentation, undoubtedly have its roots in two rather different theories, why the structure of this section has been divided accordingly.

3.4.1. The product driven approach

Godsell et al. (2011) mark the beginning of the lean-agile product driven segmentation approach to the linking together of different market winners (MW)/market qualifiers (MQ) and the concepts of lean and agile.

3.4.1.1. Market winners/market qualifiers

The notion of MW/MQ originates from the work of Hill (1985), in which a set of order-winning (OW) criteria are suggested to help focus a company's manufacturing strategy. The criteria identified by Hill are price, product quality and reliability, delivery speed and delivery reliability. However, Hill does also point out that apart from these four criteria, which are all connected to manufacturing, there are other criteria, such as after-sales service, being the existing supplier to a customer, technical liaison capability and design leadership. It is further argued that "*it is important when discussing the order-winning criteria to distinguish between those which win orders in the market-place and those which qualify the product to be there*" (Hill, 1985, p. 49). It is clear that the order-qualifying (OQ) criteria are threshold criteria which must be fulfilled if a company wants to compete with a specific product in the marketplace and that the winning criteria is what actually makes a specific product win an order. The connection to marketing and market segmentation is obvious (Hill, 1985, p. 45);

"The procedure involved for establishing the order-winning criteria of different products requires marketing to review all current and proposed products and to divide them into types having similar order-winning characteristics."

The thought behind the OW/OQ criteria was further elaborated by Mason-Jones et al. (2000) and Christopher and Towill (2001) to cover the wider supply chain oriented concept of market winners and market qualifiers, which would then include also the "other criteria" mentioned by Hill. The linking of MW/MQ to the lean and agile paradigms was first made by Mason-Jones et al. (2000) and was then mirrored by Christopher and Towill (2001, p. 237) who state that;

"At its simplest the lean paradigm is most powerful when the winning criterion is cost; however, when service and customer value enhancement are prime requirements for market winning then the likelihood is that agility will become the critical dimension."

The two groups of authors both use the same logic and connect the same MW/MQ to lean and agile supply (Christopher and Towill, 2001), or to commodity or fashion goods products (Mason-Jones et al., 2000), see Figure 7.

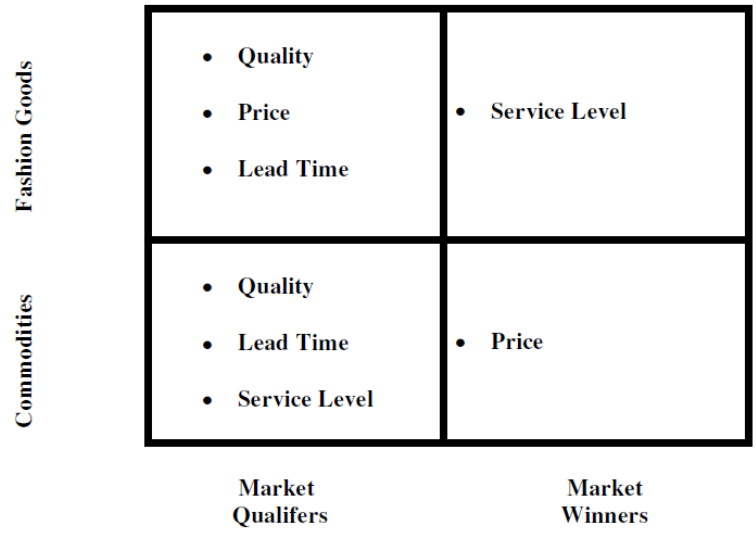

Figure 7: The market winners and market qualifiers for commodities and fashion goods (Mason-Jones et al., 2000, p. 4064).

The notion of using different supply chain treatments for the two generic product types here referred to as "commodities" and "fashion goods" dates back to 1997 to the seminal paper of Fisher, mentioned in sub-chapter 1.1. Background in the introduction chapter of this report.

3.4.1.2. Functional and innovative products

What Fisher (1997) states in his paper, is that if products are classified on the basis of their demand patterns, they either fall into the category of functional products or into the category of innovative products. He further argues that this classification of products is the first step in devising an effective supply chain strategy. The suggested basis on which the products can be classified is found in Figure 8 below.

Functional versus innovative products: Differences in demand

	Functional (predictable demand)	**Innovative** (unpredicable demand)
Aspects of demand		
Product life cycle	More than 2 years	3 months to 1 year
Contribution margin	5% to 20%	20% to 60%
Product variety	Low (10 to 20 variants per category)	High (often millions of variants per category)
Average margin of error in the forecast of the time the production is committed	10%	40% to 100%
Average stockout rate	1% to 2%	10% to 40%
Average forced end-of-season markdown as percentage of full price	0%	10% to 25%
Lead time required for made-to-order products	6 months to 1 year	1 day to 2 weeks

Figure 8: Functional versus innovative products: Differences in demand (Fisher, 1997, p. 107).

The need to classify the products as a first step in developing appropriate supply chain strategies has its roots in what Fisher frequently had observed as a mismatch between the type of product and the type of supply chain. As functional products have low profit margins (see Figure 8 above) many companies strive to introduce innovation to their products, something which would give customers additional reason to buy the products and which would also make it possible to increase the profit margins. However, it is argued that adding innovation to products makes the demand for them unpredictable and that it is easy for a company to "*gravitate from the functional to the innovative sphere without realizing that anything has changed*" (Fisher, 1997, p. 108). The problem arises as innovative products need a completely different supply chain configuration than functional. Although Fisher does not use the actual words lean and agile, it is probably what his physically efficient and market-responsive supply chains imply. The matrix shown in Figure 9 is proposed to diagnose whether the process used to supply products is well matched to the product type (Fisher, 1997).

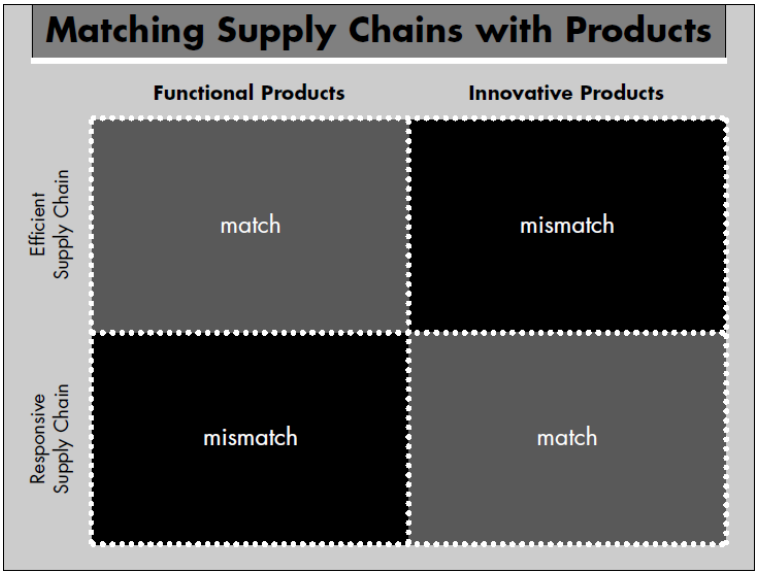

Figure 9: Matching supply chains with products (Fisher, 1997, p. 109).

The significance of Fisher's observations and analysis should not be underestimated and his framework was soon expanded to cover more aspects.

3.4.1.3. Product, demand and lead time

Christopher and Towill (2002), take a somewhat different approach when proposing a classification system to identify supply chain segments. They argue that there, especially for global supply chains, are three binary variables to take into consideration when choosing a strategy;

- Products, which are either standard or special
- Demand, which is either stable or volatile
- Lead times, which are either short or long

The importance of the lead time variable is especially discussed in the context of outsourcing (Christopher and Towill, 2002). Combining the variables in all possible constellations renders the classification scheme shown in Figure 10.

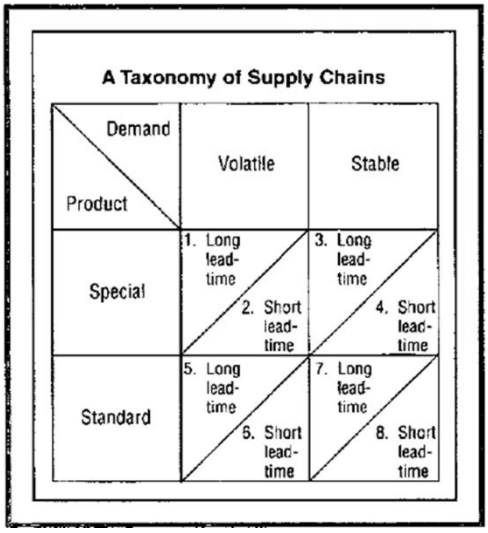

Figure 10: A taxonomy of supply chains (Christopher and Towill, 2002, p. 10).

According to the framework above, sorting products after the binary variables will make them fall into any of the eight different fields (see Figure 10). The products in the different fields require different supply chain strategies, and should be fed through different pipelines. However, once aligning the taxonomy to the pipelines identified in a company case study, it was found that only three of these suggested pipelines were utilized; number 2, 6 and 7. It is argued that the generally preferred solution would be to meet volatile demand for special products via an agile pipeline fed from local manufacturers, stable demand for standard items via a lean pipeline fed from overseas manufacturers and to use the local manufacturers to top-up standard products for which there are an unexpected demand (Christopher and Towill, 2002).

3.4.1.4. Product and supply uncertainty

Almost simultaneous to the presentation of the framework by Christopher and Towill (2002), Lee (2002) presented a slightly different way of segmenting products. Fisher's (1997) ideas are still at the basis for Lee's extended model, but contrary to Christopher and Towill (2002) it is evident that Lee makes standard/functional products equal low demand uncertainty/stable demand and instead adds the criteria of supply uncertainty. It is argued that as well as there are uncertainties connected to the demand for a product, there are uncertainties connected to the supply. It is further argued that these uncertainties are just as important to consider when developing the supply chain strategy as the demand uncertainties are (Lee, 2002).

The supply process can be characterized by either being stable or evolving. In a stable supply process the manufacturing process and the underlying technology are mature and the supply base is well established. In an evolving supply process the manufacturing process and the technology are still under development and are rapidly changing and the supply base is limited in either size or experience or both (Lee, 2002). Figure 11 shows some characteristics of stable and evolving supply.

Supply Characteristics	
Stable	**Evolving**
Less breakdowns	Vulnerable to breakdowns
Stable and higher yields	Variable and lower yields
Less quality problems	Potential quality problems
More supply sources	Limited supply sources
Reliable suppliers	Unreliable suppliers
Less process change	More process change
Less capacity constraints	Potential capacity constraints
Easier to changeover	Difficult to changeover
Flexible	Inflexible
Dependable lead time	Variable lead time

Figure 11: Supply Characteristics, adapted from Lee (2002, p. 107).

Lee (2002) further argues that although functional products are likely to have more mature and stable supply processes, it does not always have to be the case and gives some food products as a specific example. It is also clear that products can have very erratic demand while at the same time the supply process is stable, such as for fashion apparel (Lee, 2002). The different combinations are visualized in Figure 12 below.

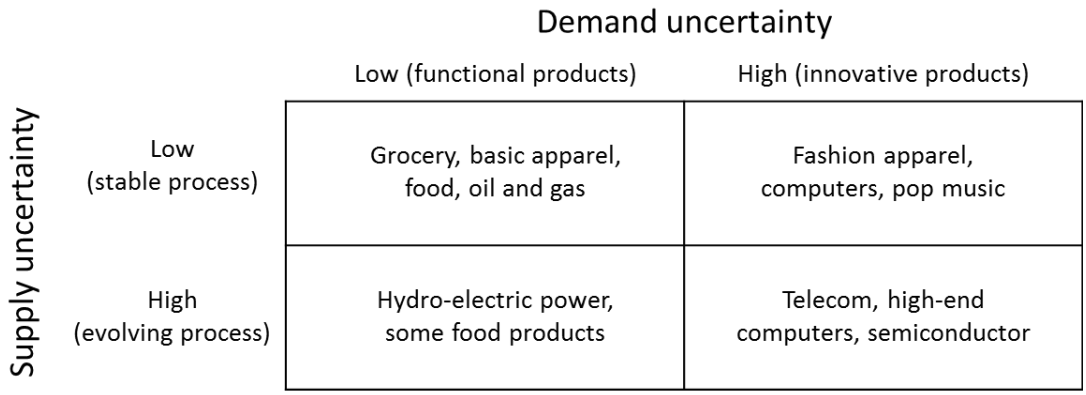

Figure 12: Framework based on demand and supply uncertainty, adapted from Lee (2002, p. 108).

According to Lee (2002), it is more challenging to operate a supply chain that is in the right column of Figure 12 than in the left, and the same goes for the lower row if compared to the upper. Furthermore, four strategy types, all argued to provide a competitive edge, are identified and matched with the squares of the model. The strategies are named efficient supply chains (which really correspond to lean), risk-hedging supply chains (by pooling and sharing of resources), responsive supply chains (by using build-to-order and mass customization) and agile supply chains (combining the strengths of hedged and responsive). The resulting model finally suggested by Lee (2002) can be found in Figure 13 below.

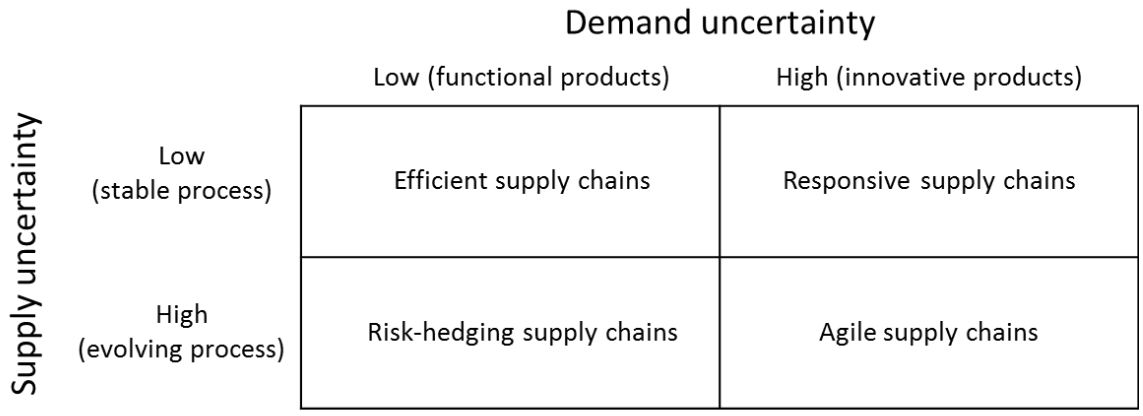

Figure 13: Matched strategies, adapted from Lee (2002, p. 114).

3.4.1.5. The DWV^3 variables

Christopher and Towill (2000) also argue that there are five specific key market characteristics that should influence decision making when it comes to supply chain strategies. The attributes are shortly known as the DWV^3 variables, and encompass Duration of life cycle, time Window for delivery, Volume, Variety and Variability (Christopher and Towill, 2000). A short description of the variables is given below.

Duration of life cycle:
An important factor to take into account when developing the supply chain strategy is the likely duration of a product's life cycle. If the life cycle is short, then so must the time-to-market and the end-to-end pipeline be. Short time-to-market is essential as uncertainty has become a product life cycle characteristic, due to the high volatility in turbulent markets. Once the product has reached the market, a short lead-time to re-supply is equally important in order to avoid lost sales and satisfy demand (Aitken et al., 2005).

Time Window for delivery:
The time window between purchase/order and the customer actually receiving the product widely differs depending on the product. It is obvious that this time is usually shorter for more standardized products as opposed to more customized (Aitken et al., 2005). Aitken et al. (2005) argue that it is usually more suitable to use agile supply chain strategies for products that are supposed to be short-lived or require to be delivered very shortly after the customer places the order.

Volume:
The volume that can be expected to be sold strongly affects the choice of supply chain strategy. Products produced for a high level of demand aimed at mass markets will usually benefit from lean supply chains and make-to-forecast strategies, whereas products produced in smaller volumes will benefit more from flexibility (Aitken et al., 2005).

Variety:
Aitken et al. (2005) argue that the higher the variety, the higher the demand variability for each stock keeping unit (SKU) since the demand is spread over a wider range of SKUs. The consequences of a high variety on supply chain and manufacturing is that flexibility becomes more crucial. Complexity usually increases with variety (Aitken et al., 2005).

Variability:
Variability, or "spikiness" or unpredictability of demand, is considered important when developing the supply chain strategy. Agility is argued to be crucial when forecast accuracy is particularly low. Variability can be measured by the coefficient of variation and when it is high, it is argued that focus should be on lead-time reduction and on capturing true demand information (Aitken et al. 2005).

It is suggested that if analyzing a product portfolio with the DWV^3 variables, the diversity of the products and market profiles will show an obvious need for differentiated pipelines. Still, it is clear that even if the variables are used in the simplest way possible, i.e. as binary variables, they would render no less than 32 pipelines (Aitken et al., 2005). However, the variables can also be used to cluster products into segments, which reduce the number of pipelines necessary, (Aitken et al., 2005). A research case study doing exactly this is investigated further in the sub-chapter 3.5. Suggested approaches and frameworks from research case studies.

3.4.1.6. Product life cycle characteristics

Yet another dimension was added by Aitken et al. (2003), namely that of the impact of product life cycle on supply chain strategy. Aitken et al. (2003) argue that while identifying the need for supply chain strategy segmentation and to tailor the logistics channels to match the strategy is crucial, the innovative manufacturer must still do more. It is especially pointed out that the manufacturer, at the conceptual stage, usually does not know what the life cycle pattern of a specific product will look like. Yet, products must be able to flow as required by the customer, throughout the entire product life cycle. The connection between the product delivery process and the new product introduction process is highlighted and it is argued that supply chain capabilities must be able to cope with demands of prototype manufacture, pre-production runs, and then in some cases the typical commodity product life cycle of introduction, growth, maturity, saturation and decline (Aitken et al., 2003).

The connection between which capabilities are needed in which phase of the product life cycle is one of the most important conclusions reached by Aitken et al. (2003). The connection is to identify how the order winners and the order qualifiers change along the product life cycle, see Figure 14 below.

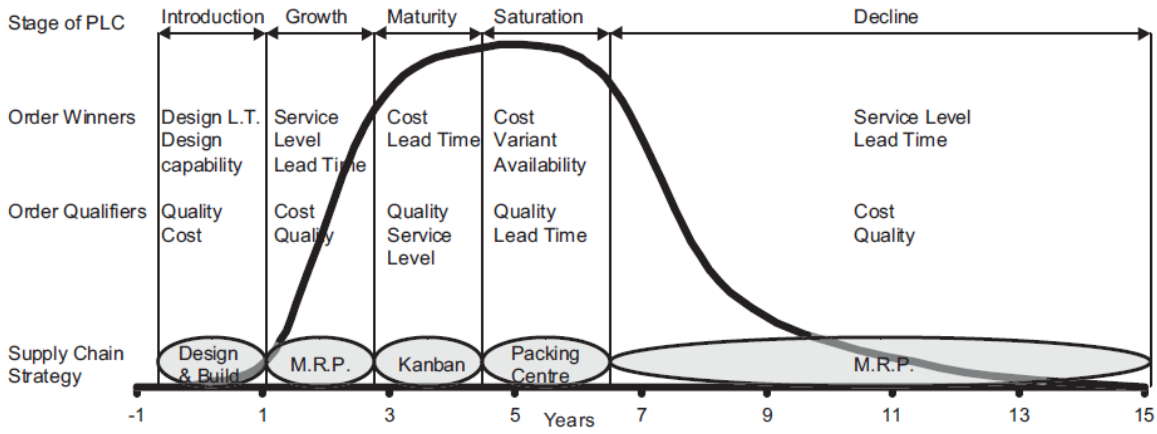

Figure 14: The product lifecycle (Aitken et al., 2003, p. 136).

The fact that the order winners and order qualifiers change over the product life cycle seems obvious, and Aitken et al. (2003) argue that the way to cope with this change is to dynamically route products to supply chain pipelines based on which stage of the product life cycle they are in. It is suggested that

the DWV[3] variables should be continuously monitored and that they provide an uncluttered aid to strategic supply chain thinking in the different phases. It is argued that no matter if using the DWV[3] classification system or another, the variables should, as well as the levels of each variable, be kept to a minimum. It is pointed out that all classification systems are somewhat flawed and that trade-offs always have to be made when choosing which variables to use for the classification. However, Aitken et al. (2003) strongly advocate the use of classification systems with the argument that;

"There are many situations where it is far more preferable to be approximately right than exactly wrong." (Engebrecht, 2001, p. 137)

To summarize the lean-agile product driven segmentation approach it can be stated that the starting point is to assign products, segmented by some sort of classification system, to pre-defined supply chain strategies, such as lean, agile or leagile. The order winning and order qualifying criteria are then evaluated continuously over the product life cycle and the products re-routed through appropriate supply chain pipelines, see Figure 15 below.

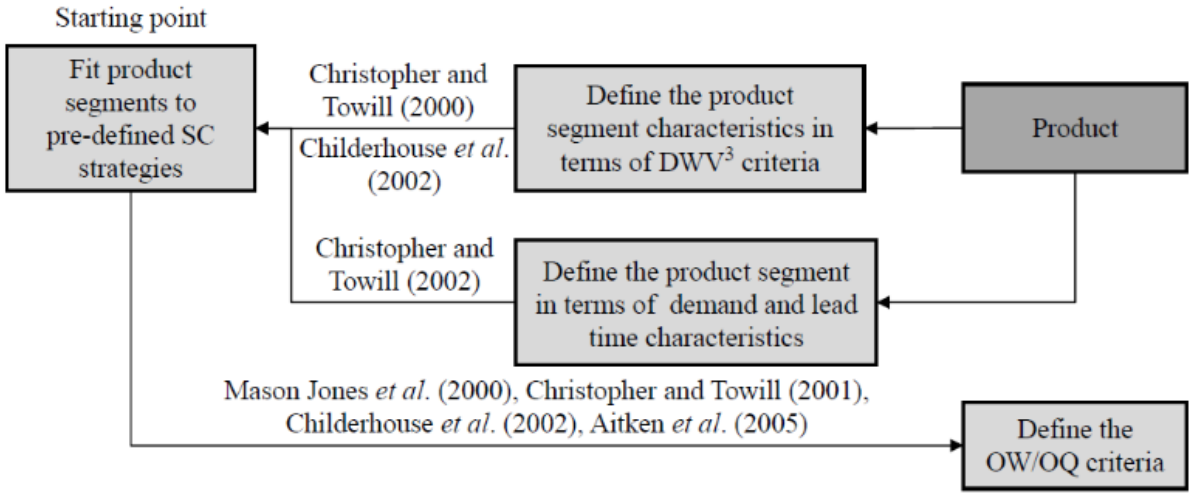

Figure 15: Summary of the lean-agile product driven segmentation approach (Godsell, 2008).

3.4.2. The market driven approach

According to Godsell et al. (2011), the second approach to supply chain segmentation is the market driven segmentation approach. At the basis of this approach is the alignment theory (Godsell et al., 2011), first presented by Chorn (1991).

3.4.2.1. The alignment and contingency theories

When the alignment theory was first proposed in 1991, it was argued to show what really drives organizational performance and effectiveness (Chorn, 1991). Research trying to find strategies, styles and competitive situations that were capable of consistently producing good performance had displayed mixed results and were not considered to show how organizational performance was actually driven. It was argued that searching for universally appropriate strategies and management styles was searching in vain and that *"it seems more sensible to recognize that any strategy is only appropriate in a given set of competitive conditions. Similarly, specific organization cultures and/or leadership styles are only appropriate in given strategic situations"* (Chorn, 1991, p. 20).

The alignment theory aims at aligning the organization and the environment to create strategic "fit". In this case, alignment considers the compatibility of the four elements of strategic fit, namely competitive situation, strategy, organization culture and leadership style (Chorn, 1991). Chorn further argues that in each of the four elements there are four logics; production (P), administration (A), development (D) and integration (I). When combining these logics in various ways a unique competitive situation, strategy, culture or leadership style is produced. Furthermore, through the replication of the same combination of logics in the four elements, strategic fit is reached and alignment occurs, see Figure 16.

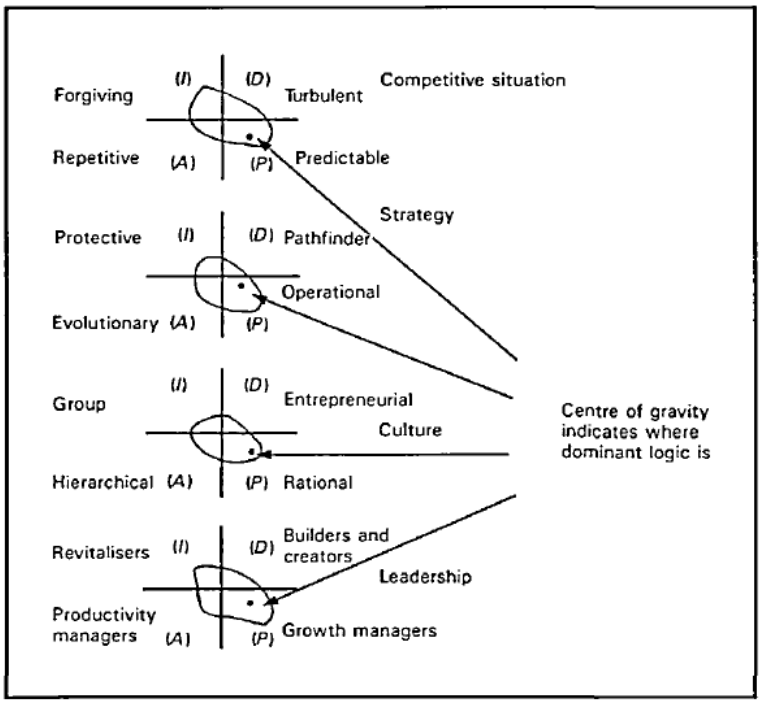

Figure 16: The four elements of strategic fit with the centre of gravity indicating the position of the dominant logic (Chorn et al., 1991, p. 23).

It is concluded that an aligned organization will be operating at the highest possible effectiveness, but that strategic fit is an ideal state which should certainly always be strived for, but which is rarely achieved. Consequently, the prime task of senior management is to manage interdependencies between situation, strategy, culture and leadership style (Chorn, 1991).

Chorn's view that universally appropriate strategies do not exist is almost entirely in line with the ideas behind structural contingency theory, dating back to the 1960s (Qiu et al., 2012). A description of the core of the structural contingency theory is provided by Qiu et al. (2012, p. 95) as follows:

The core idea of structural contingency theory is that, to produce high performance, organizational structure has to fit situational factors, which are termed 'contingencies'.

Qiu et al. (2012) argue that the key contingencies found within the vast contingency theory research area are environmental uncertainty, technology, task, strategy and size. It is further argued that organizational structure needs to fit one or several of the contingencies in order to achieve high performance (Qiu et al., 2012).

Donaldson (1987) shows that when there is a fit between structure and the strategy contingency the performance increases. Using the four categories of organizational structure suggested by Rumelt

(1974), i.e. functional, functional with subsidiaries, product divisional and holding company, in combination with four degrees of diversification, matches (or fits) and mismatches are mapped out (Donaldson, 1987). The suggested framework can be found in Figure 17 below.

	Single business	Dominant business	Related businesses	Unrelated businesses
Functional	C	i	i	i
Functional with subsidiaries	C	C	i	i
Product divisional	i	C	C	C
Holding company	i	i	i	i

C = congruent = matched = fit
i = incongruent = mismatched = misfit

Figure 17: Congruent and incongruent matches of strategy and structure, adapted from Donaldson (1987, p. 8).

Complementary to Figure 17 above, Donaldson argues that companies in which a single product generates 95 percent of sales or more, i.e. single businesses, are best organized in a functional manor or as functional with subsidiaries. It is claimed that dominant businesses, in which up to 30 percent of sales are generated from secondary product lines, should adopt a functional with subsidiaries or product divisional structural form. However, it is pointed out that the parent company in dominant businesses can still be functionally organized. For businesses in which less than 70 percent of sales originate from one product, i.e. related businesses, the product divisional organization is required. Likewise, in unrelated businesses, where less than 70 percent of sales can be traced to a related group of products, the product divisional form is needed in order to provide decentralization (Donaldson, 1987).

In addition to structural contingency theory, Chorn's alignment theory is also connected to research on personality types, management styles and organizational cultures (Chorn, 1991).

3.4.2.2. Using the alignment theory to segment supply chains

The introduction to alignment theory and its strong connection to contingency theory presented above are necessary in order to comprehend the supply chain segmentation approach presented by Gattorna et al. (1991). The approach applies the alignment theory to supply chains, and especially points out the need to take into consideration the behavioral characteristics present in the systems, people and products within a supply chain. Since behaviors and cultures are difficult to change the supply chain complexity arising from increased globalization and differing objectives of different organizations or even departments within an organization should be reduced by implementing a market-based structure. The market-based structure implies that each customer segment has a certain dominating logic or set

of logics which sets that segment apart from the others and that the company should organize itself according to these segments (Gattorna et al., 1991), see Figure 18 below.

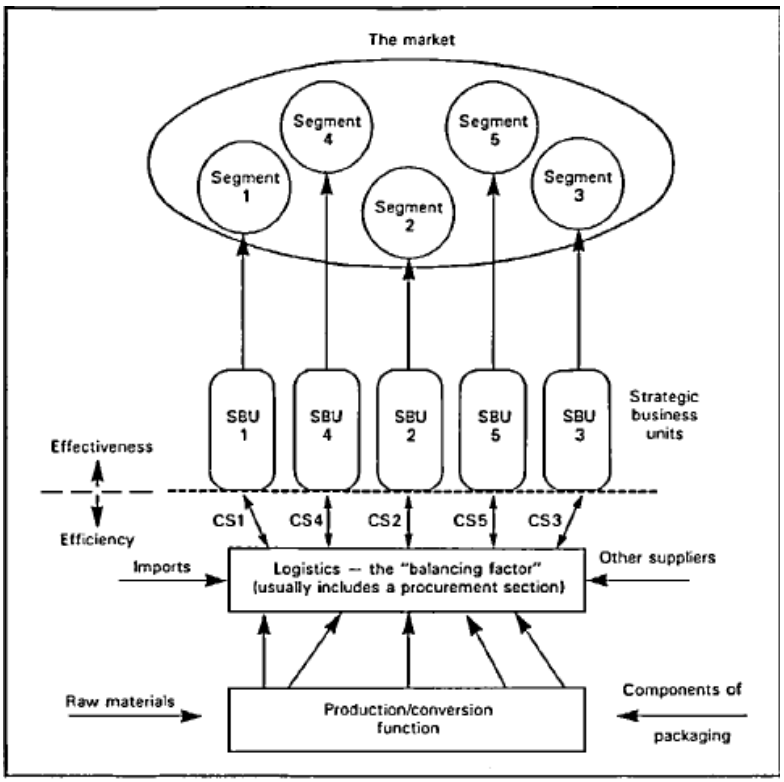

Figure 18: Market-based organization structure (Gattorna et al., 1991, p. 9).

The need to change the organizational structure to fit the market is emphasized. This is where the connection to structural contingency theory becomes clear. To quote the almost dejected-sounding Gattorna et al. (1991, p. 8):

"How often have we heard it said, and yet how rarely is it actually practiced, that structure follows strategy. Many organizations are still trying to operate within inappropriate, unwieldy structures which bear no relation to the needs of the marketplace, the idiosyncrasies of customers, or their own internal capability to deliver."

It is stated that some form of organizational restructuring may be the only way to create what Gattorna et al. (1991) call logical, flowing pathways between (and through) a company and its customers. Different approaches, contingent on the specific context and industry, are suggested in order to identify customer segments and to create logical pathways (Gattorna et al., 1991). Two of the different suggestions given by Gattorna in the early 1990s as to how this can be done in practice are investigated further in section 3.5. Suggested approaches and frameworks from research case studies.

In 1996 Gattorna and Walters (1996) further developed their ideas and elaborated the alignment logics. Especially the logics attached to the competitive situation were refined into marketplace logics with matching customer expectations; see Figures 19 and 20 (Gattorna and Walters, 1996).

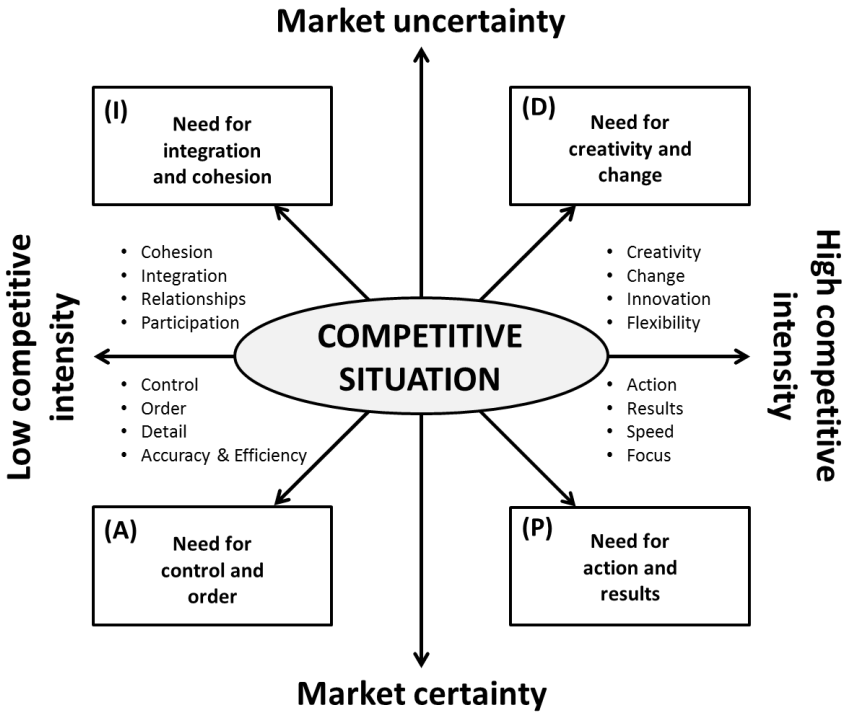

Figure 19: Marketplace logics, adapted from Gattorna and Walters (1996, p. 30).

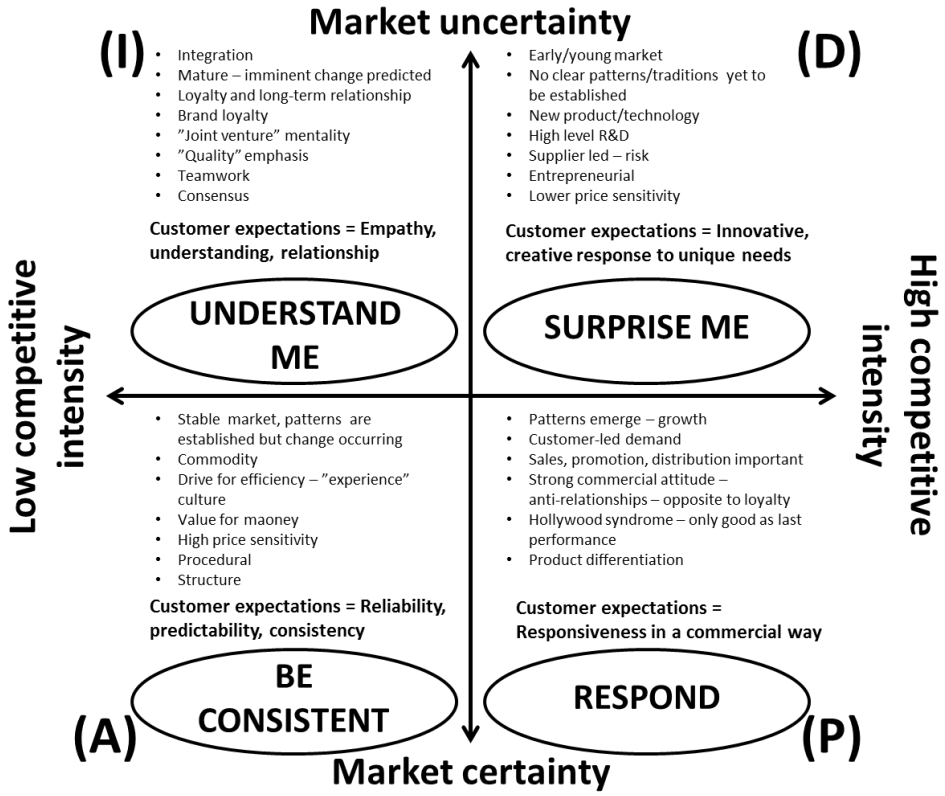

Figure 20: Customer expectations and buying logics, adapted from Gattorna and Walters (1996, p. 31).

It was argued that the alignment argument could be used to structure customer service requirements into relevant, differentiated customer service packages. Logistics service requirements were seen as an

integral part of the customer service package and it was argued that they should be determined by the "buying logics" presented in Figure 20 above (Gattorna and Walters, 1996).

Gattorna and Walters (1996) continued by identifying some problem areas connected to customer service. It was argued that the approach to implement customer service policies was widely spread but that the policies usually made little or no attempt at identifying the specific needs of the customer. The service policies were usually very similar to those of competitors, which made it impossible for the policies to result in competitive advantage. As the policies lacked strong differentiation connected to the customer preferences the customer service offers became generic. At the same time it was argued that the cost-effectiveness of the customer service remained uninvestigated. It was stated that (Gattorna and Walters, 1996, p. 47);

"Very little attempt was (or is) made at measuring customer service programmes for cost-effectiveness. It follows that resources may have been wasted in providing service activities for which no benefits (in revenue and profit terms) could be identified."

The issues above rendered Gattorna and Walters (1996) to draw two conclusions regarding customer service; firstly, because it became generic it was often seen as an unjustifiable additional cost and, secondly, since the cost-effectiveness was not evaluated it often contained elements which did not add value to the customer.

Rhetorically, the question was asked; what is customer service? The list of customer service items was argued to be extensive and to cover at least (Gattorna and Walters, 1996);

- Frequency of delivery
- Order cycle time
- Reliability of delivery
- Flexibility in replenishment
- Order fulfillment accuracy
- Accuracy of documentation
- Conformance of documentation to organizational requirement
- Continuity of supply
- Advice on supply problems
- Quality of company sales, technical and service representation

Gattorna and Walters (1996) therefore argued that customers should be segmented based on their service expectations, each segment's logics should be understood and a customer service response should be developed around those logics.

Gattorna (1998) presented the strategic alignment model connected to supply chain in 1998, see Figure 21.

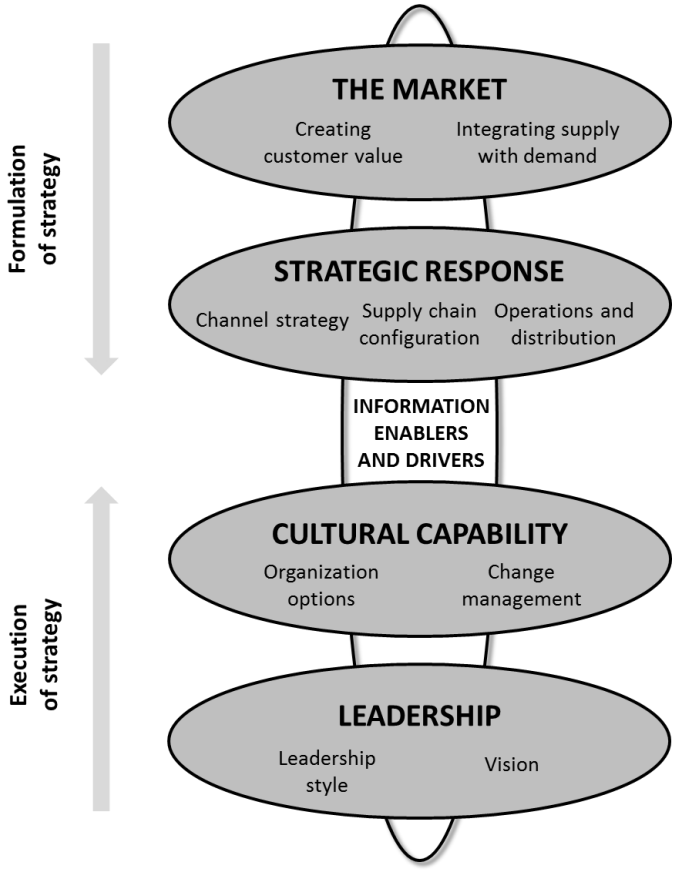

Figure 21: The Strategic Alignment Model, adapted from Gattorna (1998, p. 5).

Gattorna's model summarizes the market driven segmentation approach; the starting point is the market and the customer expectations or logics. After this the strategic supply chain response is developed around the customer segment logics. The execution of the strategy then depends on the cultural capability and the leader ship style to incorporate all aspects of the alignment model.

3.5. Suggested approaches and frameworks from research case studies

The two different approaches to supply chain segmentation that have been described in previous chapters, i.e. the product based and the market based, certainly have their roots in different theoretical approaches. But how are these different approaches manifested once applied to actual companies in research case studies and examples?

3.5.1. Example from the product driven approach

The case study upon which several of the researches of the product driven approach have based their conclusions is that of a lighting company in the UK. Before the segmentation implementation the company's organization and management of internal and external supply chains was based on a functional approach (Childerhouse et al., 2002). All manufacturing was MRP-driven and the push principle was used throughout the supply chain. There was no differentiation between high and low volume products or differentiation depending on the irregularity of demand (Childerhouse et al., 2002).

Childerhouse et al. (2002) started by presenting an integrated framework for the development of focused demand chains, see Figure 22 below.

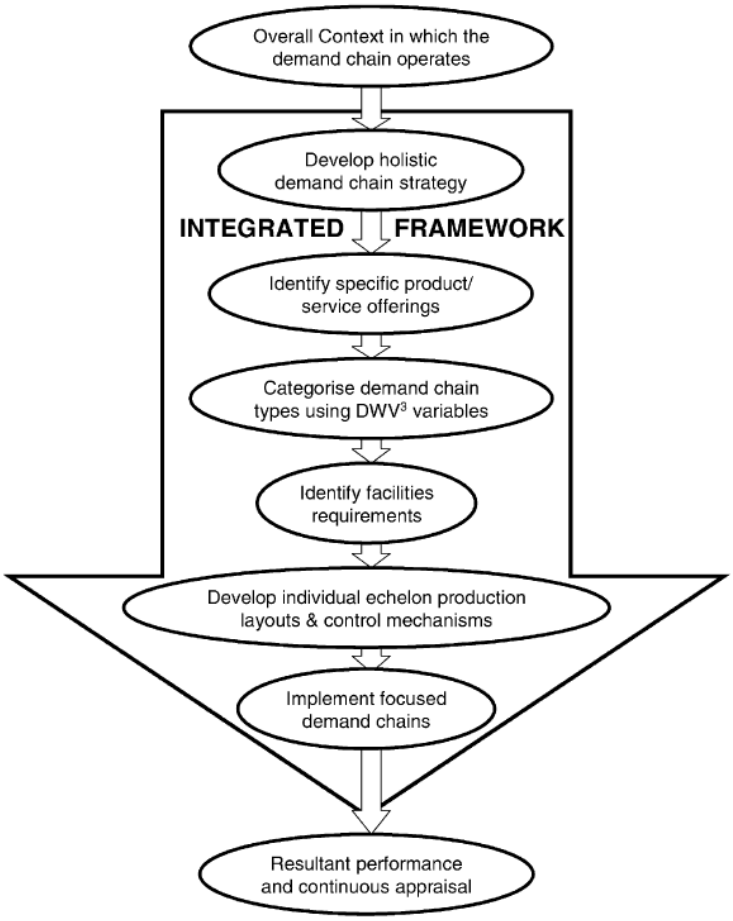

Figure 22: Integrated framework for the development of focused demand chains (Childerhouse et al., 2002, p. 677).

The framework has several different steps and is argued to start with the overall context. However, the case study played out somewhat differently. The starting point of the lighting company's segmentation was the realization that the existing product portfolio should be categorized and the supply chains designed in a way which would maximize competitiveness in each category (Childerhouse et al., 2002). The DWV^3 criteria, sequenced by the company product champion and senior management, were then used to segment the products, see Figure 23 (Childerhouse et al., 2002).

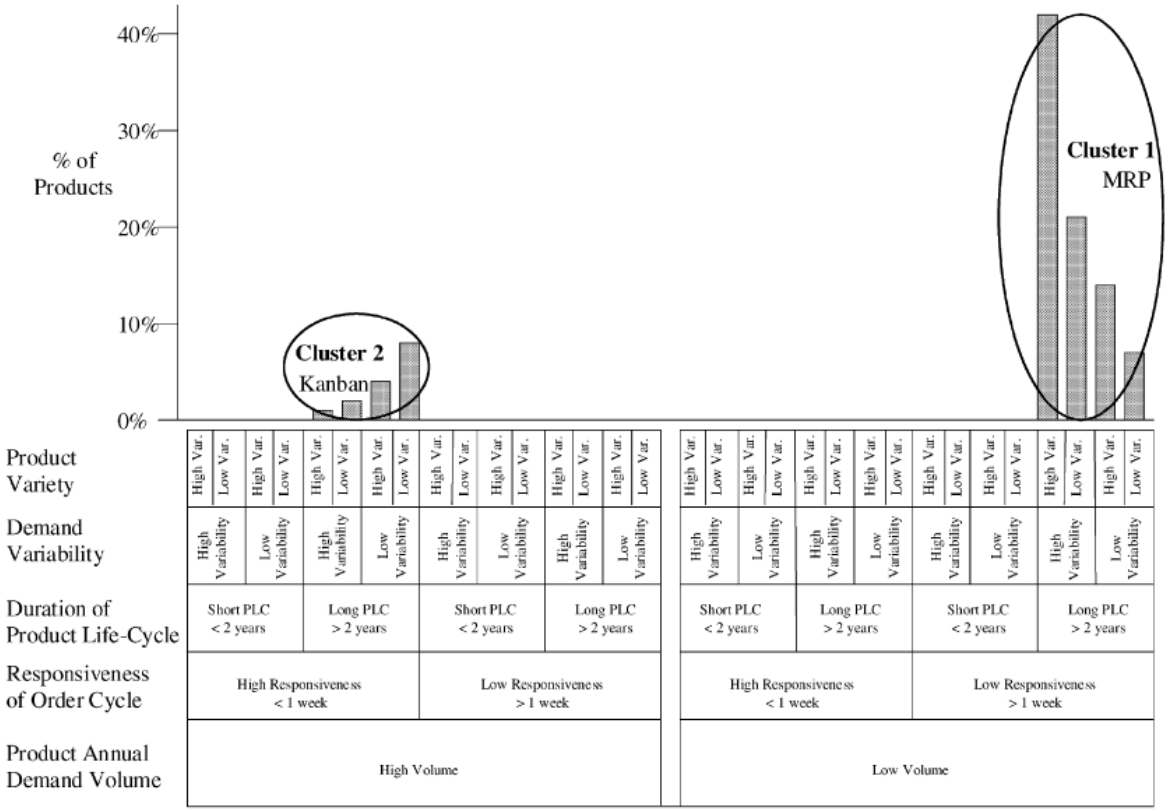

Figure 23: The first classification of the lighting case studies products (Childerhouse et al., 2002, p. 681).

Two distinguished clusters were identified, predominantly differentiated on volume and time window for delivery, i.e. how responsive the order cycle must be. A short time window for delivery was determined to mean that the responsiveness of the order cycle needed to be less than one week. A specific differentiating number of 2 years was also determined for the duration of the product life cycle. The different segments had different order winning and order qualifying characteristics. For the high volume segment the order winner was cost and for the low volume it was service level (or availability). Seeing as the high volume segment mostly had stable demand patterns, the approach was to use lean principles and kanban steering. In the low volume segment the demand was more unpredictable and the MRP steering continued (Childerhouse et al., 2002).

A couple of years later the process was re-conducted, and it was then possible to start at the beginning of the integrated framework. Since the competitive environment had changed, the DWV^3 criteria were sequenced in another order four different segments could be identified, see Figure 24 below.

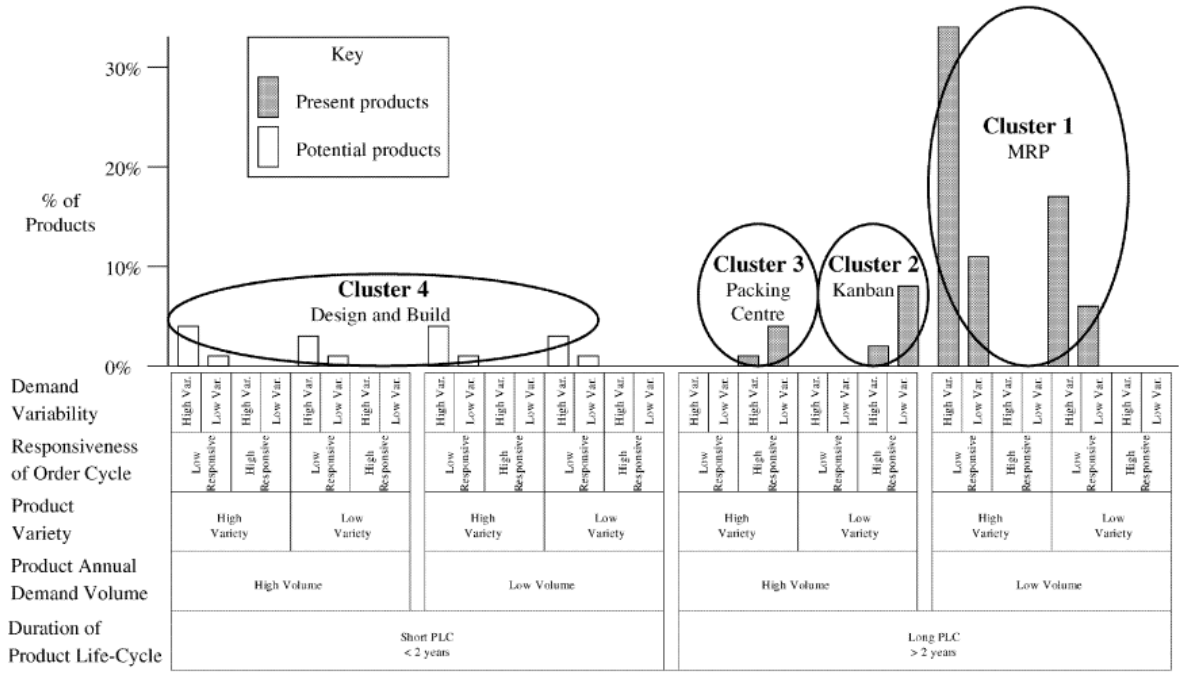

Figure 24: The second classification of the lighting case studies products (Childerhouse et al., 2002, p. 683).

Different supply chain strategies were used in the different segments and supply chains were built to utilize these. It is argued that since the order winners and order qualifiers change over time, product can be rerouted into an appropriate supply chain (Childerhouse et al., 2002).

3.5.2. Examples from the market driven approach

Gattorna et al. (1991) do not give as specific descriptions of the cases in which the alignment theory have been used as the case of the lighting company. However, in one example provided, two customer groups were identified, depending on whether the products asked for were undifferentiated, no value-added, high-volume products with low prices requiring quick delivery and arm's length relationship between buyer and seller or highly differentiated, value-added, custom-engineered products requiring higher levels of service and quality and hence closer relationships within the supply chain (Gattorna et al., 2012). It is practically impossible to not, at this stage, discern the parallels to Fisher's functional and innovative products. However, as the alignment theory does not focus on classifying products, Gattorna et al. (1991) do not mention the products' demand patterns as a segmentation criterion. The two customer groups rendered by separating the products are described using the logics proposed in the alignment theory, determining that the first segment should be aligned according to the logics of production and administration, with an emphasis on the production, and the other according to development and integration, with an emphasis on development. Following the segmentation, a restructuring of the specific company into two business units was conducted, and alignment within the BUs according to the logics above was strived for (Gattorna et al., 1991). This example shows that Gattorna et al. (1991) often think that segmentation must be followed by a structural change.

Another approach suggested was to look solely at the demand patterns. Firstly, it was acknowledged that for companies with a wide range of merchandise the first step would be to separate product groups according to their different logics and the predictability of their demand patterns. The products with easily predictable and even demand patterns were separated from those with more volatile demand and

the connected logics should be identified. However, it was argued, that the next step would be to take the products with more volatile or unpredictable demand and plot it over time. It was argued that this, for many products, would show that some part of the demand could still be predicted and that seasonal waves and sudden surges also could be identified. Gattorna et al. (1991) state that in order to reduce the complexity of managing the supply chain of such a product three pathways within the pathway should be created and the strategy for each pathway aligned in accordance with the connected logics. This will allow the focal company to manage the products from suppliers to customers via separate pathways (Gattorna et al., 1991), see Figure 25 below.

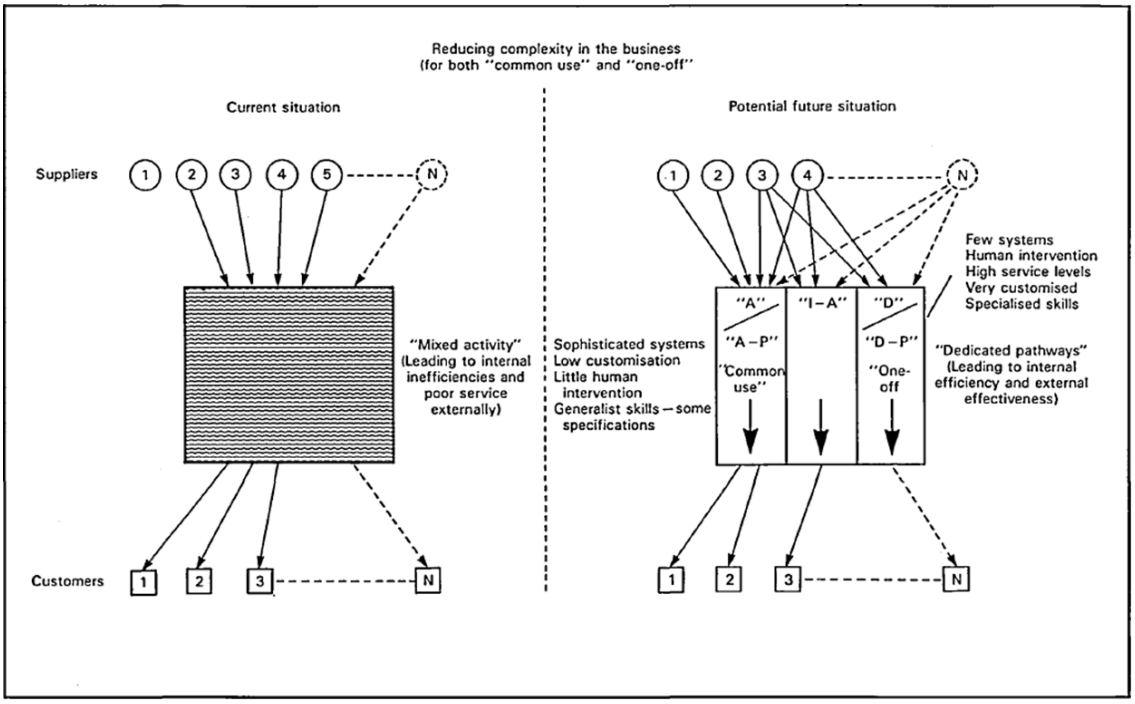

Figure 25: Reducing complexity in the business (Gattorna et al., 1991, p. 10).

3.5.3. Example from a combination of the product and the market driven approach

In one of the most recent cases that have been given, Godsell et al. (2011) argue that there is a way to combine the product driven and the market driven approach. The starting point is argued to be the customer, in accordance with the views of the market driven approach. The first step would then be to analyze customer requirements and the second to segment customers based on common groupings of order winners and order qualifiers. The third is argued to be to understand the strategic response required from the supply chain to meet customer segments and the fourth to develop a supply chain strategy aligned to meet the requirements of the customer segments (Godsell et al., 2011). The process is visualized in Figure 26 below.

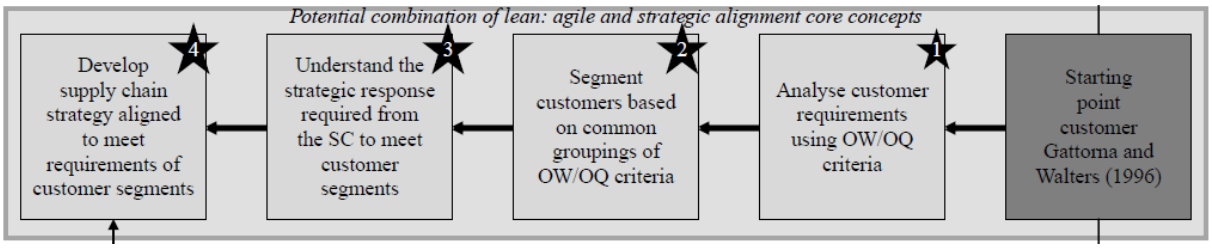

Figure 26: Framework for combining the product driven and market driven segmentation approach (Godsell et al., 2011, p. 302).

Once this model was going to be applied to segment the supply chain strategy for a fast moving consumer goods company, all senior managers of the company agreed that the customer had to be the starting point. However, the second step in the model would mean conducting a qualitative analysis in order to identify the order winners and order qualifiers to enable the segmentation of the market. None of the managers thought this was a good idea, since conducting the analysis would mean spending much time and money and it was believed that the analysis would only show what was already known; that the customers wanted the full range of products in the warehouse with high availability at time right time and price. All managers found this hard to manage, since the demand patterns for some markets were highly unpredictable. It was determined that the best way forward was to analyze the demand pattern with the DWV^3 variables. Volume and variability were the only two variables considered to be of importance for the demand profiling exercise. The analysis made was to plot the volume of each SKU as a percentage of the total volume against the variability for that particular SKU (Godsell et al., 2011). The results can be found in Figure 27 below.

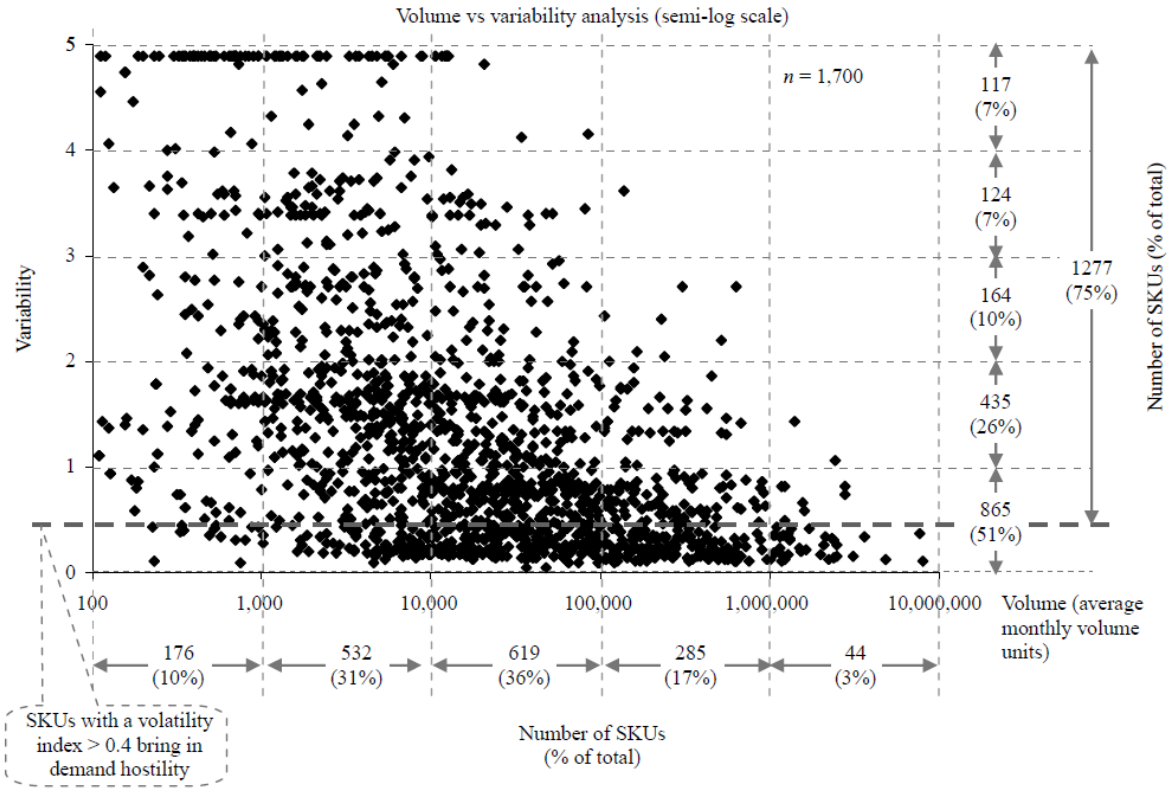

Figure 27: Volume:variability analysis for Western Europe (Godsell et al., 2011, p. 307).

It was determined that 30 percent of the SKUs should be routed through an agile supply chain whereas 70 percent should be routed through a lean. A filter was applied to the plot above so that all SKUs

with a low volume and high variability would need to pass a certain margin in order not to be taken out of the range (Godsell et al., 2011).

3.5.4. Conclusions regarding the examples

To conclude the Suggested frameworks and research case studies section, it can easily be argued that there is not much difference between the product based, the market based and the Godsell's et al. (2011) combined approach when it comes to actually implementing the theories, seeing as both Gattorna et al. (1991) and Godsell et al. (2011) use the demand pattern to identify segments and that both Childerhouse et al. (2002) and Godsell et al. (2011) use the DWV^3 variables. The biggest differences that can be seen are that Gattorna et al. (1991) do not explicitly use any criteria framework to come up with the segmentation and that once implementing the supply chain strategies Gattorna et al. (1991) usually change the structure of the company to fit the segments. The examples by Gattorna et al. (1991) could also be argued to be a bit less structured than the others. Apart from these differences the actual implementation of the segmented supply chain strategies rendered by the different approaches do not differ to any significant extent.

3.6. Enablers for the execution of a segmented supply chain strategy

Something that could be argued to be of significant importance for a successful execution of the segmented supply chain strategy rendered by either of the approaches or frameworks above are a company's knowledge and possession of the right tools and capabilities, i.e. the key enablers. The entire implementation phase will not be covered as it is outside the scope and demarcation of this research project, but prerequisites and key enablers for the execution will be investigated from different angles in the following sections.

But first of all, it should be noted that research literature covering prerequisites and enablers for supply chain segmentation is certainly not as extensive as the literature regarding segmentation of the strategy. However, several consultancy firms describe the same or at least very similar enablers, something which would indicate that there are common enabling patterns when implementing the segmented approach in practice. It is also important to note, that most of these enablers and prerequisites match well with those found in papers covering enablers for supply chain management. Secondly, in the search of key enablers and prerequisites, it is useful to also investigate barriers/inhibitors to the implementation of supply chain segmentation, since a barrier/inhibitor, once overcome, can act as an enabler or a prerequisite.

3.6.1. Enablers and inhibitors from segmentation research

One of the few research articles actually covering the area in the context of supply chain segmentation discusses enablers and inhibitors to why market understanding does or does not drive supply chain strategy (Godsell et al., 2006). Three major enablers/inhibitors were identified, the first one being "management" of the supply chain. The reason behind the quotation marks is that Godsell et al. (2006) found that most companies actually do not succeed with the management aspect of supply chains. Within this major enabler/inhibitor two smaller inhibitors can be found;

- Difficulty in focal firms to find an appropriate mechanism to manage the supply chain
- Internal functional divides complicate supply chain management further

The functional divides are argued to often be reflected in the organizational structure, but Godsell et

al. also found them in companies organized differently, but to a lower extent. The divides were further argued to be exacerbated in organizations that did not have broad spanning supply chain role at board level and that the norm still is to have functional logistical representation at board level (Godsell et al., 2006).

The second major inhibitor identified regards the concept of alignment. It is argued that there are three types of process alignment which impact the supply chain;

- Alignment of SCOR activities in the demand fulfillment process
- Alignment between the demand fulfillment and demand creation processes
- Alignment between the demand fulfillment and new product introduction processes

Godsell et al. (2006) state that issues with internal supply chain management, especially those connected to the functional dimension of organizational structures, can make it difficult to align the SCOR processes in the supply chain. Having a cross-boundary spanning planning function is considered to be an enabler of alignment, as well as producing products in a make-to-order environment. If using a fourth-party logistics provider (4PL) to help manage the supply chain, a major inhibitor to successful supply chain segmentation is to allow the 4PL to manage only a limited number of supply chain activities. The reason for this is usually that the focal company wants to remain in control, but it inhibits the gains of supply chain segmentation (Godsell et al., 2006).

The third major inhibitor was found to be connected to the inconsistent use of performance measurements throughout the segments. Measurements that do not focus on aligning the goals of a segment will lead to sub-optimizations (Godsell et al., 2006).

In the report Free Thriving in a Turbulent World: The Power of Supply Chain Segmentation, Godsell (2013) turns with explicit advice to executives on how to succeed with supply chain segmentation. Five specific enablers, that according to Godsell's experience accelerate implementation, are summarized;

- Board ownership: the initiative should not be presented and seen as a supply chain initiative but as a part of the broader business strategy. Ownership has to reside with the board.
- One owner of demand and supply planning: tensions between the commercial and supply chain teams of an organization are common and often costly. A planning function incorporating all planning can help reduce tension.
- Clear benefits to the individuals: to make the individuals understand that segmentation will reduce complexity and workload once implemented.
- Simple communication: keep communication simple so that employees in all company functions can understand the issues and the need to take a segmented approach.
- In-house data analytics capabilities: to analyze the segmentation criteria chosen and to monitor them over time to recognize important changes is necessary to facilitate the implementation and to see and respond to changes in a timely manner.

Apart from the five enablers mentioned above, Godsell (2013) also points out that since the implementation of supply chain segmentation to some extent always involves change, the initiative must be underpinned by all principles of change management. The need to keep the segmentation approach simple is also highlighted, since the complexity could otherwise be viewed as an obstacle to getting started (Godsell, 2013).

Aitken et al. (2005) also mention an enabler, although it is not really an enabler for supply chain segmentation but for agile supply. It is argued that lead time reduction and substitution of information for inventory are particularly important areas once the variability is high. It is further argued that such an "information enriched" supply chain, capturing information on demand as close as possible to the market, is a key enabler in agile supply (Aitken et al., 2005).

3.6.2. Barriers and bridges to supply chain management

Several of the supply chain segmentation enablers/inhibitors identified by the different authors presented above are also found in literature covering the area of supply chain management. Fawcett et al. (2008) summarized, analyzed and discussed the barriers and bridges to effective supply chain management presented in Table 4 below in their extensive literature review of supply chain management literature. Note that the barriers and bridges in Table 4 are not interconnected, i.e. the bridge following the barrier is not connected to that specific barrier (Fawcett et al., 2008).

Table 4: Barriers and bridges to effective supply chain management (Fawcett et al., 2008).

Barriers	**Bridges**
Lack of top management support	Alignment mechanisms
Non-aligned strategic and operating philosophies	Cross-functional process change
Inability/unwillingness to share information	Performance measurement
Inflexible organizational systems and processes	Information systems
Cross-functional conflicts	People empowerment
Resistance to change	Collaboration
Lack of training for new mindsets and skills	Process documentation and ownership
Inadequate or incompatible information systems	Open information sharing
Non-aligned performance measures	Cross-trained experienced managers
Managerial complexity	Education and training
Inconsistent operating goals	Chain advisory councils
Difficulty to measure customer demand	Steering committees
Lack of a clear vision for supply chain management	
Resource constraints	

3.6.3. Enablers from consultancies

Once reviewing the enablers and inhibitors identified for practical experience by some of the larger consultancy firms working with supply chain segmentation the need for senior management support became even more pronounced;

McKinsey: *"…a hands-on effort by the CEO and others across the C-suite is needed for success."* (Malik et al., 2011)

EY: *"…senior sponsorship is an absolute requisite for successful supply chain segmentation"* (EY, 2012, p. 6)

Furthermore, EY states that senior sponsorship is not enough and mentions process support from a cross-functional team, information technology infrastructure, real ownership of segments, segment strategies driven by performance metrics closely integrated with company goals and a clear end-to-end view as enablers for supply chain segmentation (EY, 2012). They also point out the need to combine the performance metrics with a model for governance structure (EY, 2012). McKinsey especially

indicates the need for internal collaboration and information sharing between business units as necessary for successful segmentation (Malik et al., 2011). E2Open points towards real-time insight and visibility as particularly important and suggests setting up networks where suppliers, the focal company and customers can share information (Becks, 2012).

When summarizing the different enablers, bridges, barriers and inhibitors found in segmentation literature, supply chain management literature and management consultancy reports they can be divided into six categories;

- Organizational and managerial enablers
- Performance measurement and communication enablers
- IT infrastructure enablers
- Cross-functional alignment enablers
- Responsibility allocation enablers
- Skills enablers

Examples connected to each enabler grouping can be found in Figure 28 below.

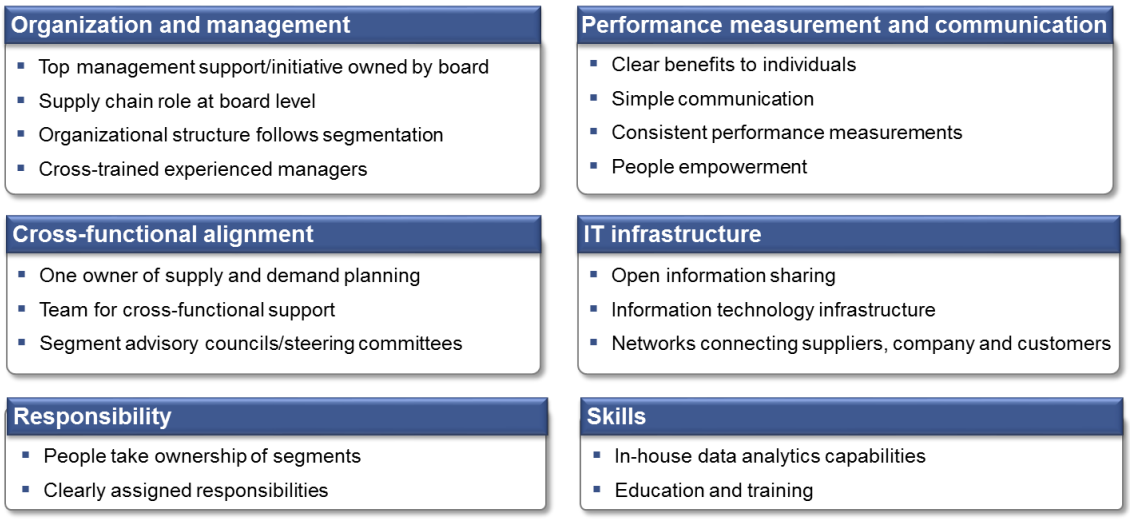

Figure 28: Enabler groupings with examples.

It should be noted that there are interdependencies between some of the enabler groups and that it therefore could be argued that some of the examples in a specific enabler group in Figure 28 should belong to another enabler group. However, some summary was deemed necessary. Furthermore, several of the enabler groupings in Figure 28 above are important parts of change management, hence change management is considered more of a prerequisite and therefore was not included in figure. Also, keeping the segmentation approach simple is not included in the enabler groupings but is seen as an important aspect of defining the segmentation before the execution.

4. FINDINGS

This chapter introduces the findings of the interview study, starting with an overview to provide structural guidance to the reader. Findings regarding the concept of supply chain segmentation are then presented, followed by findings directly connected to the research questions, i.e. findings on supply chain segmentation criteria, frameworks and approaches for supply chain segmentation and enablers for supply chain segmentation.

4.1. Overview of findings

This chapter is structured into four major areas;

- The supply chain segmentation concept
- Supply chain segmentation criteria
- Supply chain segmentation frameworks and approaches
- Supply chain segmentation enablers

Furthermore, each area is divided into a number of sub-areas, which in turn hold a varying number of findings. The chapter ends with a section with further reflections. Table 5 below shows the major areas, the sub-areas and the number of findings in each area.

Table 5: Strucutral overview of study findings.

Major area	**Sub-area**	**Findings**
The supply chain segmentation concept	The customer as the starting point	1
	The definition of the supply chain segmentation concept	2.1, 2.2
Supply chain segmentation criteria	Standard and special products	3, 4
	General opinions connected to criteria	5, 6
	Other empirical criteria and constraints	7
	Industry specific criteria and constraints	8, 9
Supply chain segmentation frameworks and approaches	Descriptions of practical approaches	Five approach descriptions
	Approach findings	10, 11, 12, 13, 14, 15
Supply chain segmentation enablers	IT infrastructure	16
	Organization and management	17
	Performance measurement	18
	Communication	19
	Cross-functional alignment	20
	Holistic perspective	21
	Governance structure and responsibility	22
	Additional enablers found	23
Further reflections		24

4.2. The supply chain segmentation concept

4.2.1. The customer as the starting point

The matter on which the interviewees expressed the most unanimous opinion was the starting point for segmentation of the supply chain. All interviewees emphasized the importance of the customer as the starting point. Examples of specific quotes used were:

"If you are going to build something, I think it is the customer, the customer and the customer that should be at the center."
Executive

"It is the customers' requirements and demand that steer the supply chain, which really is quite obvious. However, that is often not the case."
Senior manager

"It is the customers' needs that are the driver."
Senior manager

"There are many aspects to take into account, but it is important that the customer is the starting point."
Executive

"You have to segment your supply chain based upon which customer service and value it should deliver."
Executive

"Any other segmentation people talk about would be more driven by politics, power or organizational conflict."
Senior manager

The very last quote was said in the context of what would drive the supply chain segmentation if it was not for the customer. However, some interviewees did also indicate that the customers must somehow be combined with the products in order for a segmentation to actually be possible;

"You have to put the customers and the products together otherwise it does not make sense."
Manager

It was also obvious from the description of the supply chain segmentation approaches given by the companies having conducted a segmentation that even if the needs of the customers were the most important, on some level these must be combined with the product.

Finding 1:
The starting point of supply chain segmentation is the customers but they must be put in relation to the company's products.

4.2.2. The definition of the supply chain segmentation concept

Some interviewees had a clear picture of what they argued should be the interpretation of the supply chain segmentation concept while others could not spontaneously put their interpretations of the topic into a specific definition. The interviewees having a clearer picture provided descriptions such as:

"The concept has to be concerned with some kind of division of the customer categories that you are planning to serve. You have to look at the entire scope and then decide which customers you want to serve. What are their similarities? What are their differences? What do they value and how can we satisfy them? How can we focus our supply chain activities in such a way that we can have a similar way of working towards some of these customer segments and a somewhat different way of working towards others?"
Executive

"Some people simply say different supply chains. I think it is the same thing whatever word you use. It is all about defining and structuring the supply chain in a way to serve a specific customer segment."
Senior manager

"Earlier we have been very focused on "one size fits all". But the business is telling us that this doesn't work anymore."
Manager

"If companies don't segment their supply chains appropriately and they try to run everything in the same way then they will always get an average result. And an average result is not an excellent or a differentiated result so if you want to really be on the cutting edge of the very best supply chain you do need to define how it is going to work and how one segment differs from the other supply chains you are running."
Senior manager

The quotes above show the general spirit of many of the interviewees, i.e. that supply chain segmentation is concerned with moving away from the "one size fits all" perspective to the "one size does not fit all" perspective. This perspective is mirrored by picture number 5 in the slide package (see Appendix 2), which was shown to the interviewees after giving them a chance to express their own opinions. The picture is depicted in Figure 29 below.

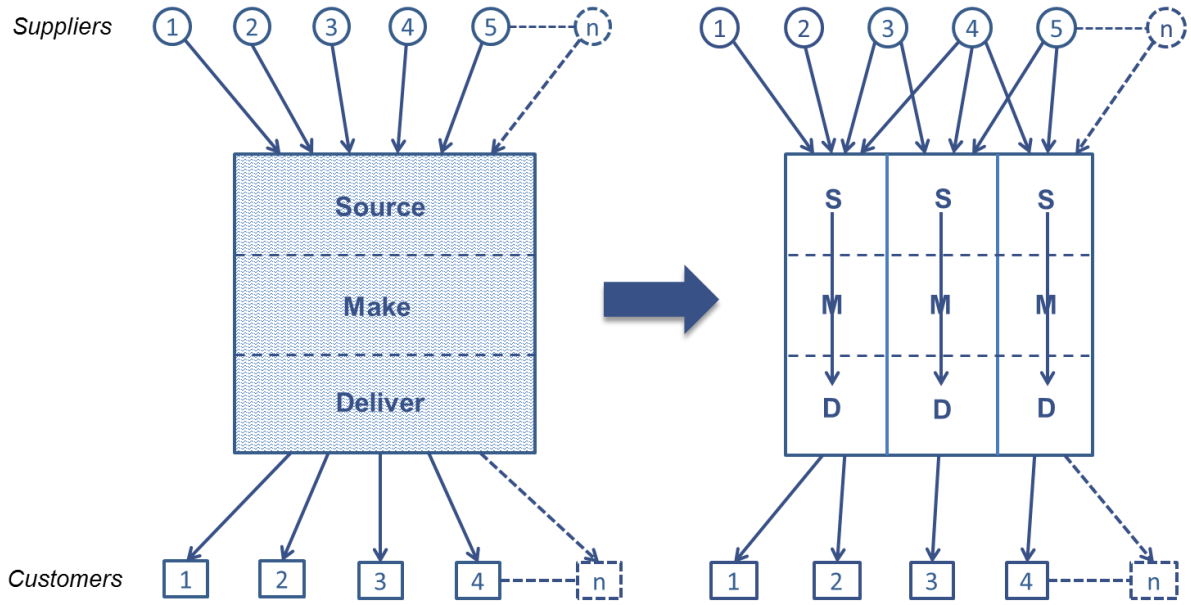

Figure 29: The supply chain segmentation concept – one size does not fit all (inspired by Gattorna et al., 1991, p. 10).

The showing of this picture along with an explanation of the likes of the quotes above mostly resulted in quiet acceptance from the interviewees. It also rendered more verbal recognition as well as more verbal concern.

"The depicted principle here is good, I think it is right. I mean the idea of segmentation is to do what this picture shows, to break up the supply chain into different elements and meaningful chunks that are defined in their delivery and performance requirements and then adjust the processes and functionality accordingly. The only thing is that… I think that the principle is right, I just do not think that it is so simple."
Senior manager

If the concern of this interviewee was that the picture generalized and over-simplified the concept of supply chain segmentation another interviewee was concerned with the entire principle depicted. The point of this interviewee's argument was that if segmenting the supply chain into even more segments than at present, the supply chain as a whole would go completely out of control. Another interviewee expressed similar opinions. The common denominators for these interviewees were that they came from company situations which for one reason or another were characterized by strong decentralization (historically or at present) and that they had a high enough hierarchical position to find the decentralization challenging (the interviewees at site level in strongly decentralized companies did not voice these kind of opinions at all).

The logics behind these opinions are not very difficult to understand; if a company and the supply chains therein have been characterized by a strong level of decentralization, it is only logical that the big blue arrow in Figure 29 should rather point to the left than to the right, in order to facilitate the creating of synergies within functions. These companies could be argued to currently employ an overall supply chain strategy of "one size does *certainly* not fit all", a case in which the creation of more supply chain segments seems meaningless and the main focus of supply chain segmentation is the consolidation of segments. In this sense, the opinions of the interviewees regarding the general idea behind supply chain segmentation falls into either one or the other of the following two categories;

- The concern of supply chain segmentation is shifting from a general supply chain thinking of "one size fits all" to "one size does not fit all", i.e. to segment the supply chain
- The concern of supply chain segmentation is shifting from a general supply chain thinking of "one size does *certainly* not fit all" to "one size does not fit all", i.e. to consolidate supply chain segments which are currently fragmented

The general ideas are visualized in Figure 30 below, where the first bullet point mentioned above is depicted in the left hand side of the picture and the second in the right hand side of the picture.

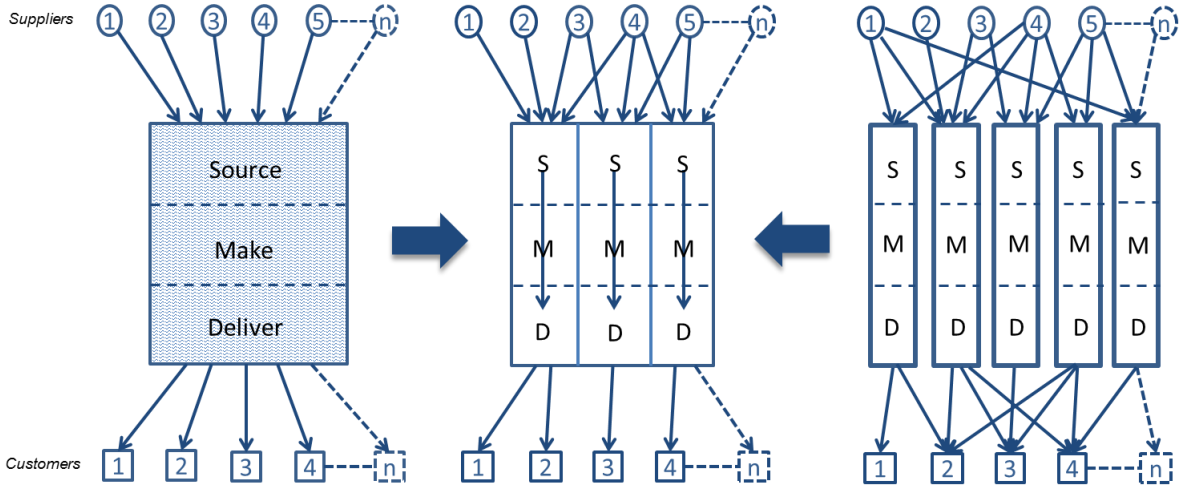

Figure 30: The two opposing views of the supply chain segmentation concept (partly inspired by Gattorna et al., 1991, p. 10).

It was evident during the interviews that the two opposing views of the supply chain segmentation concept were connected either to too strong functional focus, or to too little functional focus within the organizations. What all interviewees did agree on was that the starting point of segmentation should be the customer, which leads up to the second finding;

Finding 2.1:

Supply chain segmentation is concerned with balancing two dimensions; the horizontal functional synergy dimension and the vertical supply chain customer differentiation dimension. Where the horizontal functional synergy dimension represents the need for cross-segment functional collaboration (i.e. collaboration within/between a company's sourcing department(s), within/between the manufacturing sites and within/between delivery/logistics department(s)) and the vertical supply chain customer differentiation dimension represents the need for differentiating each segment according to needs of the customer (i.e. differentiation of the entire segment – source, make, deliver – according to the customer needs). The horizontal functional synergy dimension is marked with an orange arrow in each function in Figure 31 below, and the vertical supply chain customer differentiation dimension is marked with green arrows.

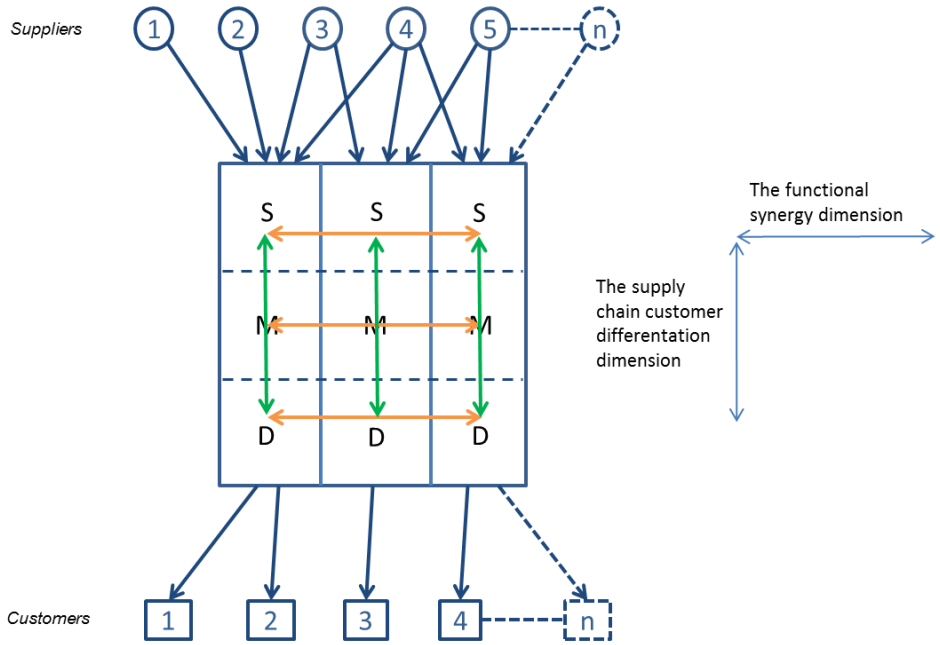

Figure 31: The two dimensions of supply chain segmentation (author).

Finding 2.2:

Depending on the level of supply chain centralization/decentralization one of the dimensions is especially important. The horizontal functional synergy dimension is more important if the general supply chain thinking has been "one size does *certainly* not fit all" and the vertical supply chain customer differentiation dimension is more important if the general supply chain thinking has been "one size does fit all".

4.3. Supply chain segmentation criteria

4.3.1. Standard and special products

Very mixed reactions were received once asking the interviewees about which criteria they considered appropriate to use to segment their supply chains. The companies that were in the middle of a supply chain segmentation initiative or that had some sort of process for it usually had no problems immediately answering or finding criteria, while some did not really seem to understand the question. Once presented with the ideas of some of the research cases done on segmentation and the criteria that research suggests, several interviewees mentioned that there was a difference between standard and special products. When digging deeper into what the interviewees meant by standard, the explanation usually contained elements such as high volume, bulk, forecasts, make-to-stock, make-to-forecast, short lead times and high availability. Some interviewees mentioned this difference as part of an example of an experience from another industry, usually connected to the production of goods for a consumer market. One interviewee, who had plenty of previous experience from supply chain segmentation from a consultancy firm, also explicitly expressed that supply chain segmentation usually is better suited in consumer goods industries;

"I must also say that the major application for this is consumer goods."
Senior manager

Once faced with the list of criteria in picture 7 in the slide package (see Appendix 2) two interviewees made the remark that several of the criteria in the list seemed to be very consumer goods-focused and to not really be applicable to the same extent in more industrial settings.

However, at the same time as some interviewees were expressing doubts about to which extent supply chain segmentation is as appropriate in other types of industries as it is in the fast moving consumer goods industry, there were also interviewees expressing opinions pointing in the other direction;

"To put it specifically to our company supply chain segmentation is a really relevant topic."
Senior manager

"Even though it has not been called segmentation this is a very, very hot topic for us."
Executive

Finding 3:
Most interviewees acknowledge the difference between standard and customer-specific/non-standard/special products.

Finding 4:
There are opposing opinions regarding whether supply chain segmentation is as applicable in the manufacturing industry as it is in the fast-moving consumer goods industry.

4.3.2. General opinions connected to criteria

Once the interviewees had been given the chance to express their opinions and thoughts regarding criteria for supply chain segmentation picture 7 in the slide package (see Appendix 2) was shown and the criteria therein explained. Some interesting reactions were received; some interviewees expressed that they found the approach of identifying segments through criteria selection a well-structured one, and one interviewee found the idea of basing the entire segmentation on specific criteria far too mechanical to actually work in practice. No matter if the general feeling of the interviewee towards using criteria to conduct supply chain segmentation was positive or negative it was obvious that the interviewees found it difficult to determine which criteria were more important than others;

"To me, the number of criteria is actually much fewer than these, but the others are parameters which are added on top of the criteria and affect our supply chain solutions somehow."
Senior manager

"It is important that I am basing this on how we have been segmenting, because all of these criteria are relevant."
Senior manager

"I don't always see these criteria as criteria for segmenting this way or that. They are however parameters for how to go about it when you actually start."
Senior manager

While the list in picture 7 in the slide package is rather long, it was obvious from the reactions of several interviewees that it was necessary to try to keep the number of criteria down for simplicity reasons.

"You really should not add more criteria to this list."
Executive

Finding 5:

The interviewees had very differing opinions regarding the concept of choosing a specific number of criteria based upon which the supply chain should later on be segmented and many of the interviewees expressed that they had done some sort of supply chain differentiation or segmentation but had not really used explicit criteria in order to conduct this segmentation.

At the same time as some interviewees found choosing specific criteria challenging or impractical, most interviewees started to elaborate their thoughts about that the customer is the starting point into the context of criteria. As one interviewee put it;

"The only thing that I would actually use over and over again would be the customer requirements and the customer demand."
Senior manager

It is also clear from all of the approaches described further below (see sub-chapter 4.3.1. Descriptions of practical approaches), that it is customer requirements or customer demand patterns which are the common denominators for all of the approaches. This leads up to an elaboration of the very first finding:

Finding 6:

The customer, or more specifically, the customer requirements and/or the customer demand patterns are the starting point for supply chain segmentation.

4.3.3. Other empirical criteria and constraints

One of the reasons behind the concern of using criteria to segment the supply chain was that there are so many different factors affecting the supply chain and influencing the different solutions. Many interviewees did, unsurprisingly, mention criteria or constraints that were of a more empirical nature than some of the criteria suggested by researchers. Five interviewees mentioned laws and legislation as one of the more obvious conditions for how to identify certain supply chain segments. Comments such as the one below were dropped;

"Legislation is a really important part of this kind of analysis."
Executive

One interviewee remarked that a supply chain segmentation based upon laws and rules is more of a passive segmentation that has to be made if you want to sell your products to certain industries, as for example the nuclear industry.

Several interviewees did also stress that some sort of geographical criterion or delimitation was necessary to use either in combination with other criteria or before conducting an analysis based on other criteria. To quote one interviewee regarding the necessity to geographically segment markets before being able to find patterns in the customer requirements;

"You could perhaps talk about this on a regional level, with southern Europe, northern Europe, and south east Asia outside of China as delimitations. If you split it up geographically you can find similarities but you have to make some kind of geographical delimitation on top of it. It could very well mean that we only need two models in the end. But I think the analysis must be conducted in a geographically segmented way."
Executive

Yet another constraint or criterion mentioned by several interviewees was that of production technology and production bottlenecks.

"The physical material flow is only one dimension of a supply chain but in there you would probably find the clearest example of a constraint which is production technology and manufacturing bottlenecks. If there is only one factory in the world where we can do things, this forces us to manage the constrained resource and that we need to do in a coordinated way. This could be the major constraint in the entire supply chain. This is what you should build up your entire segmentation around. But that is more from a technical or physical point of view."
Senior manager

A criterion mentioned by one interviewee as an example of an experience from an earlier employment was product size. The company that was referred to was simply forced to manage one segment of products differently from the others because the products were so big.

Finding 7:
There are several constraints or criteria that are of a more empirical nature which affect the segmentation of the supply chain, and four of them are legislative criteria, geographical criteria, production technology constraints and product size.

4.3.4. Industry-specific criteria and constraints

While patterns were not immediately discernible during the data collection, the clustering of companies from similar industries in the data reduction phase made pattern detection easier. Several of the interviewees coming from the heavy machinery-producing industry emphasized that a segmentation based on the nature of the demand was necessary;

"How the customer demand is varying is actually the main criterion to why we segmented X from Y."
Senior manager

Whether or not a segmentation based on this criterion had actually been implemented in the heavy machinery-producing companies differed. In one case this segmentation had been part of the company organization for a long time. In another it had recently been implemented and in yet another it had not been implemented to the same extent, but no matter if the segmentation had actually been conducted or not, the criterion demand variability was always considered important. To quote what one interviewee said regarding demand variability;

"That is really what drives our supply chain today – we call it end-customer demand-driven supply chain – that is; it is the customer demand which drives the supply chain."
Senior manager

Finding 8:
In heavy machinery-producing industry the criterion demand variability is especially important.

All interviewees of process industries particularly emphasized that manufacturing in process industries is special.

"We are a process industry so our machines really have to keep running. We are producing seven days a week, 24 hours per day. And process industry is really built to do so, a production stop costs a lot of money. It should always be kept running."
Manager

"What differentiates the large process industries from other industries is that it is not so easy for us to increase or decrease production. If we are running five shifts in our factories it is not possible to increase further. The cost of capital for starting another factory is gigantic."
Executive

Once asked for which other criteria and constraints that can influence supply chain segmentation apart from the criteria mentioned in research, the amount of capital tied up in production was mentioned only by interviewees from the process industry. One interviewee also mentioned that if there were not any constraints, the ideal situation would be to have one machine for each customer or each product in order for the customer requirements to penetrate further up the internal chain. Another indication pointing in the direction of process industries generally segmenting only in the distribution process is that all but one interviewee only focused on segmentation in the distribution during the interviews. One interviewee representing a company in the process industry did describe a segmentation of the manufacturing as well. However, even though the amount of capital tied up in production equipment in this company certainly was high, it was not as high as for many of the others.

No matter what it was clear that process industry companies focused segmentation to the distribution process;

"Where you can gain the most is not inside the factory but in the distribution from the factory."
Executive

Finding 9:
In process industries supply chain segmentation usually does not reach further back into a company's supply chain processes than the distribution and the reason for this is the high amount of capital tied up in production technology making it impossible to aim for anything else than lean strategies in the manufacturing.

4.4. Supply chain segmentation frameworks and approaches

While the interviews clearly showed that the customer should be the starting point of supply chain segmentation the actual practical approaches taken by the companies showed similarities as well as differences. This sub-chapter of findings is divided into two different parts; Descriptions of practical approaches and Approach findings. The first part contains short descriptions of the approaches taken by companies that had explicitly chosen certain criteria, or that had developed a process for segmentation. Approaches 1-4 are descriptions of different approaches taken by a single company whereas the fifth approach is not the approach of an individual company but a summary of similar approaches taken by different companies. The second part of the chapter, Approach findings, summarizes the findings across and within certain approaches.

4.4.1. Descriptions of practical approaches

Approach 1: The "nature of the demand" segmentation approach
The first approach to supply chain segmentation was described by a company having recently segmented its supply chain, after having realized that their current way of working with supply chain did no longer work;

"We used to run everything in the approximately same supply chain, with the same control and steering mechanisms. Even if the supply chain perhaps was not entirely the same from the start we

tried to steer and control it in same way. But we realized that it didn't work… So then we concluded that we had to segment and split the steering mechanisms. Of course, we were still going to use the same warehouses, buildings, logistics and shipping where possible, but we had to steer and control in a different way."
Senior manager

The reason to why the company had tried to steer the entire supply chain in the same way was explained with that another business area within the organization was previously considered to be outstanding in supply chain in general and all other business areas were benchmarked against that outstanding business area. It was stated that;

"If you look at supply chain from the perspective of efficiency I think that we, just as many others, thought that it was best to do it in an as similar manner as possible, which results in designing all warehouses and stock levels in the same way, using the same steering of the stock levels, running the production in the same way, conducting the shipping in the same way. Business area X has been considered to be outstanding in the group when it comes to supply chain. And what had they done? They had streamlined their organization and said that although we know we can lose some, we will run everything in the same way all the time. And that is most certainly appropriate for their part of the business."
Senior manager

However, it did become obvious to the persons in charge of supply chain that this did not work in the business area participating in this study. It was clear that one size did not fit all.

The main criterion upon which the segmentation in this company was based was the nature of the demand, implying considerations regarding variability, volume and geographical predictability of where the demand would occur.

"How the customer demand is varying is actually the main criterion to why we segmented X from Y… In this case demand variability means that there are two entirely different natures of the demand. For the consumables we know that once a specific machine is put into work then a certain amount of consumables will be consumed during a certain time period. But for the machines there is another kind of variability arising from completely unpredictable parameters."
Senior manager

This segmentation based on the demand variability criterion led the company to split the organizations behind the supply chains completely, i.e. the segmentation resulted in an organizational change. Another company in the study, also concerned with the production of heavy machinery (but for a completely different industry), was organized in the same way, and yet another was partly organized like that. The interviewee of the company organized in the exact same way did not reflect too much on the direct criteria behind this organizational divide, but simply concluded that the organizations were very different;

"We're talking about a completely different animal."
Senior manager

The segmentation resulted in the company running three completely different supply chains; one for the production of the actual machines, one for spare parts for the machines and one for consumables connected to the machines. The company's supply chain strategy is now argued to be demand driven and this drives all of the segments throughout the internal supply chain;

"We have probably shifted towards becoming a more segmented organization also in how we are approaching the customer. The organization is more streamlined throughout the segments; all the way from the customer to the persons meeting the customer, to the creators of forecasts that are sent on into the supply chain and then the supply chain is held together within the segment all the way back to the suppliers of raw materials."
Senior manager

Also within these over-arching segments some segmentation approaches have been conducted, an example from one of the segments is the streamlining and controlling of production in product families.

Approach 2: The customer segmentation approach
The second approach was described by a company where supply chain segmentation is one part of the overall company growth strategy and a major initiative. The supply chain segmentation process started with a discussion regarding which criteria to choose and the organization settled on three criteria, namely time, cost and service (or customization). The reason for choosing no more than three criteria was to keep it as simple as possible so that it would be easy to get the entire company and all employees to understand why and how the segmentation would be conducted. The three criteria were drawn as a triangle, see Figure 32 below, and all customers for a certain product were then positioned in the triangle according to their requirements, rendering customer clusters (customers 1, 2 and 3 in the figure below are simply a randomly plotted example).

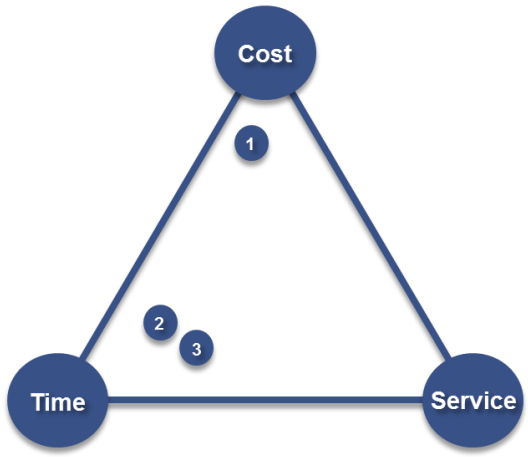

Figure 32: Criteria framework for customer clustering (Manager).

In order to determine which products to start with, data from some of the largest customers were gathered and analyzed by a specific department only created for and concerned with supply chain differentiation. Once a certain product has been chosen from the data analysis a cross-functional team consisting of representatives from sales, R&D and operations maps out the customers according to Figure 32 above. Then it is up to this group to determine which of a specific set of supply chain tools to use and adopt in the supply chains for this product. The tools are part of a toolbox, developed by looking at which type of solutions that were used in the company before starting the differentiation within the entire company. According to the interviewee it is up to the cross-functional group to decide which customers should be served and through how many different types of supply chains. The company is in the starting blocks for conducting this segmentation and has not yet determined which tools should end up in the toolbox. The aim right now is to develop the toolbox, to determine which products will undergo the differentiation analysis and to define the process in such a way that once a product is determined and the customers are positioned in the triangle, it will be obvious or at least

easy to know which tool/tools that are most appropriate for that pattern of customer clusters. If the customer requirements vary a lot for a certain product the cross-functional team will determine which customers to serve and if more than one supply chain strategy is necessary whether to actually set up a supply chain for these customers. The process is summarized in Figure 33 below.

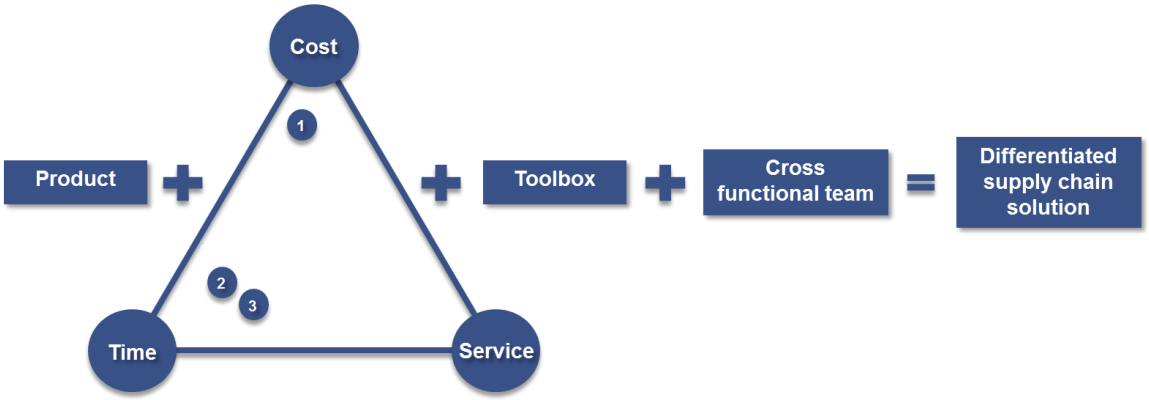

Figure 33: Summary of process for supply chain segmentation (Manager and author).

Approach 3: The industry/sub-industry/customer segmentation approach

The third approach was described by a company having recently started a segmentation and customer focus initiative. The decision to segment the supply chain was based on a top management decision dating some years back. The company is large and its products are sold to numerous companies in numerous industries worldwide. Because of this, the customer requirements and the demand patterns vary a lot from product to product. Therefore the company found that it would be difficult to easily determine which products have similar patterns, why a process was formulated and implemented for each product, starting on an industry level. If the customer requirements varied a lot within an industry, the process was conducted on a sub-industry level and if this was still not enough, the analysis was once again conducted on a customer specific level. The following process was adopted:

- Determine and define the customer needs and sales logics, i.e. the key selling points (sales department)
- Formulate the win strategy, i.e. how to win the customer order (sales department)
- Develop a demand chain strategy (distribution, manufacturing, purchasing) that realizes the key selling points

For the purchasing department the development of the demand chain strategy implies determining;

- The requirements that customer needs and sales logics put on the suppliers and the supply structure
- The purchasing capabilities needed in order to realize the key selling points

Each business unit's purchasing strategy is then determined through this process.

This process does, as well as the interviewee describing it, strongly emphasize that the supply chain must be built around the customer requirements, and that it is important that these requirements penetrate the internal supply chain all the way back to purchasing.

Approach 4: The site level product segmentation approach

The fourth approach was described by an interviewee working at site level in a decentralized organization. The site conducts process manufacturing, but in comparison to many of the other process industries in the study, the amount of capital tied up in production is rather low. Due to the

decentralization every site is free to establish individual supply chain solutions and on this site a product classification system had been developed.

However, the development of the classification system could be considered to be only one part of the site's segmentation initiative. The other part of the initiative is a major ongoing restructuring project, with the aim of making the site more efficient, more streamlined and more focused. This was needed as historically, for one reason or another, the business and production of the company's four business units had been mixed up a bit, rendering the site in question producing products actually belonging to a different business area. This created confusion and raised control issues;

"We had several machines which our business unit had to share with another, so a machine at our site was supposed to produce Product X for our business unit and Product Y for the other. This resulted in an ever-lasting conflict – which product should be prioritized? Which business unit is the most important? That was hopeless."
Manager

The big restructuring with moving machines between different sites was conducted to increase focus in operations and to give each business unit the possibility of doing what it does best, i.e. to produce a certain family of products. This newly gained focus within each business unit is considered by the interviewee to strongly aid the work with the product classification at site level.

The classification system is firstly based on whether or not the products are standard, and thereby made to forecast, or customer-specific, and thereby made to order. The second classification is conducted for the products which are made to forecast only, and implies classifying the products according to a classical ABC-classification where products representing more than 80% of the turnover are classified as A, products with more than 15% turnover are classified as B and the rest are classified as C. The products classified as D are customer-specific products for which there are a contract between the company and the customer, which enables them to be made to forecast even though they are customer-specific. The make-to-order products are classified as F. Products which are going to be phased out are classified as E and new products are classified as G for 6 months. At the end of the 6 month time period it is decided if the product is going to be part of the company's offering or not (which in turn depends on the product's profitability, volume and the importance of the customer/customers demanding it). If it is, then it is incorporated into the classification system after discussions between the supply chain and the product responsible. The classification system is summarized in Table 6 below.

Table 6: Product classification system summary (Manager).

	A	B	C	D
Make-to-forecast (MF)	80% turnover	15% turnover	5% turnover	Contract products
Make-to-order (MO)	F			
MF/MO phasing out	E			
MF/MO new product	G			

The benefits of segmenting the products according to the classification above are argued to be important for knowing the volumes of operational purchases, for planning the stock and batch levels, for monitoring the profitability of newly introduced products and to make sure that products which are going to be phased out are phased out at the right time to avoid obsolete stock. Another benefit from the classification system is argued to be that it is an easy way of communicating and making sure that everyone at the site, through the IT system, immediately knows the general nature of the product and

how to treat it. There are pre-set lead times for all products; one lead time for make-to-forecast products and one for make-to-order, which facilitates the coordination between sales and the supply chain activities. A new product classification is made once every year, except for the G products which are classified every 6 months.

Approach 5: The distribution segmentation approach

The fifth approach is not specifically linked to the description of a certain interviewee, but is rather a summary of several descriptions; all concerned with differentiation of distribution solutions. The common denominator for all descriptions of differentiation of distribution solutions was that lead time was always a central topic. Sometimes the differentiation of lead time had its roots in customer requirements, sometimes in absolute demands from specific customers or specific industry groups. During the interviews it became clear that there are several different ways of achieving lead time differentiation, e.g.;

- Keeping stock points in varying distances from different customers
- Using different modes of transport
- Get the customers to plan better and thereby order further in advance
- Prioritizing some customers ahead of others

During the interviews in which it was described how different stock point solutions were used for different segments or customers, it became clear that this kind of differentiation could be of a more or less voluntary nature. For example when delivering products to customers in the automotive industry one interviewee explained that if the company as a supplier would not keep stock at the customer location, it would not even be considered as a potential supplier. However, the same interviewee also explained that keeping stock closer to the customer could be a much more voluntary choice and a competitive weapon, making the customers choose that company ahead others.

Another way of achieving lead time differentiation mentioned was to use different means of transport for different customers or segments of customers. The interviewee mentioning this did also emphasize that it should be the individual customer's choice to determine mode of transport and that a faster mode would entail a higher price for the customer.

While the specific approach to give the customer a choice regarding the means of transport was not frequently mentioned, the approach of giving the customer a choice between a longer lead time at a lower price and shorter lead time at a higher price was mentioned by several interviewees. One interviewee described that their customers made this kind of choice in a drop-down menu in the ordering system. Another interviewee had a somewhat different approach and described it as if the customer is able to plan ahead, and thereby accept a bit longer lead time, it gets a discount compared to those customers wanting the same products with minimum lead time. In general, several interviewees expressed that they suspected that their distribution networks were designed to deliver an unnecessarily high performance, i.e. that the customers were given a shorter lead time than they really needed, and that it would be much more preferable if the performance of different solutions could be differentiated and the customers would pay accordingly.

However, one interviewee found this concept to be rather difficult to predict, as it perhaps would require future investments in certain production sites or warehouses if the pricing of the lead time would change the buying behavior of the customers completely.

In connection to the discussions about differentiation of distribution solutions, it was clear that stock point optimization in the form of the network planning of warehouses was something which was on

the agenda for some companies. Such network planning often results in a decrease in the total number of warehouses, something which improves the general performance of the network but might increase the lead time infinitesimally for customers in some geographical areas. Several interviewees found that it was difficult to get the sales department on board such an initiative and that the customers often were easier to deal with. As one interviewee put it;

"The customer is considerably more benevolent to this than our sales department."
Senior manager

The final description that came up as a way to differentiate the lead time, and that was mentioned by several interviewees, was to prioritize some customers ahead of others, either by always offering them a shorter lead time than the average or by simply prioritizing their orders at the expense of others. The prioritization of certain orders ahead of others was usually made for specifically important customers or when the product contribution margin was particularly high. In some cases the prioritization was a standardized approach, but in most cases it was an ad hoc decision. However, none of the interviewees that mentioned this way of lead time differentiation found this approach particularly appealing but saw it more as a necessary evil. Some were ashamed to admit that some customers were systematically prioritized ahead of others.

4.4.2. Approach findings

The descriptions above show that while several companies had somehow differentiated the distribution solutions, not too many companies had segmented further up the internal supply chain than the distribution, which leads up to the first approach finding.

Finding 10:
Differentiation of distribution solutions is the most common way of achieving customer differentiation in the supply chain. Segmentations stretching further into the internal supply chain are not as common.

A pattern which could be discerned during the interviews, and which is also to some extent connected to the first finding, is that it is more common for distribution solutions to be differentiated on the individual customer level, which means that a distribution solution segment can be made up of only one customer. If the segmentation stretches further up the internal supply chain the customers are usually clustered into segments consisting of more than one customer. There are certainly cases in which distribution solution segments consist of several customers, but it is nevertheless so that the segments and the strategies and solutions therein often are less standardized over a range of customers in distribution solution segmentation than in segmentations reaching further into the supply chain.

It is also the case that specific segmentation criteria are used more often for the analysis when the segmentation stretches further up the chain than the distribution. Particularly approach two and three shows that defining customer segments from criteria analysis is not something that can be done simply by taking all customers of a company and dividing them into segments and then be done. It can very well be the case that a certain customer, or group of customers, purchases several different products from the same company and that the customer has very different requirements and demand for different products, why the clustering of customers according to criteria is conducted on a product basis, i.e. for each product.

Finding 11:
Segments usually include more customers and the clustering of customers into segments are

more commonly based on criteria if the segmentation stretches further up the chain than the distribution. Segmentations based on criteria are usually conducted on a product level.

Another difference between the first four approaches and the distribution segmentation approach (approach 5) is that cross-functional alignment in the supply chain is emphasized much more in the first four approaches. In two of the four cases cross-functional teams are somehow used in the segmentation approach. Cross-functional alignment is also of obvious importance in the other two cases; in the second approach it is evident in the determined process, and in the first approach it is obvious from the quotes that the entire internal supply chain must be aligned.

Finding 12:
Teams or processes for cross-functional alignment are more common if the segmentation stretches further up the supply chain than the distribution.

Regarding differentiation of distribution solutions the length of the lead time was always central to the differentiation and it was obvious that a differentiated lead time could be achieved in many different ways.

Finding 13:
The length of the lead time is central to differentiation of distribution solutions.

Finding 14:
There are several of ways of achieving lead time differentiation in distribution solutions, e.g. by placing stock points at different locations, by using different modes of transport, by making the customers plan better and by prioritizing some customers ahead of others.

The summary of the different approaches making up the fifth approach also shows that lead time pricing is a popular way to differentiate the distribution solutions.

Finding 15:
Lead time pricing is a popular way to differentiate the distribution solutions.

4.5. Supply chain segmentation enablers

While discussing criteria for supply chain segmentation seemed a bit difficult to many interviewees, discussing enablers were much easier. A general observation made was that some interviewees spontaneously started talking about enablers or prerequisites before having been given any questions about the topic. Once actually asked about which enablers are important to have in place to execute supply chain segmentation most interviewees had much to say. The specific enablers mentioned and explained by the interviewees differed some, but the ones most frequently mentioned were somehow concerned with IT infrastructure, KPIs and performance measurements, responsibility allocation and different types of cross-functional alignment and communication. However, while the mentioned enablers differed some, the general reaction once confronted with and asked to grade the importance of the enablers summarized in picture 9 in the slide package (see Appendix 2) was more or less the same. To put it in the words of one interviewee;

”They are all important.”
Executive

That all enabler groupings are considered to be important is also reflected in Table 7 below, where a summary of the average grades given to the different enabler groupings can be found (the interviewees

graded the enablers groupings on a scale from 1 to 3, where 1=very important, 2=important, 3=not so important).

Table 7: The average grades of the enabler groupings.

Enabler grouping (see picture 9 in the slide package)	**Average grade**	**Importance score (1=highest importance, 5=lowest importance)**
Organization and management	1,13	1
Performance measurement and communication	1,38	2
Responsibility	1,63	3
Cross-functional alignment	1,75	4
IT infrastructure	2,13	5
Skills	1,75	4

4.5.1. IT infrastructure

When summarizing the enablers or grouping of enablers that were most frequently mentioned spontaneously by the interviewees, i.e. before the interviewees were presented with the list in picture 9 in the slide package, enablers connected to IT systems and IT infrastructure stood out. Five interviewees spontaneously voiced the necessity of IT infrastructure in order to succeed with supply chain segmentation. The general spirit of the comments below was aired by several interviewees;

”It would have been easier if there had been an infrastructure for example for the IT systems within the company.”
Executive

“Within the company you must use the same lingo. It is as obvious as the fact that English is our corporate language. No one is calculating the benefits of using English as the corporate language but when it comes to investments in IT infrastructure everyone is calculating like crazy. I mean it is obvious that we should use the same IT system. And then customers and suppliers should be connected to that to as high a degree as possible.”
Executive

The IT infrastructure enabler was also taken one step further and was seen as part of a more extensive enabler - a business intelligence strategy;

”Regarding enablers versus constraints; you have to have qualitative facts and in order to produce qualitative facts you must to have a business intelligence strategy. How are the facts going to be gathered? And which facts are you going to gather? From which systems should the data be gathered and how long is it going to be saved? How is it going to be structured and made available to the organization? Very few companies have had such a business intelligence strategy. Some have implemented it and many haven’t implemented it at all… And that is absolutely one constraint/enabler: the IT infrastructure, the gathering of facts and whether or not you can manage to analyze the gathered facts.”
Executive

"IT infrastructure is a prerequisite otherwise there is no such thing as consistent metrics. But using the very best IT systems is probably not necessary."
Manager

It was obvious from the start of many of the interviews that IT infrastructure was considered a very important enabler. However, once the interviewees were asked to grade the importance of the enablers in the list in picture 9 in the slide package, IT infrastructure got the lowest average importance of the six enabler groupings (see Table 7). Opinions such as the ones below were usually expressed once asked why the interviewee gave the enabler such a low score;

"The importance of that enabler shouldn't be exaggerated. But if we don't have the right background information, the right data then it will be tricky… But its importance shouldn't be exaggerated."
Executive

"IT infrastructure is important if you are going to measure, of course, but the measurements will never be better than the tool. If you have a blunt saw you have to use it longer to get through. IT infrastructure is not conclusive."
Executive

The same interviewee later elaborated some more;

"If you've got a state of the art IT system, measuring will be easier. If you've got Excel, well, it's not as easy but it usually works."
Executive

The interviewee expressing the importance of IT infrastructure as part of the business intelligence strategy to get hold of qualitative facts explained the score indicating low importance with the following comment;

"It is still possible to get hold of facts without IT systems."
Executive

It was clear that the interviewees found IT infrastructure to be an important enabler, but it was also clear that once the interviewees were presented with more enablers than they had thought of spontaneously, the significance of IT infrastructure paled some in comparison. It was also clear that it is possible to execute supply chain segmentation without state of the art IT infrastructure.

Finding 16:
IT infrastructure is an important enabler but in comparison to many other enablers it is still possible to manage supply chain segmentation without.

4.5.2. Organization and management

The enabler grouping called Organization and Management in the list of enablers in picture 9 in the slide package received the average score indicating the highest importance of all enablers in the grading. It fast became clear that this was due to the fact that top management support was one of the enablers in the enabler grouping. Phrases such as the one below were commonly mentioned.

"It must have high level management support."
Senior manager

Several interviewees also indicated that top management support for supply chain initiatives in general has been much stronger in recent years than a decade or two ago and that supply chain now is much higher on the management's agenda.

"In brief I can put it this way; what has happened during the last 3-4 years is that this one, the top management attention, has changed completely. It is much better now."
Executive

However, as one interviewee put it, supply chain is still not the priority of all management teams.

"It is highly dependent upon who is part of the company management because if you have seen the benefits of a well-functioning logistics and supply chain then… Unfortunately, for very many persons in the corporate world it is marketing, sales and product development that are most important."
Executive

All except two of the interviewees specifically pointed out top management support as an enabler or as a prerequisite for supply chain segmentation. Many interviewees argued that top management support should not in fact be seen as an enabler, but as an absolute prerequisite to reaching any kind of success in the execution phase. The two interviewees grading top management support as being of medium importance as opposed to all the others grading it as very important were representing decentralized organizations.

Finding 17:
Top management support is considered to be an extremely important enabler or even a prerequisite for the success of a supply chain segmentation initiative.

4.5.3. Performance measurement

The enabler grouping with the second highest importance of the enablers in picture 9 in the slide package was Performance measurement and communication. Enablers connected to this enabler grouping were also very frequently mentioned before presenting the interviewees with the picture from the slide package. However, after conducting only a few interviews it did become clear that most interviewees saw the enablers connected to the enabler grouping Performance measurement and communication as belonging to either Performance measurement or Communication. Regarding the necessity to follow up and measure performance comments such as the ones below were very frequent.

"You get what you measure."
Manager

"What we follow up, we will get."
Manager

The importance of aligning the performance measurements of the different functions within a segment was an enabler that was specifically pointed out.

"If each function is using KPIs that are not aligned with the flow of goods through the company you will never be able to control supply chain segments. There will be sub-optimizations. If you set the KPI goal to reduce the cost of purchased goods with seven percent per year, then purchasing won't be bothered with how the purchased goods will perform in the manufacturing and then costs will increase there instead."
Executive

Another interviewee representing a company where a recent segmentation resulted in the creation of two organizations instead of one argued that by using the right performance measurements an organizational split might not always be necessary. Once discussing the enabler Performance measurement the interviewee referred to picture 5 in the slide package and made the following remark;

"You could achieve the principle depicted in this picture anyway, with the use of the right measurements."
Senior manager

Finding 18:
Performance measurement is considered to be an important enabler and it is necessary to align the performance measurements of each function within a segment to avoid sub-optimizations.

4.5.4. Communication

Regarding communication, several interviewees found it to be a very important enabler. Some interviewees also saw the lack of communication between departments and in the organization in general as a challenge.

"That is the key really – the communication between the departments. It is the only way to succeed."
Manager

The same interviewee then elaborated further;

"The challenge is the communication, to understand that we are striving for the same goal. Because sales is easily focused on selling, selling, selling. Production is focused on efficiency and reducing waste; as big batches as possible all the time. And we are somewhere in between putting the big picture together. The challenge is to make everybody understand that we are aiming for the same goal. It is a challenge but we are getting there."
Manager

Another interviewee raised similar concerns, and pointed out the importance of communication between the sales department and the supply chain organization as integral for supply chain segmentation;

"It requires some honesty from the sales department regarding that the customers actually are not one big lump; you have to get to the bottom of their needs. To some customers price is most important, to others it is lead time and so on. And you have to know and understand the customer's processes. You have to know what they really need and be able to consolidate that into something manageable. After that the supply chain can be adapted accordingly. But it requires communication."
Executive

Finding 19:
Communication between departments is considered to be an important enabler and to succeed with supply chain segmentation the communication between the sales department and the supply chain organization is integral.

4.5.5. Cross-functional alignment

An enabler that to a high extent is connected to performance measurement and to an even higher extent to communication is cross-functional alignment. Several interviewees also remarked that many of the enabler groupings in picture 9 in the slide package were somehow interconnected, which evidently is the case. Enablers connected to the enabler grouping Cross-functional alignment were frequently mentioned by the interviewees before presenting them with the list in picture 9 in the slide package. One enabler in this grouping was singled out by several interviewees as an important means of increasing the cross-functional alignment and the communication between departments; a well-developed mechanism for sales and operations planning (S&OP).

"At previous employers of mine the sales department has had a really strong position but the management of the production did not have a clue about the requirements and the demand so it came as a surprise every time. And then the production was overloaded and clogged and the sales department called and yelled and yelled, which of course didn't help. But with a process for sales and operations planning you get a completely different dialogue."
Executive

One interviewee argued that different mechanisms can be used to balance supply and production capacity in different segments, why it is often necessary to have different planning mechanisms in different segments. Another interviewee, seeing the increased volatility connected to both supply and demand in that company's supply chain as the future major challenge, argued that a well-developed S&OP process was not actually enough. This interviewee saw a well-developed S&OP more as a prerequisite than an enabler and argued that it must be combined with agility throughout the supply chain in order to be able to cope with the ever increasing volatility on the markets.

Finding 20:
S&OP is considered a very important enabler or prerequisite and different S&OP processes are commonly needed in different segments.

4.5.6. Holistic perspective

S&OP can obviously be seen as one way to increase the cross-functional alignment within the company and segments. An enabler closely connected to cross-functional alignment that was not part of the list of the enablers mentioned in the reviewed research but that was strongly emphasized by several interviewees was the need to take a holistic perspective on supply chain. While the interviewees stressing this did not phrase it exactly the same, it was clear that taking a company internal holistic supply chain perspective, i.e. to see source, make and deliver as interlinked parts of the supply chain that need to be controlled and managed together, as well as looking in the horizontal functional dimension within each function, was an absolute necessity for supply chain segmentation. In some cases it was even emphasized that it was important to look beyond the direct customers and the own organization, to include not only the customer but the customer's customer, and the supplier and the supplier's supplier etc., i.e. the entire external supply chain. One of the interviewees echoed the essence of a quote by Christopher, and argued that without this realization supply chain segmentation will never succeed;

"Companies do not compete – supply chains do."
Executive

The same interviewee elaborated further;

"If you know and can keep track of your supply chain end-to-end, then you'll win."
Executive

Another interviewee focused more on the benefits that a more holistic way of thinking can bring;

"I could sit here for a couple of days explaining and giving hands-on examples of how logistics and holistic thinking can contribute to increasing the customer service while at the same time lowering the environmental impact."
Executive

The need to take a company internal holistic view to supply chain could probably be argued to be exactly what cross-functional alignment is all about, yet it was obvious from several interviewees that this is a very challenging part of supply chain work in several companies. One interviewee formulated this argument in interesting words;

"In my perspective, for a supply chain segmentation to be successful source, make and deliver have to be grouped together under one roof. Or alternatively, a very well-developed network is needed with a product manager in charge of steering and control. But somehow I think that source, make and deliver must be steered and controlled together."
Executive

The same interviewee later came back to this topic in a more elaborative manner.

"If you are looking at the titles that people are having, it is obvious that you can be called supply chain manager if your responsibilities are source and deliver. That is very common. And then you are not responsible for manufacturing. To me, if the company is actually manufacturing something, I found the role with responsibility for the entire chain – sourcing, making and delivering – an excellent one. That role gives such an amazing opportunity to steer and control, to adapt and deal with the requirements of different customers, in comparison to if you are only responsible for parts of the chain. There will never be sub-optimization in functional silos or the silo way of thinking, but instead everyone knows that this is a team work. Purchasing is not going to sign any deals that don't land well in production. And production will make sure there is always enough availability so that the logisticians can send the goods out in time. End of discussion."
Executive

Finding 21:
To take a holistic perspective on supply chain is considered to be a very important enabler.

4.5.7. Governance structure and responsibility

The enabler to take a holistic perspective on supply chain within the company is in turn also connected to two other enablers; a clear governance structure and a process for supply chain segmentation. Having a clear governance structure and responsibility allocation in the organization was pointed out as important by many interviewees, both spontaneously and after having been presented with the list in picture 9 in the slide package. To quote one interviewee regarding the need for a well-defined governance structure;

"How would it otherwise be possible to track and monitor a network consisting of more than one hundred factories and several thousand suppliers?"
Executive

The same interviewee also mentioned that there are several models that could be followed to make sure that the governance structure actually is clear and that the responsibilities are rightly allocated. One of the models referred to was the RACI model, with the capitals implying that it should be clear who is responsible, who is accountable, who should be consulted and who should be informed in the decision-making process.

It also became evident during the course of the interview and analysis phase that governance structure was considered especially important in matrix organizations. Most interviewees representing matrix organizations expressed that responsibility allocation and clear governance structure was an important enabler, while some did not call it an enabler but instead expressed that lack of governance structure is a challenge. One interviewee said that the matrix in itself was a challenge, as all decision-making was built upon a group of persons having to reach consensus before being able to make a decision, which also indicates the need for a clear governance structure. To put it in the words of one interviewee;

"The various responsibilities must be well-defined. Especially in big companies and groups organized in matrices – otherwise it's really tricky. In pure line organizations there is only one person above and one below. In a matrix there can be one person to right and one to the left or there can be three dimensions, which makes it really… Governance structure is important."
Senior manager

The importance of having one person in charge of each segment was also emphasized. To quote a comment by one interviewee once the "people take ownership of segment"-enabler in the enabler grouping Responsibility was shown;

"If you have a segment for sure you need a segment owner because otherwise it is never going to fly."
Senior manager

Finding 22:
Having clearly allocated the responsibilities within the organization is considered an important enabler. In matrix organizations governance structure is viewed as a particularly important enabler, or, alternatively, the lack thereof is considered a big challenge.

4.5.8. Additional enablers found

Apart from the enablers presented above, a number of other enablers (more or less connected to the enablers above) were mentioned by the interviewees. Short descriptions of the findings connected to these other enablers will be presented below.

An enabler that was mentioned by some interviewees was the need for a process for supply chain segmentation. However, a process for supply chain segmentation could really be considered to be more of a framework for or an approach to supply chain segmentation than an actual enabler. This becomes clear in a quote from one of the interviewees;

"The thing about a process is cooperation and team work. The best athlete in the world sprinting 400 meters will always lose against a mediocre team of four athletes running the 4 × 100 meter relay. Why? Because one athlete can't run all 400 meters with the same speed as one only having to run 100 meters. But the team of four will never beat the single athlete if they fail in one thing – the changeovers. You have to know when, where and how to conduct the changeovers. And that is what a process is all about."
Executive

Knowing where, when and how to conduct the changeovers in a relay corresponds to knowing where, when and how to conduct supply chain segmentation, which is really what structured approaches to segmentation is all about. The quote contains another very important part, namely that of team work. While only one other interviewee actually mentioned team work in passing, this was an underlying concept in many parts of the interview conversations. Some interviewees called it mindsets of the employees, some interviewees called it skills, but what all of these have in common is that in order for supply chain segmentation to be successful employees need to understand that supply chain is about team work.

Another enabler, which to a rather high extent is connected to skills, team work and employees' mindsets, that was mentioned by some interviewees was that the organization needed capabilities in change management. One interviewee particularly stressed this issue by expressing that the perspective to supply chain segmentation in this research project probably should be shifted more towards change management in order for the conclusions to gain practical relevance. Although perhaps not very clear-cut, the final finding connected to enablers for supply chain segmentation follows;

Finding 23:
Team work and employees' mindsets and skills, as well as capabilities for change management are enablers of supply chain segmentation.

4.6. Further reflections

While most interviewees agreed on that the starting point of supply chain segmentation should be the customer, it was also common for the interviewees to see the current way of organizing the company and controlling the supply chain as something unplanned in which the company has landed without particular reason. This was especially common for the more organizational part of segmentation. Comments of the likes of the ones below were rather common.

"I think that what you mentioned is the absolute most important consideration; whether the current segmentation is deliberate or not. The segmentation might be the result of specific past actions not fully understood."
Executive

"If it just happened or if it was planned I do not know"
Senior manager (regarding whether the split or the organizational segmentation between the group's major BUs was a coincidence or whether it was planned)

"From a business perspective some things happen out of habit or because of tradition, that's how it is."
Executive

Finding 24:
It is common for the interviewees to see the current way of organizing the company and controlling the supply chain as something unplanned in which the company has landed without particular reason.

5. ANALYSIS

The focus of this chapter is to provide the reader with an analysis of the findings from the interview study. Each finding is compared to the theoretical framework and discussed from different angles. After a structural overview the chapter starts with the analysis of findings connected to the concept of supply chain segmentation and continues with analysis of findings connected to criteria, approaches and enablers consecutively.

5.1. Analysis chapter overview

The analysis chapter is built on the same structure as the findings chapter, but with some modifications. Two areas have been added; the sub-area Concluding analysis of enablers and the major area The framework for a segmented supply chain (see Table 8 below).

Table 8: Structural overview of the analysis chapter.

Major area	Sub-area	Finding being analyzed
The supply chain segmentation concept	The customer as the starting point	1
	The definition of the supply chain segmentation concept	2.1, 2.2
Supply chain segmentation criteria	Standard and special products	3, 4
	General opinions connected to criteria	5, 6
	Other empirical criteria and constraints	7
	Industry specific criteria and constraints	8, 9
Supply chain segmentation frameworks and approaches		10, 11, 12, 13, 14, 15
Supply chain segmentation enablers	IT infrastructure	16
	Organization and management – Top management support	17
	Performance measurement	18
	Communication	19
	Cross-functional alignment	20
	Holistic perspective	21
	Governance structure and responsibility	22
	Additional enablers found	23
	Concluding analysis of enablers	16-23
Further reflections		24
The framework for a segmented supply chain		1-24

5.2. The supply chain segmentation concept

5.2.1. The starting point

The first part of the very first finding, i.e. that **the starting point of any supply chain segmentation is the customers**, fits well with previous theoretical contributions on the supply chain segmentation

topic. While it has been considered that the researchers usually contributing to the market driven segmentation approach advocate stronger customer focus than those of the product driven segmentation approach, both approaches actually do to some degree start with the customer. The product driven approach takes the customer requirements into consideration through the market winners and market qualifiers of Hill (1985) and the customer demand is taken into account in Fisher's Functional versus innovative products (Figure 8). The customer demand was later elaborated as a criterion, first by Christopher and Towill (2000) as a part of the DWV[3] variables and then as part of the framework presented by the same authors in 2002 (see Figure 10). It is also present in Lee's demand uncertainty criterion from 2002 (see Figure 12 and 13). In the market based approach the customer requirements and demand are important parts of the competitive situation (see Figure 16 and 19), which was elaborated further as "buying logics" in 1996 (see Figure 20).

The second part of the finding, i.e. that **the customers must somehow be put in relation to the company's product**, might seem a straightforward and obvious part in forming supply chain segments as products are a major concern of industrial supply chains. While the idea of starting with the customer and then combining it with the products somehow is easily comprehendible and rather intuitive, the *somehow* is a word of major practical importance. It is evident both from the interviews and the research literature that there are many ways of executing supply chain segmentation. Structured detailed approaches in research case studies are scarce and almost all of the research conducted by the researchers of the product driven segmentation approach is based on the same case study, described in sub-chapter 3.5. Suggested approaches and frameworks from research case studies. The market driven segmentation approach uses different practical approaches, sometimes restructuring the organization according to different customer segments and sometimes according to customer demand patterns (see sub-chapter 3.5. Suggested approaches and frameworks from research case studies). However, the approaches used by the researchers of the market driven segmentation approach are not really described in detail. While some patterns were discernible the companies represented in the interview study had still used rather different approaches to segment and differentiate their supply chains; for example, in one case criteria are used to segment the customers, in others criteria are used to segment the products and in yet others some differentiation has been made without actually using criteria. It can be concluded that analyzing the *somehow* is really the concern of much of the following analysis sections.

5.2.2. The definition of the supply chain segmentation concept

While the interviewees and the researchers seem unanimous in that customers must be combined with products to define meaningful supply chain segments, the theory differs more from the findings of the study regarding finding 2.1. and 2.2. The first part of the second finding, i.e. that **supply chain segmentation is concerned with balancing two dimensions, the horizontal functional synergy dimension and the vertical supply chain customer differentiation dimension**, is perhaps not very surprising seen in the light of what all supply chain work is about; to achieve both effectiveness and efficiency. One interviewee described the implications of these two dimensions on the company purchasing strategy as;

"We have to be category-driven and business-driven."
Executive

Where category-driven was that company's solution for functional synergy and business-driven meant that the category managers must collaborate closely with the purchasing managers of the individual

business units in order to ensure that the category managers take the differing customer requirements originating from the customers of different business units and different segments into account.

The second part of the finding; "**depending on the level of supply chain centralization/decentralization one of the dimensions is especially important. The horizontal functional synergy dimension is more important if the general supply chain thinking has been "one size does *certainly* not fit all" and the vertical supply chain customer differentiation dimension is more important if the general supply chain thinking has been "one size does fit all**"."", was somewhat more surprising. While more or less all theory suggests that supply chain segmentation implies moving away from the "one size fits all" supply chain thinking, the study shows that while this was often the case, it was not *always* the case. In fact, to some of the interviewees supply chain segmentation implied the direct opposite. The fact that the interviewees indicating this came from strongly decentralized organizations is probably part of the explanation.

Behind the researchers' (and most of the interviewees') "one size fits all" point of view, is the assumption that it is the horizontal functional synergy dimension that historically has been the strongest of the dimensions. It is not difficult to see where this point of view has its roots. Already in the days of Henry Ford it was clear that customer requirements were not the focus of the supply chain;

"Any customer can have a car painted any color that he wants so long as it is black."

Simplicity and standardization was clearly the top priority in the days of Henry Ford, and while the product range has expanded enormously for most companies since then, this has not always been the case for the supply chain strategies. It is easy to understand why; the distribution department of a specific company will probably use the same methods as always when a new product is going to be shipped, since those methods have worked well historically. This has probably been similar throughout the supply chain, leaving the companies running the same kind of supply chain for all products with the "one size fits all" way of thinking.

However, some interviewees presented opinions pointing in the opposite direction, i.e. that their companies historically have been thinking too much "one size does not fit all". The background to this way of thinking is also easily comprehendible; during mergers and acquisitions the supply chain solutions of the company merged or acquired have been kept in order not to create confusion, or, product owners have been given the power to create their own solutions in order to increase performance, all in the spirit of decentralization. It is not very difficult to understand from where the advocates of decentralization are coming once drawing parallels to the structure and strategy contingency alignment of Donaldson (see Figure 17), indicating that the more diverse the number of products, the more decentralized the company structure ought to be. It might even be possible to assert that decentralized organizations are the result of having moved away from the "one size fits all" way of thinking, not in a supply chain context but in the context of organizational structure (which undoubtedly has consequences for supply chain as well). However, once using a decentralization strategy over many years the number of organizational units could, as well as the number of supply chain solutions and supply chain strategies within the units, get out of hand, resulting in no regard being taken to the horizontal functional synergy dimension. In these cases it is likely that similar supply chain strategies are deployed in two or more supply chains without taking advantage of synergies or benchmarking, why the supply chain (and organizational) thinking can be argued to have been "one size does certainly not fit all". There is an obvious trade-off between the two dimensions, but it is imperatively so that no matter which dimension is the most pressing, it is crucial for companies not to forget the other.

5.3. Supply chain segmentation criteria

5.3.1. Standard and special products

Regarding the segmentation criteria, the first finding, i.e. that **most interviewees spontaneously acknowledge the difference between standard and customer-specific/non-standard products**, is completely in line with Fisher's framework from 1997 and thereby also with most of the basis of the product driven segmentation approach. It is also to some extent in line with the market driven approach, as the divide between special and standard products can be a result of alignment, as described in the first example from the market driven approach in sub-chapter 3.5. Suggested approaches and frameworks from research case studies.

However, while most interviewees did acknowledge the difference between these kinds of products and some had implemented different supply chain solutions for these segments, several interviewees did not feel that this kind of segmentation approach was applicable to the products in their company. There was also **opposing opinions regarding whether the entire concept of supply chain segmentation is as applicable in manufacturing industry as it is in the fast-moving consumer goods industry**, which was the second finding. A possible reason to why supply chain segmentation could be considered less applicable in companies in industrial settings could be that many of these companies are much more specialized from the start than fast-moving consumer goods companies. It is of course still possible for the customers of industrial manufacturers to have differing requirements, but nevertheless it is usually the case that an industrial manufacturer already from the start focuses on a certain niche and/or a certain industry of customers as compared to fast-moving consumer goods companies. This could be part of the reason behind the fact that many of the interviewees did not find the segmentation according to Fisher (1997) meaningful for their companies.

Another reason to why segmentation could be considered less applicable is the complexity and long lifetimes of the products of several of the companies in the study, resulting in much lower total volumes than in the fast moving consumer goods industries. However, it was also clear that many of the interviewees found the topic interesting and that several certainly saw it as applicable also in more industrial settings. Research on supply chain segmentation in industrial settings is close to non-existent, which would support the interviewees finding segmentation to be less applicable in industrial settings. However, seeing to the fact that some companies have conducted or are conducting full-scale segmentations with a basis in criteria selection and that several companies still are experiencing a divide between standard and special products, it could be argued that segmentation is relevant in industrial settings.

5.3.2. General opinions connected to criteria

The fifth finding, i.e. that **the interviewees had very differing opinions regarding the concept of choosing a specific number of criteria based upon which the supply chain should later on be segmented and that many of the interviewees expressed that they had done some sort of supply chain differentiation or segmentation but had not really used explicit criteria in order to conduct this segmentation**, does not differ much from theory behind the market driven approach. While the researchers of the product driven segmentation approach advocate the use of criteria, the approaches and theory behind the market driven approach do not explicitly state how the different segments are identified. Most likely this is due to that no specific criteria were used and that the situation was evaluated more as a whole with the four elements of strategic fit shown in Figure 16. It is difficult to

judge and favor one approach ahead of the other, since it is obvious that the two different sides usually come up with quite similar segmentation solutions in the end. However, starting a supply chain segmentation initiative with a list of criteria that other companies and researchers have used cannot really be advised against, since it does provide good guidance.

A reason to why some interviewees found the concept with criteria selection difficult and mechanical could be that there are other more empirical criteria and more empirical constraints that affect the segmentation of the supply chain, as stated in finding 7. This is discussed more in detail in the section 5.2.3. Other criteria and constraints below.

Another general opinion voiced, which was really an elaboration of the very first finding, was the sixth finding, i.e. that **the customer, or more specifically, the customer requirements and/or the customer demand patterns are the starting point for supply chain segmentation**, is almost completely in line with the theory of both the product driven and the market driven segmentation approach, for the same reasons as described in the analysis of the first finding. The reason to why the match is perhaps not entirely complete is that supply uncertainty which is suggested as a criterion by Lee (2002) was not really mentioned as a criterion by the interviewees. It does however depend on how the concept of criteria is interpreted in general; Lee might only have seen supply uncertainty as something which affects the supply chain strategy and not as a criterion which the entire supply chain segmentation should be built around.

5.3.3. Other empirical criteria and constraints

The first part of the seventh finding, i.e. that **there are several constraints or criteria that are of a more empirical nature which affect the segmentation of the supply chain**, is not reflected in theory at all. The different criteria for how to segment the supply chain mentioned and explained by researchers are all of a more general or theoretical nature and do not really acknowledge that there are actually constraints that sometimes make the ultimate strategy, for example complete supply chain agility or complete leanness, impossible to realize. It also became clear during the interviews that some segments simply have to be run in separate ways from others because of factors not mentioned in research. This was the case for some of the **four more empirical constraints or criteria** which make up the second part of the finding, **i.e. legislative criteria, geographical criteria, production technology constraints and product size**. Naturally, as there is no match for the first part of the finding there is also no match for this part. However, legislative criteria are, as well as geographical criteria, certainly connected to the more general customer requirements criteria mentioned in theory. While it is clear that legislation connected to products which, for example, are going to be delivered to the nuclear industry could make it necessary to run an entire segment separate from others, this kind of legislation is ultimately based on customer requirements regarding quality and safety. Regarding the different kinds of geographical criteria mentioned by the interviewees, it is not only logically apparent that it in some cases is necessary to geographically segment the customers before being able to discern clear patterns of requirements on for example price, but this type of over-arching segmentation was also made in the approach from the product driven side, visualized by the fact that the case study was made for Western Europe (Childerhouse et al., 2002). The production technology constraint of high amount of capital tied up in production is further elaborated in the subsequent section of the report (5.2.4. Industry specific criteria and constraints). The last practical criterion for how to identify a specific supply chain segment encountered in the study was product size, which can naturally be an important issue in all of the supply chain activities source, make and deliver.

It is clear that there are other criteria and constraints to take into consideration when conducting supply chain segmentation, regardless of the weak theoretical support. However, there are probably several other practical criteria and constraints that could affect the segmentation which were not found in this study. For example, a product characteristic other than size that could affect the supply chain solution would be whether or not the goods are dangerous. It can be concluded that it is rather safe to say that practical criteria and constraints most likely vary a lot between industries, companies, and business areas and business units within companies.

5.3.4. Industry specific criteria and constraints

The eighth finding, i.e. that **the criterion demand variability is especially important in heavy machinery-producing industry**, is not very surprising once compared to theory and once a general understanding of the customer requirements of those kinds of industries is obtained. While no research has been conducted with specific focus on heavy machinery-producing industry the criterion demand variability is used in research case studies both in the product driven and the market driven segmentation approach, as well as by Godsell et al. (2011) when attempting to combine the two approaches. Demand considerations are part of several of the research frameworks; Fisher specifies that the demand for functional products is likely to be predictable while the demand for innovative products usually is more unpredictable; Christopher and Towill (2002) acknowledge demand as a criterion in their 3-criteria framework (Figure 10) and claims that it is either stable or volatile; demand variability is also one of the five variables in the DWV^3 framework of Christopher and Towill (2000); Lee (2002) claims that one of two important criteria to take into consideration is demand uncertainty and that it can be either high or low.

Most of the heavy machinery-producing companies participating in the study were rather specialized, and while producing many different types of machines it was usually machines that would perform if not the same then at least very similar tasks for the customer. This is of importance for the nature of the customer requirements and results in them being very similar no matter who purchases the product or where it is purchased. At first glance, it may seem as if these kinds of industries are the kinds of industries in which segmentation could be less applicable. However, once investigating the demand patterns closer there are usually a major difference between three potential segments; a machinery production segment, a spare parts segment and a segment for the consumables feeding the machines. It is not always the case that the company producing the machines also produce the consumables for the machines, but it was indeed frequently so in the companies participating in the interview study.

Even though the criterion demand variability was considered the most important criterion, it was not in the form of the binary variable of high and low or stable and unstable so frequently used by researchers. This type of analysis is certainly relevant for the machinery-producing companies but if the analysis would be based solely on the demand variability being high or low, only two segments would have been found; the rather erratic machinery production segment, probably to some degree following the economic situation, and a low variability segment made up from spare parts and consumables. The criterion which separates the consumables from the spare parts is the geographical predictability of where the demand will arise. For consumables it will arise at every customer location at the same pace during the entire life of the machine. For spare parts the demand will naturally also arise at the customer location, but the question is when. This would not be an issue if the spare parts did not have such a high volume-to-weight ratio as they do, because then stock could be kept close to the customer locations anyway. This is however not possible, and it is obvious that the difference between spare parts and consumables has implications for the supply chain activity plan.

This kind of segmentation could still be considered to be rather high level, and there were cases in the interview study showing that some of the companies had conducted further segmentations within each segment, for example based on volume or customer requirements on price. However, the over-arching machinery production/spare parts/consumables segmentation seems to be preferred in heavy machinery-producing industry.

The first part of the ninth finding, i.e. **that supply chain segmentation in process industries usually does not reach further back into a company's supply chain processes than the distribution**, is not reflected in the research literature. In fact, as previously described, the reach of supply chain segmentation through the company internal supply chain processes as well as outside of the company borders is a topic not really touched upon in the reviewed literature. However, once taking the second part of the finding into consideration, i.e. that **the reason behind this narrow reach is the high amount of capital tied up in production technology making it impossible to aim for anything else than lean strategies in the manufacturing**, the first part of the finding becomes more logical. This finding must however be regarded with caution as one of the companies in the interview study actually had been making approaches to segment the manufacturing process as well. Since this company did not have as much capital tied up in production as all of the other companies in process industries did it could be concluded that the reach of supply chain segmentation in companies in process industries depends on the amount of capital tied up in production. If the amount of tied up capital is very high, which it usually is in process industries, the segmentation can only reach as far as the distribution process, as lean principles is the only possible strategy in the make process and as segmentation in the form of buying more machines for a specific product segment is impossible. If the amount of tied up capital is somewhat lower, segmentation further up the chain could be possible.

While it is possible for some process industry companies to segment as far as the make process it could probably be debated whether or not a segmentation of the buy process is as urgent for process industry companies as it is for many other categories of companies, seeing as the number of production inputs, and thereby also the number of suppliers, usually are much fewer in process industries than in other industries. Different purchasing strategies do probably need to be followed, but identifying segments are most likely easier if the supplier network consists of just a few suppliers as compared to several hundreds.

5.4. Supply chain segmentation frameworks and approaches

The first part of the tenth finding, i.e. that **differentiation of distribution solutions is the most common way of achieving customer differentiation in the supply chain**, does not have an explicit match in theory. However, it could be argued that differentiation of the distribution solution is exactly what Gattorna's (1991) market-based organizational structure is all about (see Figure 18). While Gattorna et al. (1991) did argue that the company should be organized according to customer segments, the customer requirements were only going to penetrate the organization as far as the distribution. This could probably be viewed as some form of decoupling point for the customer requirements, and Gattorna et al. (1991) advocated that it should be located after the manufacturing. Gattorna did however seem to change his view somewhat over the years, as research progressed and later on meant that segmentation should reach further up the chain than just the distribution (see for example the example from the market driven segmentation approach in sub-chapter 3.5.2. Examples from the market driven approach, where pathways through the entire company are suggested). Nevertheless, there is no theoretical match connected to that differentiation of distribution solutions should be more common than further up the chain.

However, the finding cannot really be considered to be very surprising, seeing to fact that distribution (or deliver) is the supply chain activity which is performed closest to the customer. It is therefore only logical that the customer requirements are taken more into account there than further up-stream in the internal supply chain. One could also argue that it often is easier to differentiate the distribution solutions than for example the manufacturing solutions according to customer requirements.

The second part of the tenth finding, i.e. that **segmentations stretching further into the internal supply chain are not as common** (as segmentations of the distribution activity), does not have a theoretical match either. In fact, the reach of supply chain segmentation through the company internal supply chain processes as well as outside of the company borders is a topic not really touched upon in the reviewed literature. One interviewee made the following remark on the topic;

"If you go as far as into the suppliers and the purchasing processes, that is typically where the supply chain segmentation is not the only driver and the enforcing strategy and the replenishment strategy also come into play and also the negotiations around material supply contracts and everything. So it becomes complex. And if you would go further up-stream in the supply chain the segmentation does not make much sense anymore. That would be a principle."
Senior manager

While this opinion was not shared by all interviewees (it is for example stressed in Approach 3 that the entire internal supply chain should be focused on the customer requirements or customer demand) a conclusion actually connected to the concept of supply chain segmentation can be drawn from the discussion of this finding; that complementary to the two dimensions of supply chain segmentation there is also the issue of the internal reach of supply chain segmentation. This reach is inherent in the vertical supply chain customer differentiation dimension, and simply acknowledges how far up the internal supply chain the customer differentiation reaches. From the interviews it can be concluded that there are three different levels of reach; distribution-level segmentation, manufacturing-level segmentation and sourcing-level segmentation. The three levels are depicted in Figure 34 below, and from the findings it is obvious that distribution-level segmentation is, logically, the most common.

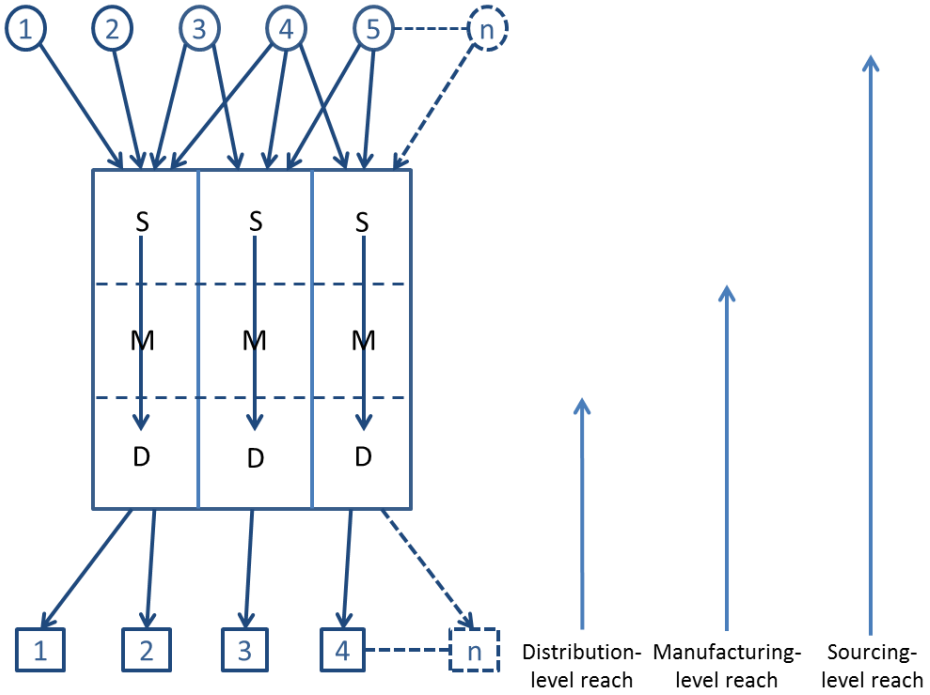

Figure 34: The different levels of supply chain segmentation reach (author).

The first part of the eleventh finding, i.e. that **segments usually include more customers and that the clustering of customers into segments are more commonly based on criteria if the segmentation stretches further up the supply chain than the distribution**, does not have a counterpart in the reviewed literature. It is also a bit difficult to evaluate whether or not the finding is surprising or not. It all depends on what is read into the concept of supply chain segmentation. If giving customized distribution solutions to individual customers on an ad hoc basis is considered to be segmentation, something which could definitely be questioned if it should, it is not very surprising. This is often completely impossible to do in the manufacturing, usually because of capital constraints. As one interviewee put it;

"The ideal would be to have one pipeline for each customer or each product, but that just simply does not work. Everything has to go through the same plant here, which is made up of one big high volume segment. We have to utilize our resources."
Manager

However, it is very difficult to argue that giving customized distribution solutions to individual customers on an ad hoc basis is not customer differentiation, and it is obvious that supply chain segmentation with the customer as the starting point and random customer differentiation in the distribution are concepts which are easily mixed up. It could certainly be argued that customer differentiation in the distribution is one part of supply chain segmentation, but that doing so on an ad hoc basis and with very small segments (for individual customers) is not really segmentation as the horizontal functional synergy dimension is not taken into consideration if providing individual solutions to all customers.

To sum up, it is not very surprising that segments usually include more customers if the segmentation stretches further up in the internal supply chain than the distribution, but it all depends on what is read into the concept of supply chain segmentation.

The second part of the eleventh finding, i.e. that **segmentations based on criteria are usually conducted on a product level**, matches rather well with what is stated in theory. While an explicit match may be lacking, it is obvious from all frameworks presented in the product driven segmentation approach that no matter how many variables or criteria are chosen, every criterion is reviewed for each product. Also in the customer driven segmentation approach it is obvious that criteria are reviewed on a product level, even though the customer is emphasized more strongly than the product. In the approach by Godsell et al. (2011) aiming at combining the product driven and the market driven segmentation approach, the analysis is also conducted for each product, which further supports the trustworthiness of the finding.

Also, in approach 2 (the customer segmentation approach), where it is actually the customers that are being segmented by the criteria, the analysis of the customers and their requirements are made for each product. The interviewee describing this approach did strongly emphasize that the company needed to take the customer more into consideration, which they certainly do through their framework, but in order to take the customers into consideration the analysis must still be done on a product basis. An option would of course be to conduct the analysis on a product family level, which would reduce the time needed for the analysis, but it comes down to how closely related the product families are and the size and composition of the customer base for the families.

While most of the theory fits perfectly with the second part of the fourth finding, there is one theoretical contribution in the market driven segmentation approach which does not really fit and it is the part where Gattorna et al. (1991) introduces the market-based organizational structure (see Figure 18 in the sub-chapter 3.4.2.2. Using the alignment theory to segment supply chains). This does not fit as it certainly does not have to be the case that a certain customer has the same requirements on all products that it purchases from a certain company. It could be argued that the structure presented in Figure 18 would only be true for one product at the time, why there would probably be as many configurations of customer segments as there would be products. Naturally, it all comes down to how diverse and un-related the different products of a certain business are. And Gattorna did later on elaborate, refine and somewhat change his views as his research progressed.

To conclude, it is obvious that different approaches use different levels of customer-product aggregation, but that the products usually are not aggregated at all, i.e. all segmentations are made on a product level. For a certain product, the customers can be aggregated on an industry level, on a sub-industry level or not at all before being analyzed against the criteria. For example, once a specific product is going to be analyzed, it might be possible that a specific customer requirement criterion can be evaluated on an industry level, i.e. that all customers within that industry have similar requirements (e.g. low lead time). However, it might be necessary to break up the industry into sub-industries or even into individual customers if the requirements differ within the industry. The number of levels for each criterion must also be determined, e.g. if the customers for a certain product is going to be divided depending on if their lead time requirements are high or low, or high or medium or low, or very high or high or medium or low and so on. If comparing to the different approaches in research case studies, it can be concluded that there are actually not much difference between the product driven and the market driven segmentation approaches. The difference that actually exists lies in that the product driven segmentation approach always assumes that the level of each criteria is binary, i.e. high or low, without actually investigating the customer base to see if more levels are necessary. For example in the approach by Childerhouse et al. (2002) five criteria are used, all on a binary level. It is clear that the level of customer-product aggregation differs from company to company.

The twelfth finding, i.e. that **teams or processes for cross-functional alignment are more common if the segmentation stretches further up the supply chain than the distribution**, is actually more connected to the research question regarding enablers for supply chain segmentation than approaches to supply chain segmentation. Cross-functional alignment as an enabler is further analyzed in the sub-chapter 5.4.5. Cross-functional alignment. While cross-functional alignment is considered a very important enabler of supply chain segmentation (see sub-chapter 5.4.5. Cross-functional alignment for further analysis of cross-functional alignment as an enabler) there is no reviewed theory that discusses cross-functional alignment combined with the reach of supply chain segmentation. However, the finding can be supported logically; if the segmentation reaches only as far as the distribution activity, teams or processes for cross-functional alignment are simply not needed to same extent as if more supply chain activities are part of the segmentation. Naturally, cross-functional alignment between sales and distribution is of as high importance in distribution solution segmentation as it is in a segmentation that stretches further up-stream, but cross-functional alignment of the entire segment is not as crucial.

The thirteenth finding, i.e. that **the length of the lead time is central to differentiation of distribution solutions**, has a rather strong but perhaps not explicit match in theory. The fact that lead time is a central issue of supply chain strategy in general is apparent from Naylor et al.'s (1999) discussion about the position of the decoupling point and how it is connected to the longest lead time an end-user can accept. Lead time, or more precisely delivery speed, is also one of the potential market winning and/or market qualifying criteria of Hill (1985) and it is present in several of the models and frameworks, both from the product driven and the market driven side. Perhaps it could be argued that stating that the length of the lead time is central to differentiation of distribution solutions is not actually what the theoretical position implies, but that it instead implies that the length of the lead time is central to differentiation of the entire supply chain. However, in the same way as Mason-Jones et al. (2000) discuss that lean and agile can be combined in the supply chain, with agility down-stream and leanness up-stream of the decoupling point, it could be argued that customer requirements should affect the supply chain more in the more agile environment closer to the customer and that they are not as paramount in the leaner environment further up-stream. Nevertheless, the eighth finding is not contradictory to theory and it is not a very surprising finding seen more in the light of common sense; there is a number of rather straightforward ways of achieving differentiation in the delivery process.

The different ways of achieving lead time differentiation in distribution solutions is the concern of the seventh finding, showing **that placing stock points at different locations, using different modes of transport, making the customers plan better and prioritizing some customers ahead of others** are ways to achieve this. While there is no match between this finding and the reviewed research theory, there is most certainly theory in the field of distribution that covers different methods and approaches to differentiation of the delivery activity. This is however outside the scope of this research project, why it is not analyzed in depth any further.

The last finding connected to approaches, i.e. that **lead time pricing is a popular way to differentiate the distributions solutions**, does not really match the reviewed theory. The concept in itself is not very difficult to understand; a higher supply chain performance simply incurs higher costs than a lower. Several of the companies recognized this and found lead time pricing to be an interesting way of giving the customer a choice in the matter. At the same time, some interviewees were concerned that their current distribution network was designed to perform better than it actually needed to, seen in the light of what the customers really needed. One interviewee explained the background to how their company had ended up in this type of situation with that the products previously had had such high margins that it did not really matter much that the distribution solutions

were a bit more expensive or performed a bit better than the customers actually needed. The same interviewee did describe that the situation had markedly changed in recent years, and that the cost of distribution now could be the difference between making and losing money on a specific order.

5.5. Supply chain segmentation enablers

5.5.1. IT infrastructure

The first part of the first finding connected to enablers of supply chain segmentation, i.e. that **IT infrastructure is an important enabler**, reflects theory rather well. While it is not mentioned as a specific enabler for supply chain segmentation by Godsell et al. (2006) or by Godsell (2013), the "information enriched" supply chain where information on demand is captured as close as possible to the market is considered to be an enabler of agile supply chains by Aitken et al. (2005). It must certainly not be the case that all supply chain segments should deploy agile strategies and need to be information enriched, but the increased variability and volatility seem to be a trend for several of the industries in which the companies in this study participates. Furthermore, "information systems" and "open information sharing" are considered bridges for effective supply chain management (Fawcett et al., 2008), why IT infrastructure could be argued to be a bridge or an enabler in the execution of supply chain segmentation as well. A well-developed IT infrastructure could probably remedy the barriers "inability to share information", "inadequate or incompatible information" and "difficulty to measure customer demand" to effective supply chain management also mentioned by Fawcett et al. (2008). While it could perhaps be discussed if barriers and bridges to effective supply chain management immediately and without adaptation can also be considered to be barriers and bridges to supply chain segmentation, the barrier "difficulty to measure customer demand" is obviously a barrier to supply chain segmentation, especially if demand variability is the criterion chosen for the segmentation. Furthermore, several consultancy firms mention enablers or prerequisites for segmentation connected to IT infrastructure; EY mentions information technology infrastructure, Malik et al. (2011) mentions information sharing and E2Open mentions real-time insight. Also, even though Godsell et al. does not mention IT infrastructure as an enabler it could be argued that a well-developed and aligned IT infrastructure would facilitate the alignment of SCOR activities, considered by Godsell et al. (2006) to be a major inhibitor.

Regarding the second part of the finding, i.e. that **it is still possible to manage the execution of supply chain segmentation without well-developed IT infrastructure**, there is not an explicit match in theory. Although it is difficult to argue against that well-developed IT infrastructure would facilitate the execution of supply chain segmentation, well-developed IT infrastructure is not specifically mentioned as an enabler of segmentation in the research literature. It is certainly logically comprehensible that it is not impossible to manage a segmentation without, as well as it is understandable that the gains with IT infrastructure from a supply chain segmentation point of view must be compared to the size of the investment necessary to increase the performance of the IT infrastructure. At the same time, it is highly unlikely that the execution of segmented supply chain strategies would be successful without *any* kind of IT infrastructure.

5.5.2. Organization and Management - Top management support

Out of the enablers summarized in the enabler grouping Organization and Management one significantly stood out from the others; top management support. The high relevance of this enabler shown in the seventeenth finding, i.e. that **top management support is considered to be an extremely important enabler or an absolute prerequisite to the success of a supply chain segmentation initiative**, is mirrored completely in theory. In 2006 Godsell et al. argued that a broad spanning supply chain role at board level can facilitate the alignment of SCOR processes in the supply chain by reducing functional divides. Later, in 2013, Godsell elaborated this further and concluded that ownership of a supply chain segmentation initiative has to reside with the board. Regarding the wider concept of barriers and bridges to effective supply chain management, "lack of top management support" is one of the barriers presented (Fawcett et al., 2008). Also, "lack of a clear vision for supply chain management" is a barrier that could be argued to be, to some extent, bridged by top management support. On top of this, the necessity of top management support (Malik et al., 2011) or senior sponsorship (EY, 2012) is strongly emphasized as prerequisite by consultancy firms with experience from executing supply chain segmentations.

An interesting consideration connected to top management support is that while the lack thereof is stated to be a barrier by Fawcett et al. (2008) no bridges are presented that could knock the barrier, or part of the barrier, down. It seems as if top management support is something that is either there or it is not, something that a supply chain manager either has or has not. Strong indications were received during the interviews that top management support for supply chain actions in general has increased over the last couple of years, but there were also indications that it essentially depends on the understanding and competence of the persons in the top management or board and the persuasiveness of the persons in charge of supply chain. It is clear not only that top management support is extraordinarily important but that the process of receiving it can be rather a daunting task. As one interviewee put it;

"Preferably they shouldn't feel that you have told them to do it, why as supply chain responsible you have to be something of a psychologist. You should get them to say the insight without them realizing that it is actually you that have planted it in their brains. That is the ultimate enabler."
Executive

While top management support was singled out as some sort of prerequisite, because of its importance it did over-shadow the other enablers in the grouping Organization and Management during the interviews. However, the barrier "inflexible organization systems" (Fawcett et al., 2008) and the inhibitor of organizational structure reflecting functional divides (Godsell et al., 2006) should still be considered important issues to bridge for the success of supply chain segmentation.

Nevertheless, top management support is an extremely important enabler or even a prerequisite to the success of supply chain segmentation, except perhaps in companies with a more decentralized structure, where lower management support could suffice.

5.5.3. Performance measurements

The eighteenth finding, i.e. **that performance measurement is considered to be an important enabler and that it is necessary to align the performance measurements of each function within a segment to avoid sub-optimizations**, is the almost complete literal reflection of some of Godsell et al.'s (2006) theory except that Godsell et al. see it the other way around, i.e. that using measures that

do not focus on aligning the goals of the segment is a major inhibitor to supply chain segmentation. It is argued that this will lead to sub-optimizations and that a supply chain strategy cannot be customer responsive without boundary-spanning performance measures, focusing on optimizing the performance of the supply chain as a whole and not of the individual functions (Godsell et al., 2006). It almost goes without saying that aligning the SCOR activities would be a practically impossible task if each activity has differing or, even worse, opposing goals cemented by differing or opposing performance measures. Furthermore, "non-aligned performance measures" is, along with "inconsistent operating goals", considered to be barriers to effective supply chain management (Fawcett et al. 2008). Bridges such as "steering committees" and "chain advisory councils" (Fawcett et al., 2008) are perhaps a bit vague but it is not very difficult to argue that a *chain* advisory council would increase the understanding of the chain as a whole and therefore aid the alignment of the segment and its performance measures. Also in consultancies the alignment of performance measurements is stressed as an enabler for supply chain segmentation, for example by EY underlining that segment strategies have to be driven by performance metrics closely integrated with company goals and with a clear end-to-end view (EY, 2012).

As the finding match not only with theory on both supply chain segmentation, supply chain management and the opinion of more practical experts it can be concluded that segment aligned performance measurements is an enabler for supply chain segmentation as it reduces the risk of sub-optimizations.

5.5.4. Communication

The nineteenth finding, i.e. that **communication between departments is considered to be an important enabler and that communication between the sales department and the supply chain organization is integral**, could certainly be argued to be strongly connected to several of the other enablers. However, many interviewees did express that communication should be considered as an enabler of its own. It might be even be sensible to see communication as some form of enabler for other enablers, for example in aligning performance measurements and harmonizing IT infrastructure. The need for communication is of even greater importance if an organization lacks aligned performance measurements and segment compatible IT infrastructure.

It is also certainly not illogical to argue that the different types of alignment mentioned by Godsell et al. (2006) (alignment of SCOR activities, between demand fulfillment and demand creation processes, between the demand fulfillment and new product introduction processes) would be difficult to achieve without communication over different organizational boundaries. Godsell (2013) also stresses the need to keep communication simple, so that all employees of an organization can understand the segmented approach. "Unwillingness to share information" is a barrier to effective supply chain management (Fawcett et al., 2008) and it is obvious from the finding and quotes from the interview study that this most certainly is a barrier for supply chain segmentation as well. The importance of communication is also stressed through the bridge "collaboration", as collaboration without communication is very challenging. Even though there are matches between the finding and the theory regarding communication, they are perhaps not as strong as in the cases of some of the previous enablers. One reason for this could be that communication is implicit in many other enablers and therefore not always seen as an enabler itself.

5.5.5. Cross-functional alignment

The first part of the twentieth finding, i.e. that **S&OP is considered a very important enabler or prerequisite**, is quite obviously interlinked with the second part of the fourth finding, i.e. that **communication is especially important between the sales department and the supply chain organization**. The finding has a strong theoretical match in the alignment between the demand creation and demand fulfillment processes discussed by Godsell et al. (2006) and in the "one owner of supply and demand planning" advice given by Godsell (2013). However, as the author interestingly noted during several of the interviews, purchasing was often not considered to be part of operations, but to be an entirely separate function, why a process for S&OP did not always entail a process for *supply* and demand planning, but more of a process of production and demand planning. There were certainly cases in which S&OP did actually entail matching supply and demand through the entire internal supply chain, but it is none the less obvious that the views of the different companies in the study regarding the definition of operations differed quite a lot.

Having said that, one interviewee specifically argued that planning supply, production and demand in an integrated process is an absolute necessity, but that it on its own still is not enough for supply chain competitiveness today, due to increasing market volatility. While this might be true in some industries, it is not certainly so that it is the case in all companies, why the concluding remark regarding S&OP as an enabler is that it is indeed an important enabler that can sometimes and in some industries be considered a prerequisite.

The second part of the finding, i.e. that **different processes for S&OP are usually needed in different supply chain segments**, does not have an explicit match in theory. Nevertheless, it could be connected to the inhibitor "difficulty in focal firms to find an appropriate mechanism to manage the supply chain" mentioned by Godsell et al. (2006), as the reason for this difficulty could be that the focal firms do not acknowledge the fact that there are different segments needing different management mechanisms.

5.5.6. Holistic perspective

An issue connected to the twenty-first finding, i.e. that **taking a holistic perspective on supply chain is considered to be a very important enabler**, is that a company's attitude towards what a holistic perspective really entails strongly depends on what different persons, managers etc. actually find is incorporated in the definition of a supply chain. Just as there was obvious disagreement among the interviewees regarding what operations really entails, there were differing opinions regarding what supply chain really entails. In some cases manufacturing was not considered to be a part of supply chain, in others there was a strong divide between the inbound part of the supply chain and the outbound, in yet others purchasing was seen as separated from supply chain and so on. There were also cases where all of the SCOR activities (Supply Chain Council, 2006), similar to the supply chain definition of this research project, were considered to be part of the supply chain. The different opinions on what the supply chain really entails were usually reflected in the organizational structure of the companies. However, it was not always the case that the individual interviewee's opinion matched with how the company was organized.

Nevertheless, the finding that a holistic perspective is an enabler does not have an explicit match in theory. It can however be concluded that alignment of the SCOR activities, the importance of which is strongly emphasized by Godsell et al. (2006), would be very difficult if the general thinking within an organization would be that all of the activities are not really part of the supply chain. Whether it matters much if a company is organized as if all of the SCOR activities are part of the chain or not

could be debated and this also one of the main differences between the product driven and market driven segmentation approach. The market driven segmentation approach emphasizes the need to organizationally separate the different segments, whereas this is not really the focus of the product driven segmentation approach. To once again quote the interviewee expressing that the picture 5 in the slide package could be achieved without organizationally separating the segments;

"You could achieve the principle depicted in this picture anyway, with the use of the right measurements."
Senior manager

An important aspect to take into consideration in this case is that in order to come up with the right measurements and implement them throughout the segment is inevitably dependent on taking a holistic perspective to the supply chain. This is also emphasized by EY (2012) in the enabler "clear end-to-end" view.

It can be concluded that taking a holistic perspective of the supply chain, i.e. to really understand that a supply chain consists of all of the activities plan, source, make and deliver, is a prerequisite to supply chain segmentation.

5.5.7. Governance structure and responsibility

The first part of the finding connected to responsibility and governance issues, i.e. that **having clearly allocated responsibilities within the organization is considered an important enabler**, does perhaps not have a match as explicit in theory as some of the other findings do. However, there are several ways in which the finding could be connected to specific enablers/inhibitors mentioned in theory. Godsell et al. (2006) state that difficulty in focal firms to find an appropriate mechanism to manage the supply chain is a major inhibitor to supply chain segmentation. It could quite easily be argued that having clearly assigned responsibilities/a clear governance structure is an important part in any mechanism set up to manage a supply chain. Also, the barrier "managerial complexity" (Fawcett et al., 2008) could to some extent be considered to be reduced by clearly allocating responsibilities within the organization. It is obvious that managerial complexity could arise for other reasons than the lack of clearly assigned responsibilities, but nevertheless, depending on the kind of managerial complexity a clear governance structure could probably reduce it. One of the bridges described by Fawcett et al. (2008) is "people empowerment". To empower the people within an organization in a structured way without a clear governance structure would logically be really tough, why the conclusion that it would be equally tough to empower people within a segment within an organization without a clear governance structure is close at hand. Also, the bridge "steering committees" mentioned by Fawcett et al. (2008) could be considered to be linked to responsibility allocation and governance structure. However, this bridge is also linked to several of the other enablers, especially those connected to cross-functional alignment.

When it comes to enablers presented by consultancy firms the match is clearer. EY (2012) emphasizes real ownership of segments as well as the need to combine performance measurements with a model for governance structure as enablers for supply chain segmentation.

Also, assigning responsibilities is considered to be important in all forms of team work, and ultimately the supply chain could, as well as companies in general, be considered to depend strongly on team work.

The second part of the finding, i.e. that **governance structure is viewed as a particularly important enabler in matrix organizations, or alternatively, that the lack thereof is considered a big challenge**, is hardly surprising once scrutinized with common sense and logic. Matrix organizations can, as highlighted by some interviewees working in this type of environment, be really organizationally complex why it is only logical that clearly assigned responsibilities/a clear governance structure can reduce the managerial complexity and be an enabler for the management of not only the supply chain but the entire organization.

It can be concluded that clearly assigned responsibilities/a clear governance structure is an enabler for supply chain segmentation in all companies, but could be considered to be even more important where managerial complexity is high, as for example in matrix organizations.

5.5.8. Additional enablers found

The last finding connected to enablers, i.e. that **team work and employees' mindsets and skills, as well as capabilities for change management are enablers for supply chain segmentation**, fits rather well with theory even if the enablers summarized in this finding usually are only mentioned in passing in theory. Godsell (2013) does not mention change management as an explicit enabler but instead ends the advice connected to enablers with stating that segmentation must be underpinned by all principles of change management. Fawcett et al. (2006) do not mention change management as a specific enabler either, but do instead see "resistance to change" as a barrier. However, as previously stated, a barrier can, once overcome, act as an enabler, why capabilities for change management is considered to be an enabler. Team work is not specifically mentioned in theory either, but is implicit in many other concepts. All the different forms of alignment mentioned by Godsell et al. (2006) could be argued to be very difficult to achieve without the employees realizing the necessity of team work. One could also argue that team work really is just a subset of cross-functional alignment and a bridge for the barrier "cross-functional conflict" (Fawcett et al., 2008). Also, "lack of training for new mindsets and skills" is considered a barrier to effective supply chain management by Fawcett et al. (2008) which undoubtedly could be connected to this the last finding.

It can be concluded that the very last finding connected to enablers perhaps is not as unambiguous as several of the other findings on enablers for supply chain segmentation, but that the parts therein nevertheless can aid the execution of a supply chain segmentation initiative.

5.5.9. Concluding analysis of enablers

It is impossible not to note the interconnectedness of several of the enablers and it is obvious that they are strongly intertwined. In several cases possessing capabilities and organizational readiness connected to one enabler or enabler grouping makes it easier to progress with other enablers and vice versa. For example, taking a holistic view of the supply chain helps understanding if the organization's needs are to increase performance in the horizontal functional synergy dimension or in the vertical supply chain customer differentiation dimension, which is important for the entire concept of supply chain segmentation. However, taking a holistic perspective to supply chain is also a prerequisite for achieving real cross-functional alignment, for aligning the performance measurements of each segment, for allocating the responsibilities in a segment in an effective way, for controlling the complexity of the supply chain and for forming an effective process of the segmentation. At the same time, without the top management understanding and support of a holistic supply chain perspective, several of these enablers lose some in meaning and the segmentation is less likely to succeed. An enabler for creating understanding of which criteria to segment upon is adequate IT infrastructure,

especially if demand variability is an important criterion. Adequate IT infrastructure is also an enabler for controlling the aligned performance measurements and to ensure progress of the alignment etc.

It is evidently so that the enablers are somewhat hierarchical in their nature, where some are enablers not only for supply chain segmentation but also for other enablers and some are prerequisites both for other enablers and for supply chain segmentation. Organizational maturity in several of the enabler fields is helpful for other organizational issues than supply chain segmentation as well. Clear governance structure makes the entire organization more efficient. IT infrastructure facilitates the measuring of other things than segmentation as well. Cross-functional alignment is good for innovation etc. In the end, with a high maturity in all enabler fields the supply chains will do what they are supposed to do, which is to meet the customer demand and requirements, and they will do so using as little as possible of the organizational resources, i.e. as effectively and as efficiently as possible.

Having said that, maturity in all enabler fields is not a prerequisite to supply chain segmentation success. The enablers can be viewed more as supporting processes in the execution of segmented supply chain strategies, comparable to the supporting processes described by Porter in his value chain of 1985. The enablers are summarized in Figure 35 below, with top management support and holistic supply chain perspective concluded to be prerequisites and not enablers and therefore presented outside of the supporting processes.

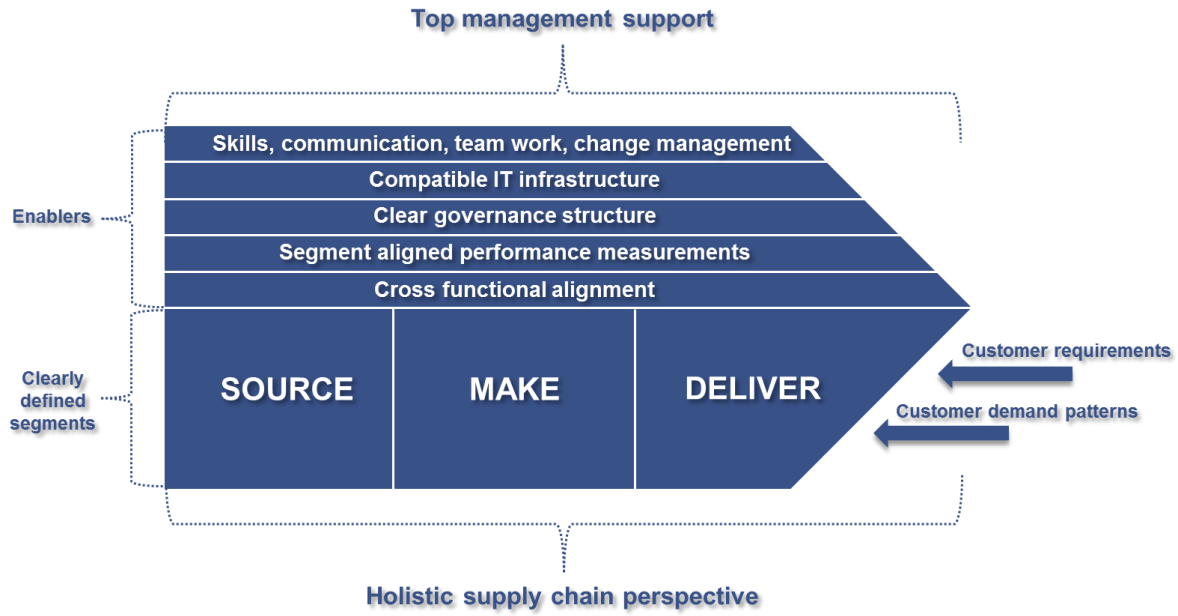

Figure 35: The key enablers and prerequisites of supply chain segmentation (author).

Advice regarding which enablers, apart from the prerequisites, that a company should prioritize cannot be generally concluded, why the advice to supply chain managers would be to evaluate the organizational readiness in all enabler fields and thereafter ensure the full utilization of the enabler fields in which the company already possesses strength. For example, a supply chain segmentation initiative may still succeed even though no investments in new and enhanced IT systems for segment alignment and control are made, as long as a clear governance and reporting structure is in place. However, if the company readiness is low in crucial enabler areas, naturally, the advice would be to prioritize and then improve the fields as much as necessary.

5.6. Further reflections

The very last finding of the study, i.e. that **it is common for the interviewees to see the current way of organizing the company and controlling the supply chain as something unplanned in which the company has landed without particular reason**, matches to a certain extent with theory. All descriptions of examples and research case studies from the market driven segmentation approach end with restructuring of the organization. This would naturally not be necessary if the companies had planned and structured themselves according to supply chain segments from the start, which supports the finding.

However, there are obviously many aspects to take into consideration once determining the structure of an organization, but since supply chain in most cases was not really an issue or an influencing factor in the years when many companies determined their organizational structure and way of working, the finding is not really surprising. It could be concluded that no matter if supply chain segmentation results in reorganizing the company or not, it will render a supply chain which is not unplanned.

5.7. The framework for a segmented supply chain

In order to disentangle a supply chain situation in which a company has landed seemingly without reason, or a situation where most previous decisions have been taken without considering the impact on the supply chain, an eight-step framework consolidating the knowledge gained from this research project can be followed, see The framework for a segmented supply chain in Figure 36 below.

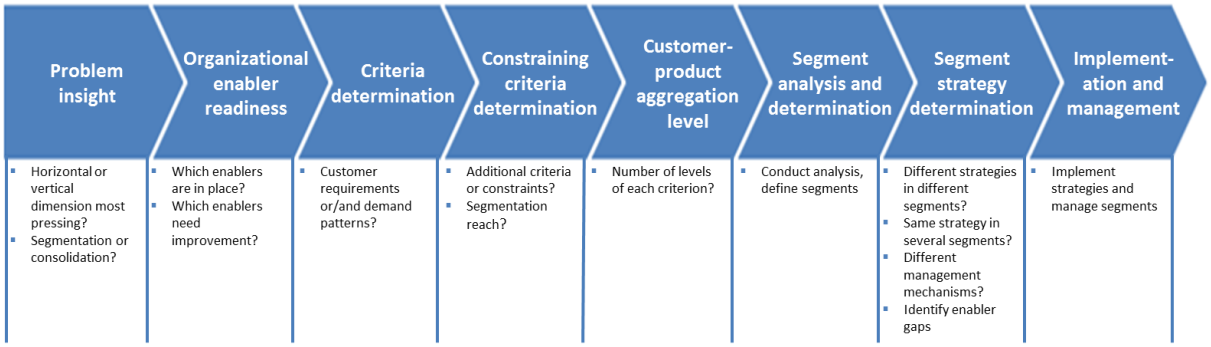

Figure 36: The framework for a segmented supply chain (author).

This framework offers guidance in the process of supply chain segmentation and in finding an appropriate mechanism to manage the segments, no matter if it is supply chain segmentation or consolidation that is on top of the agenda. For example, while consolidation might be on the top of the agenda in a decentralized organization, it might not be possible to physically consolidate segments, why the result of a segmentation analysis could show that a potential way to manage the supply chain would be to use benchmarking between segments following the same strategies. Naturally, if segmentation is on top of the agenda, the analysis could provide the exact opposite result, i.e. that benchmarking two segments deploying different strategies is essentially wrong, that different mechanisms must be used to manage different supply chain segments and that the segments have to be run completely separately from each other. No matter what, the framework, combined with the enablers in Figure 35 further above, can help supporting and guiding companies through supply chain segmentation.

6. CONCLUSIONS

This chapter presents the overall conclusions of the research project. The conclusions are drawn from the comparison of the findings of the interview study and the theoretical framework which was made in the analysis chapter. The conclusions are connected to the research questions and implications for future research and managers are suggested.

6.1. The supply chain segmentation concept

Supply chain segmentation always start with the customer and after that the concern of supply chain segmentation is the balancing of two dimensions, stated in bullet points and summarized in Figure 37 below;

- The horizontal functional synergy dimension
- The vertical supply chain customer differentiation dimension

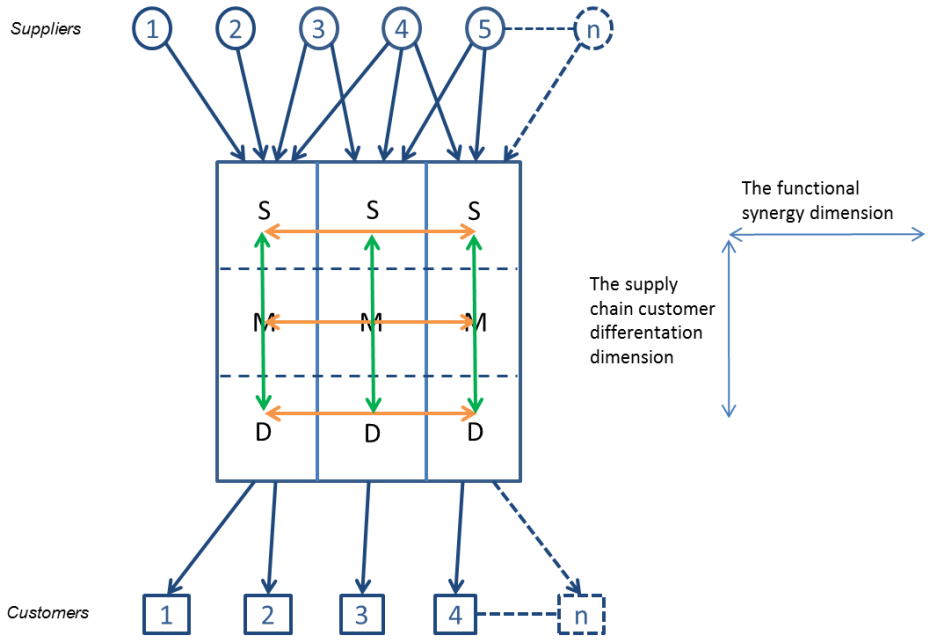

Figure 37: The two dimensions of supply chain segmentation (author).

Which dimension that historically has been the stronger of the two, has consequences for how the general concept of supply chain segmentation is perceived. If the functional synergy dimension has been the stronger, which is likely in more centralized companies, the general concern of supply chain segmentation is shifting from a supply chain thinking of "one size fits all" to "one size does not fit all". If the focus has been the opposite, i.e. that the supply chain thinking has been "one size does certainly not fit all", which is likely for more decentralized companies, the general concern of supply chain segmentation is consolidation, i.e. shifting from the "one size does certainly not fit all" to "one size does fit all". Supply chain segmentation and supply chain consolidation are visualized in Figure 38 below.

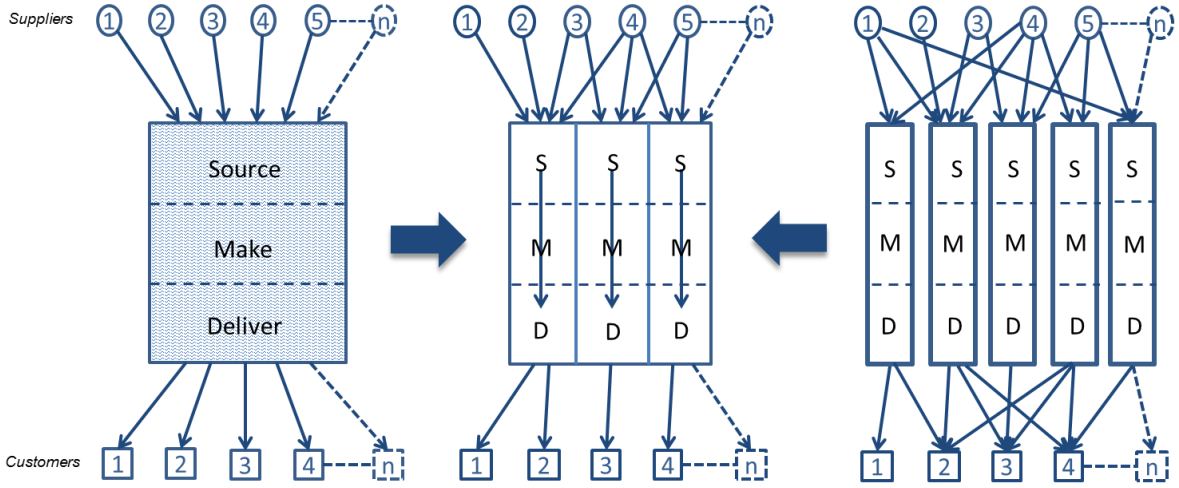

Figure 38: The two opposing views of the supply chain segmentation concept (partly inspired by Gattorna et al., 1991, p. 10).

Supply chain segmentation can have different reach, depending on how far up the vertical supply chain customer differentiation dimension the segmentation reaches. The concept is parable to that of the decoupling point but for penetration of the customer requirements or customer demand instead of the order. There are three different reaches of supply chain segmentation, stated in bullet points and visualized in Figure 39 below.

- Distribution-level reach
- Manufacturing-level reach
- Sourcing-level reach

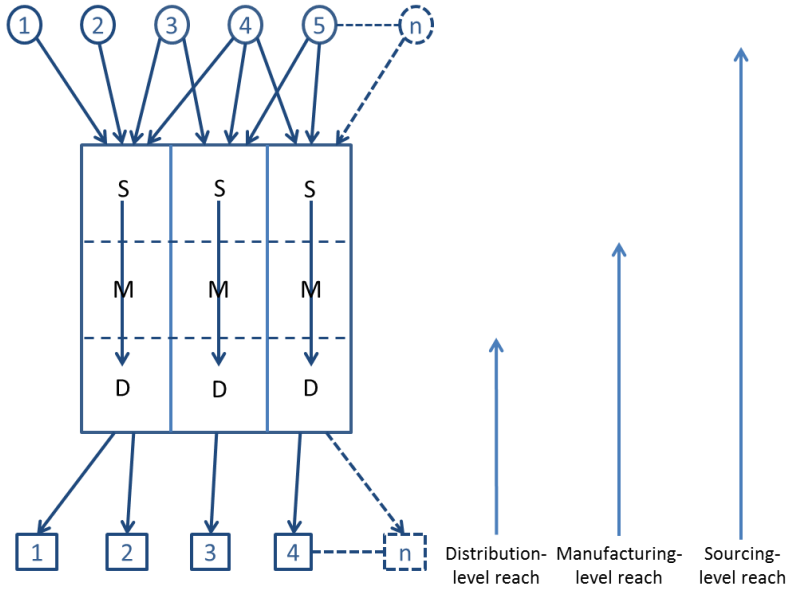

Figure 39: The different levels of supply chain segmentation reach (author).

6.2. Supply chain segmentation criteria

The criteria used for supply chain segmentation should have their basis either in customer requirements or customer demand patterns or both. No general conclusion can be drawn regarding

when a specific criterion or a specific combination of criteria should be used, since that differs from case to case and company to company. However, a pattern was found among companies in the heavy machinery producing industry where the criterion "nature of the demand" commonly rendered different segments for machinery production, spare parts and consumables. Additionally, the distinction between standard and special products is widely acknowledged although not always used in industrial companies. It is also clear that supply chain differentiation or segmentation can be conducted without explicitly being based on criteria.

There are often other criteria and constraints, not necessarily having their basis in customer requirements or customer demand patterns (although they sometimes have), that can affect the identification of supply chain segments and the supply chain strategy within a segment. Examples of such criteria and constraints are;

- Legislative criteria/constraints
- Product characteristics criteria (e.g. product size)
- Geographical constraints
- Production technology constraints

The presence of these types of criteria and constraints also differs from case to case and from company to company.

An industry in which the reach of supply chain segmentation is affected by a constraint is the process industry. Supply chain segmentation is constrained to the distribution activity if the amount of capital tied up in production is very high (i.e. a production technology constraint), something which is very common for process industries.

6.3. Supply chain segmentation frameworks and approaches

Differentiation of the distribution solutions is, unsurprisingly, the most common way of achieving customer differentiation in the supply chain. In this kind of segmentation criteria are used more seldomly for the segmentation analysis than in segmentations stretching further up the internal supply chain. If the segmentation is based on criteria the analysis is usually conducted on a product level. For distribution solution segmentation the length of the lead time is a particularly central topic and pricing of the lead time is a popular way of achieving differentiation in the distribution solutions.
It is clear that while segmentations using criteria analysis are conducted on a product level, the level of customer-product aggregation differs from company to company and depends on how thorough and resource demanding the analysis should be.

6.4. Supply chain segmentation enablers

There are many enablers for supply chain segmentation, but top management support and taking a holistic perspective to supply chain are the most important and are concluded to be prerequisites instead of enablers. The prerequisites and all key enablers are summarized in Figure 40 below.

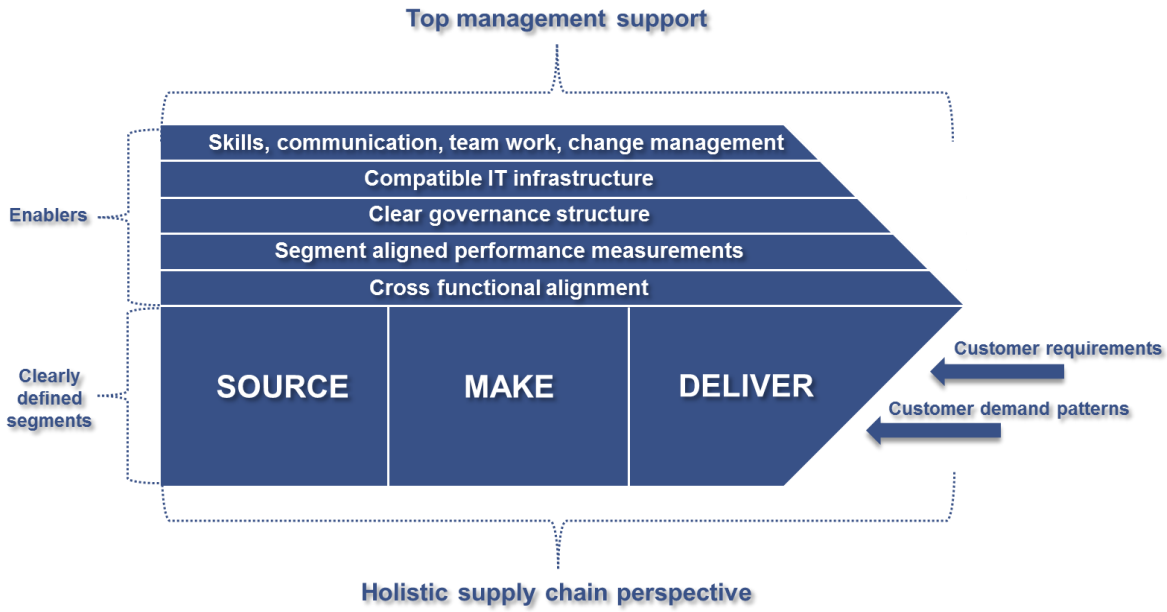

Figure 40: The key enablers and prerequisites of supply chain segmentation (author).

6.5. Implications for managers

The implications of this research for managers about to conduct supply chain segmentation are summarized in the framework for a segmented supply chain, see Figure 41 below. In the problem insight phase a holistic supply chain perspective enables understanding of whether the horizontal functional synergy dimension or the vertical supply chain customer differentiation dimension is the most pressing and whether to focus on segmentation or consolidation. In the second phase the organizational readiness connected to the prerequisites and key enablers presented in Figure 40 is evaluated and improvement areas prioritized and determined. In the third phase criteria, connected either to customer requirements or customer demand patterns or both, are determined. This phase is enabled by cross-functional alignment and collaboration between the supply chain organization and the sales department, as well as by IT infrastructure for tracking demand patterns. Potential constraining criteria are identified in the fourth phase, along with determination of the reach of segmentation. The customer-product aggregation level is determined in the fifth step, where the number of levels of each criterion as well as the aggregation of customers on an industry/sub-industry or individual level is determined. In the sixth step the analysis is conducted according to the determined criteria, constraints and aggregation level and the segments are defined. In the strategy determination phase the strategies, management mechanisms and KPIs for each segment are determined and potential benchmarking between segments is identified. In the final step the strategies are implemented and the segments managed in accordance with the strategies decided upon.

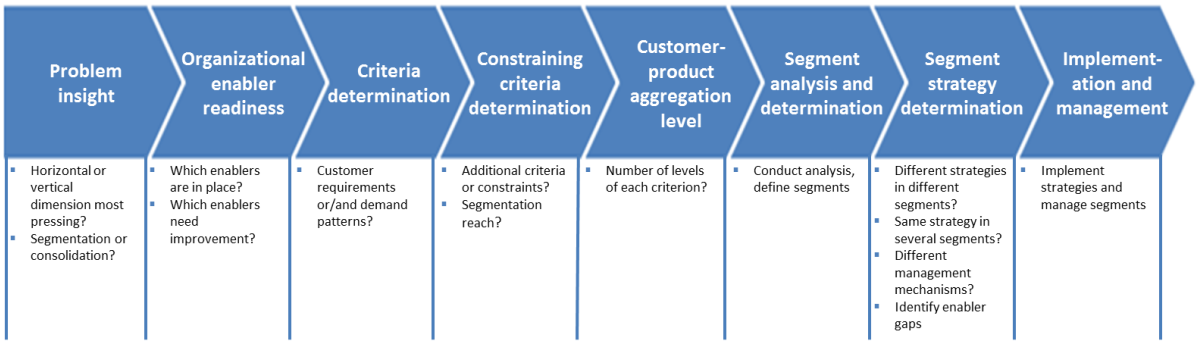

Figure 41: The framework for a segmented supply chain (author).

6.6. Implications for future research

The contribution of this research project originates from the purely industrial setting in which the companies in this study are situated. As previous research on supply chain segmentation usually has not had an industrial focus, this research provides a new perspective to the topic. However, as well as providing a new perspective, it also opens up for further research. Indications were received during some of the interviews that supply chain segmentation might not be as applicable in an industrial setting as in the fast-moving consumer goods industry (see Finding 4). During others, or sometimes even during the very same interviews where this kind of opinion was expressed, indications were received of the opposite. Further research would have to be conducted to shed light on this particular issue.

Furthermore, supply chain segmentation can obviously be conducted on different levels within an organization. In some of the participating companies supply chain segmentation was part of a group- or company-wide initiative, where the result could be major organizational restructuring, or it could be an initiative in a specific business area or at a specific production site. Further research would be needed to investigate the specific characteristics of supply chain segmentation connected to each of these levels.

Additionally, the different hierarchical positions of the interviewees showed that the tasks connected to supply chain segmentation differed depending on the position. Typically, the roles of the executives were to ensure management support (if they themselves were not part of the highest management) and securing that the key enablers and organizational structures were in place. The roles of senior managers and managers were more connected to conducting the segmentation analysis and managing and controlling the supply chains. However, these patterns were not completely unanimous, why more research would be needed to provide additional advice to managers regarding the tasks of different hierarchical levels.

Another interesting area touched upon during some interviews was that of taking over value chain activities which were originally outside the company's scope. Although this clearly is another way of achieving supply chain differentiation, it was not the focus of this research project and hence further research would be necessary for investigating this kind of differentiation.

While the criterion of product life cycle is frequently mentioned in the literature it was usually mentioned rather fleetingly by the interviewees and has therefore not been discussed very thoroughly in this research project. At first glance, it seemed that product life cycle was not really an important criterion in more industrial companies. However, during the data collection it did become clear that

this criterion might have been neglected in several of the companies, rendering overlarge product ranges and issues connected to aftermarket service. As one interviewee put it;

”There has been more and more and more customer adaptation which in turn generates more and more and more requirements and a much greater range of products. And you must provide service to customers for all products.”
Executive

Further research connected to how to deal with issues connected to the product life cycle criterion would be needed for deeper understanding of the field.

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APPENDIX 1

INTERVIEW GUIDE

Interview with:
Company:
Position of interviewee:
Expected duration: 1 h 30 min
Date:

A: OPEN

First: Introduce myself. Purpose of study. Background about Triathlon. Confidentiality issues. (Picture 1 and 2 from slide package if necessary).
Present agenda: Picture 3 from slide package.

1: Interviewee background
How long within the company?
Positions?
Previous experience/companies?

2: Company background
Company part of group?
Responsible for BU or entire organization?
Main products/product groups? Nbr of products?
Production abroad? Nbr of facilities?

3: Supply chain function background
One in each BU?
Represented in company management?
Report to?
Current focus on specific topic/functional area (restructuring, supplier base, visibility etc.)?
Organization? Picture 4 from slide package.

B: BODY

4: Personal SC segmentation awareness
Heard or thought about it/work with it?
Definition?

Show Picture 5 from slide package
5: SC segmentation in current organization
How have you done/where did you start?
Different strategies?
Clear responsibility allocation? Follow product end-to-end? Internal functional alignment? Balance of power internal/external? Management mechanisms?

6: SC strategy segmentation drivers
Why work with it/not work with it?

Why need a differentiated approach to SC strategy?
Confirm or repudiate list in Picture 6 in the slide package

7: SC strategy segmentation criteria
How to start (once current situation is clear)? (Picture 5-6 from the slide package).
Strategic starting points? MW/MQ? Demand patterns etc.?

8: SC segmentation constraining factors
Criteria and factors that further influence how the physical pathways will run through a business?
Picture 7 from the slide package + grade. (Picture 8 if necessary)

9: SC segmentation enablers/barriers
What are prerequisites and enablers to execute the segmentation in the organization? To provide complete visibility and alignment in the pipeline/segment? Show Picture 9 from the slide package + grade.

C: CLOSE

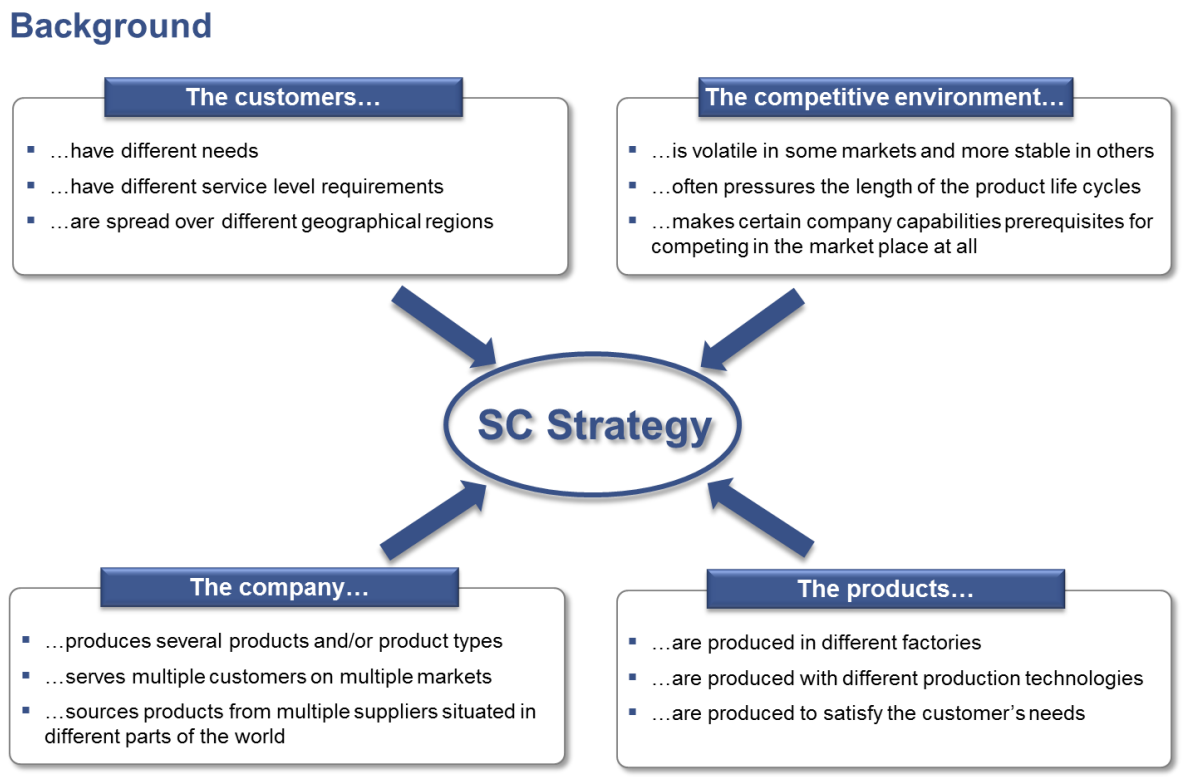
10: Objectives and gains with segmentation approach
What would be/is the objective of conducting supply chain segmentation?
(If they have done it). Would recommend it to others?
Challenges right now? Plans for SC function?
Picture 10 from the slide package – place in picture.

11: Closing
Missed something? Want to say more?
Can I come back with further questions? E-mail? Phone?

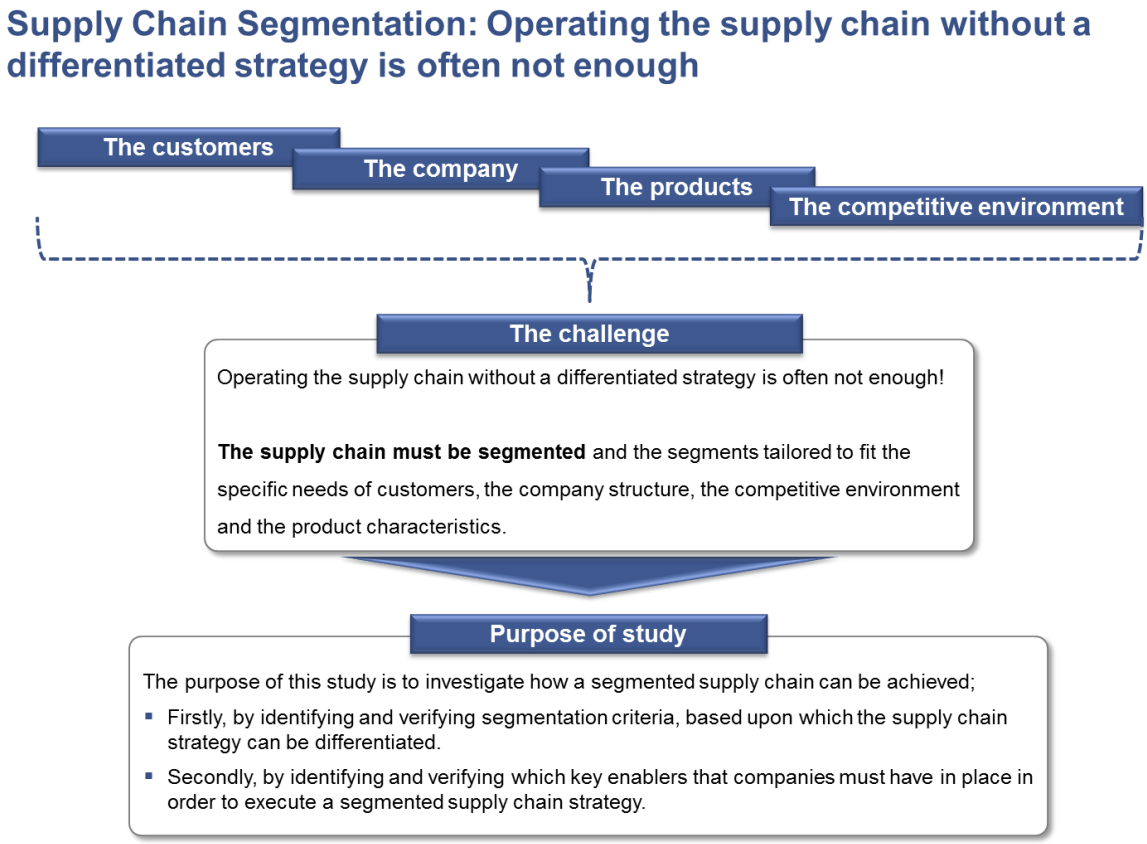
APPENDIX 2

SLIDE PACKAGE

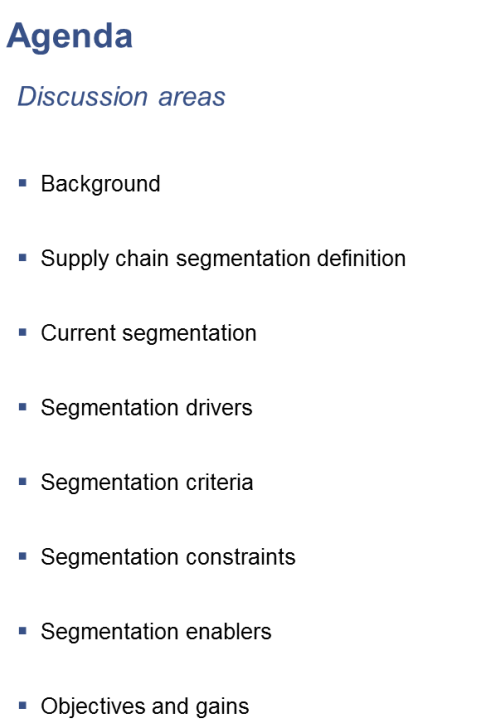
Picture 1



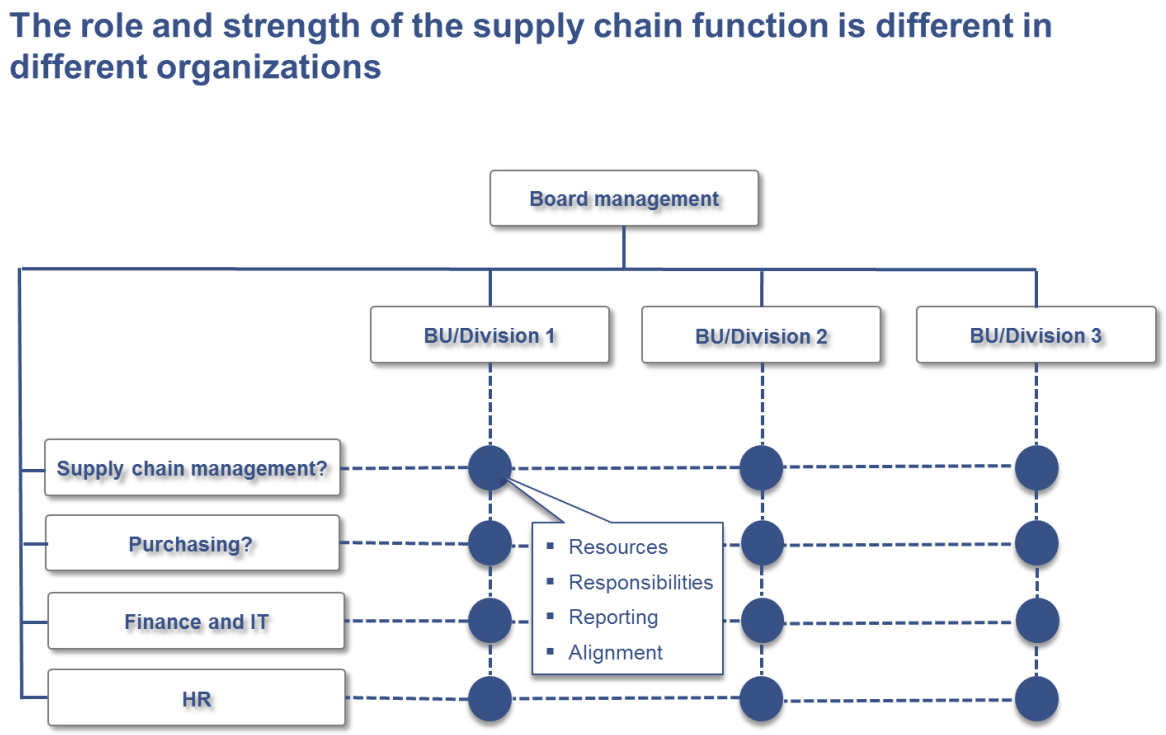
Picture 2



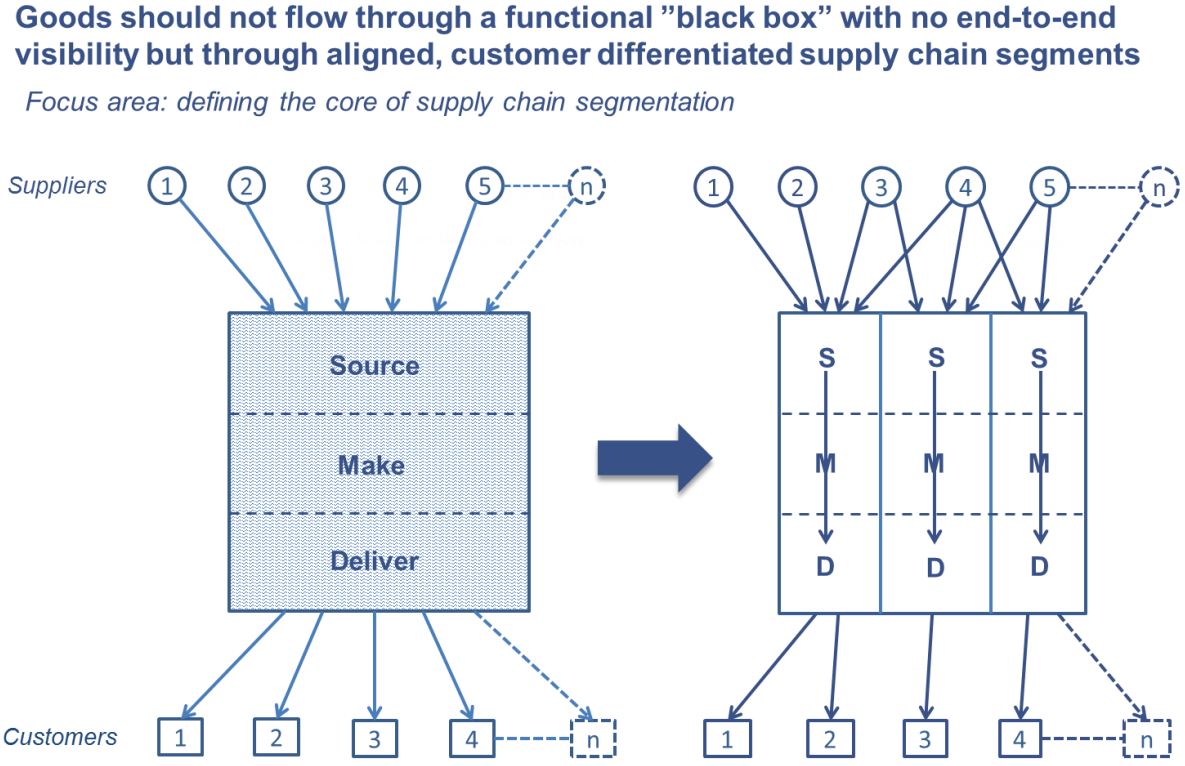
Picture 3



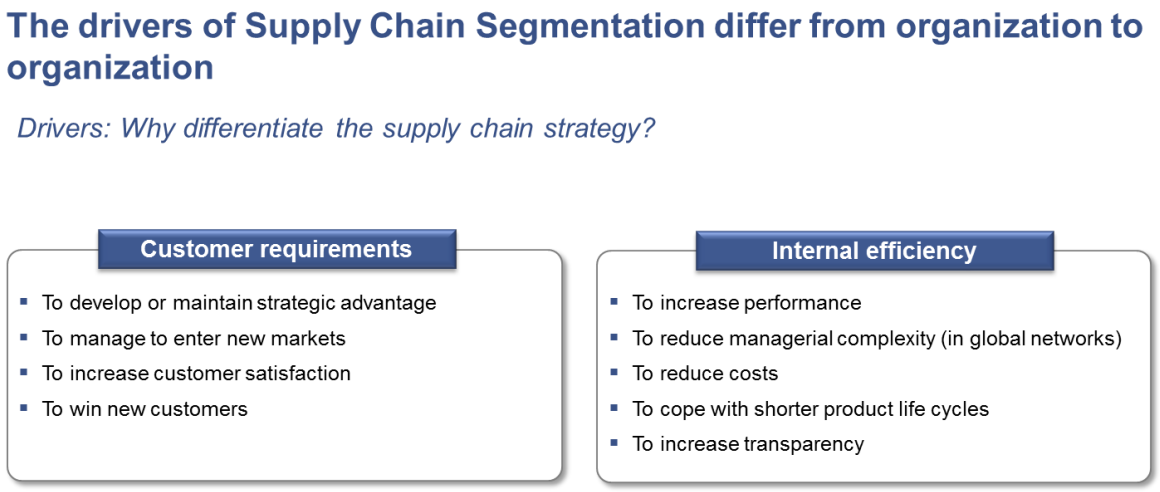
Picture 4



Picture 5



Picture 6



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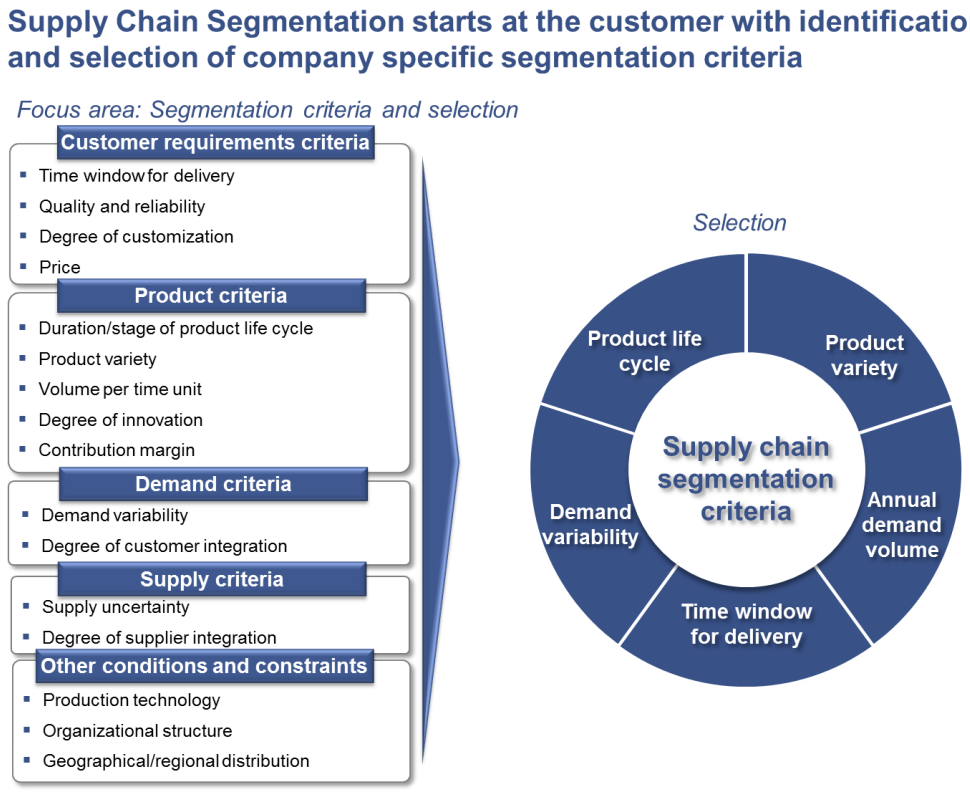
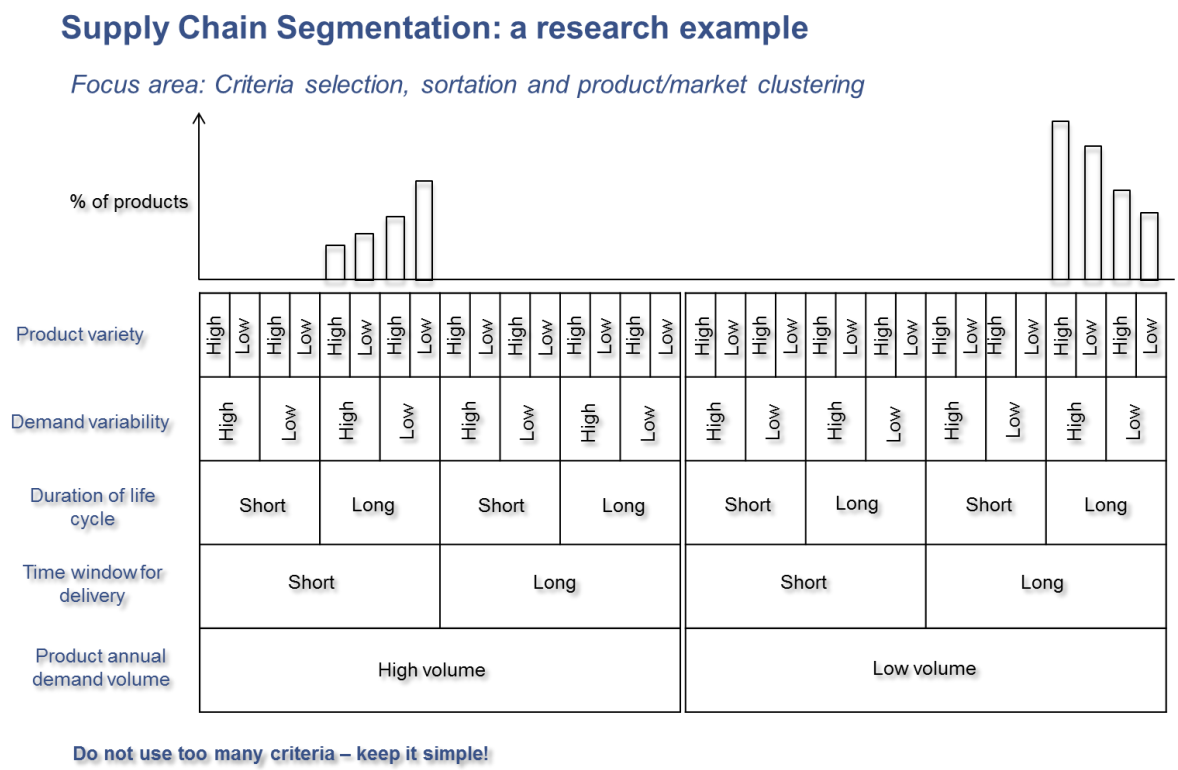
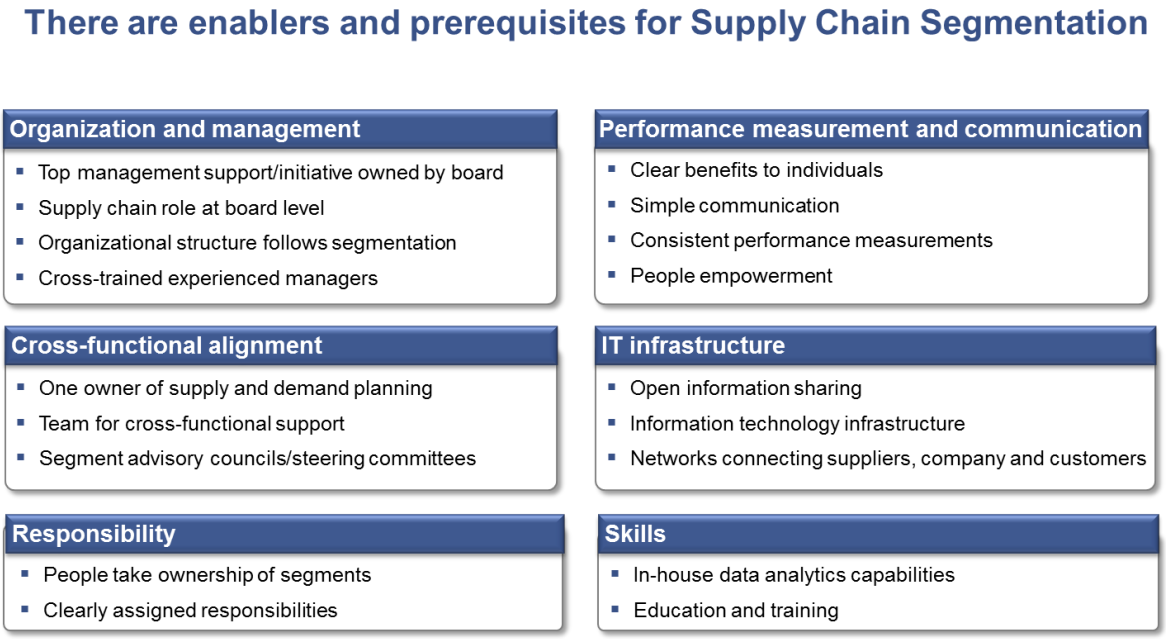


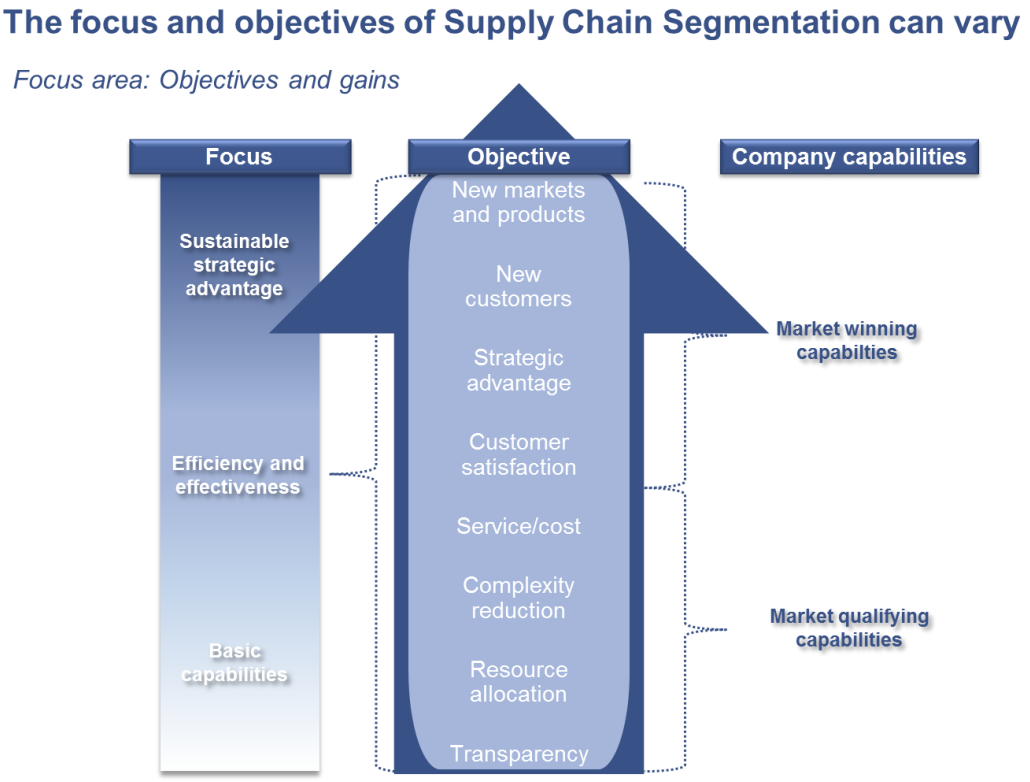
Picture 8



Picture 9



Picture 10


The focus and objectives of Supply Chain Segmentation can vary
Focus area: Objectives and gains
Focus
Objective
Company capabilities
Sustainable strategic advantage
Efficiency and effectiveness
Basic capabilities
New markets and products
New customers
Strategic advantage
Customer satisfaction
Service/cost
Complexity reduction
Resource allocation
Transparency
Market winning capabilties
Market qualifying capabilities

APPENDIX 3

CODES

General categories: Internal contextual factors, External contextual factors, Supply chain strategy, Supply chain segmentation, Approaches, Criteria, Enablers
Possible quotation (Q)

The numbering in the column to the right refers to the connection of the code to a specific subset of the theoretical framework (where 1=Definitions, 2=Supply chain strategy, 3=Criteria for the development of a segmented supply chain strategy, 3.1=The product driven approach, 3.2 The market driven approach, 4=Approaches and frameworks from research case studies, 5=Enablers for the execution of a segmented supply chain strategy)

Internal context (IC)	1, 2, 3, 4, 5
- Centralized/decentralized/matrix organization (IC-CO/DO/MO)	2, 3.2, 4
- Centralized/decentralized supply chain function (IC-CSCF/DSCF)	1, 2, 3.2, 4
- Organization characteristics (IC-OC)	3.2, 5
- Supply chain function coverage (source, make, deliver) (IC-SCFC)	1, 2, 3, 5
- Supply chain internal importance (IC-SCII)	2, 5
- Product range (IC-PR)	2, 3, 4, 5
- Product type (IC-PT)	2, 3, 4
- Production footprint (IC-PF)	2, 3, 4
- Production characteristic (IC-PC)	3, 4
- Interviewee background (IC-IB)	1, 2, 3, 4, 5
External context (EC)	2, 3, 4, 5
- Market characteristics (EC-MC)	3, 4, 5
- Customer characteristics (EC-CC)	2, 3, 4, 5
Supply chain strategy (S)	1, 2, 3
- Goals (S-G)	1, 2, 3
- Make-to- strategy (S-MTS)	2, 3
Supply chain segmentation (SCS)	2, 3, 4
- Awareness (SCS-A)	3, 4
- Definition (SCS-D)	3, 4
- Drivers (SCS-DR)	3, 4
- Process (SCS-P)	3, 4
- Market segmentation (SCS-MS)	3, 4
- Customer segmentation (SCS-CS)	3.2, 4
- Special thoughts (SCS-ST)	
- Starting point (SCS-SP)	3, 4
- Product segmentation (SCS-PS)	3.1, 4
- Lead time pricing/segmentation (SCS-LTP/LTS)	3.1, 4
- Manufacturing segmentation (SCS-MFS)	3, 4
- Distribution segmentation (SCS-DS)	3, 4
- Examples from other company (SCS-EOC)	2, 3, 4

Criteria (C)	3
- Mentioned of own accord (C-OA)	3
- Mentioned after discussion (C-AD)	3
- Customer requirements (C-CR)	3
- Special thoughts (C-ST)	
- Constraints (C-C)	
- Interpretation issues (C-II)	
Approaches (A)	3, 4
- Described approach (A-D)	4
- Approach starting with customer (A-SC)	3.2, 4
- Approach starting with product (A-SP)	3.1, 4
Enablers (E)	5
- Mentioned of own accord (E-OA)	5
- Mentioned after discussion (E-AD)	5
- Indicated lack of enabler (E-IL)	5
- Indicates having enabler (E-IH)	5
- Special thoughts (E-ST)	
- Interpretation issues (E-II)	