Customers’ logistics service requirements and logistics strategies in the Swedish sawmill industry
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Växjö University Press
Customers’ logistics service requirements and logistics strategies in the Swedish sawmill industry. Thesis for the degree of Doctor of Philosophy, Växjö University, Sweden 2006

Series editors: Tommy Book and Kerstin Brodén
ISSN: 1404-4307
ISBN: 91-7636-498-4
Printed by: Intellecta Docusys, Göteborg 2006
Abstract

The future of the sawmill industry is uncertain; this is partly due to its internal structural changes, but also due to structural changes amongst their customers. Concurrently, competition within the industry is increasing, and therefore focus is constantly being placed on reducing costs and leveraging economies of scale. However, in order for sawmills to benefit from economies of scale, it is necessary to work with a well thought-out logistics strategy. This doctoral dissertation aims at identifying and describing the customers' logistics service requirements as well as describing and analyzing logistic strategies in the sawmill industry.

The dissertation identifies and defines some of the sawmills customers' logistics service requirements and establishes a theoretical framework for logistics strategies, as well as it studies logistics strategies in the sawmill industry.

House-builders and traditional retailers appear to focus on similar logistics service requirements, whereas the logistics service requirement of the DIY multiple retailers differ. Furthermore, this dissertation provides a general definition of logistics strategy that has been operationalized by generic logistics strategies.

The sawmill industry makes use of generic logistics strategies such as differentiation and postponement. The individual sawmills ought to consider improving their process performance by implementing additional generic logistics strategies as well as increasing their utilization of generic logistics strategies that are already implemented. The sawmill industry's utilization of generic logistics strategies is however restricted by its own supplier market (including uncertainties of quality of incoming material), and also by the inherent nature of commodity products, as well as divergent material flows.

Key words; Logistics strategy, House-building industry, Retail industry, Sawmill industry, and Service requirements
Preface

This dissertation addresses logistics service requirements as stated by the sawmills' customers as well as logistics strategies in the sawmill industry. It takes as its starting point the author's licentiate thesis, and extends the research with logistics service requirements in the house-building industry, as well as developing the logistics strategy concepts and carrying out empirical studies in the sawmill industry. The licentiate thesis is appended in Appendix 1 and contains three individual papers. Paper 1 has been revised after the publication of the licentiate thesis, and the revised paper is therefore included in this dissertation.

No research is complete without data, and I'm in dept to the interviewees for supplying me with so much information, as well as providing me with encouragement for the topic of logistics strategies in the sawmill industry. Finally, I would like to express my thanks and appreciation to my colleagues at Växjö University, both at the School of Technology and Design and the School of Management and Economics, and all those others who have participated in one way or the other in order to prepare this thesis.

I would also like to thank the research program "Wood Design and Technology" for its financial support.

Explicitly, I would like to express my appreciation to Lars-Olof Rask for coaching me through the process of this research, Stig-Arne Mattson for his contribution in the final steps of the research process, and Rolf Björheden for his encouragement.

It has been a privilege to work with you all, and I look forward to new opportunities in the future.

Ödetofta, Tolg, February 2006

Äsa Gustafsson
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1. Introduction

This chapter gives the reader a background to the research area, research questions and purpose. It also clarifies the dissertation’s limitations, methodology, and planning of the work. Finally a reader’s guide is provided for the remainder of the dissertation.

1.1. Background

Logistics has developed to become more and more directed towards customer service issues. Previously logistics was defined as a function for minimizing total logistics costs or for maximizing profits, while achieving desired levels of service performance. Nowadays logistics is rather defined as maximizing internal and external flexibility aiming at, for instance, customization. This implies that logistics has become focused on meeting customers’ service requirements and is considered as a key source to company’s competitive advantage (Mentzer et al. 2001; Sharma et al. 1995).

Successful logistics organizations understand their customers’ needs and expectations and are able to provide them with the products and logistics services for which they ask. Furthermore, suppliers need to focus on the service aspect of their product-service mix, as the service component, if not up to an acceptable standard, represents the highest risk for losing customers (Grönroos 2000). Being able to provide customers with the logistics services they ask for has implications on the suppliers’ organization. Stank et al. (1998) suggest that companies which recognize logistics services as a significant element in the buying process, often respond to the requirements by developing effectiveness in their basic operational capabilities. If the customers’ requirements differ, it should be possible for suppliers to customize their services to the different sets of requirements. On the other hand, if different customers view logistics services similarly, suppliers should strive towards creating logistics services that are identical to these in order to gain economies of scale (Mentzer et al. 2001). It is important to be aware of customer logistics service requirements, in order to avoid underestimating or overestimating the value expectations of the customer.
Customer logistics service requirements are a key input to the logistics strategy (Magee et al. 1985) and knowing their customers logistics service requirements is essential for companies in their work with developing and deploying logistics strategies that enable for them in meeting their customers’ logistics service requirements (Gattorna and Walters 1996). According to Gattorna and Walters (1996), the logistics strategy process consists of decisions regarding for instance transportation modes, alliances and partnerships, and stock locations and levels. Further, logistics strategies take into consideration external as well as internal factors in the business environment (Cooper 1993) as well as the need to be closely connected with the other sub-strategies within the company (Morash et al. 1996; Gattorna and Walters 1996).

Logistics services, and consequently the development of logistics strategies, increase in importance as more industries reach maturity, necessitating “commodity”-type competition that forces companies to seek alternative methods for becoming competitive (Stank et al. 1998). At the maturity stage products tend to become generic in nature, especially industrial products in the supply category, resulting in small promotional gains due to intensive competition (Darden et al. 1989).

Softwood lumber is basically considered to be a commodity product (Roos et al. 2002), and in order to improve their competitive situation, some sawmills have focused on value-added activities in which they have transformed the traditional softwood lumber into a more customized product. The sawmill industry is experiencing a concentration process, where the number of sawmills is decreasing at the same time as existing sawmills’ production volume is increasing. The sawmill industry has different groups of customers, such as the retail and the house-building industries. The retail industry is under continuous transformation, and being a valuable supplier ought to be profitable in the future. The house-building industry (referring to family houses) purchases a steady amount of softwood lumber and uses it as incoming material in its production processes. As softwood lumber being considered a commodity product, one area the sawmills need to focus on is their customers’ logistics service requirements and a way of being able to meet these requirements.

In order to be able to meet their customers’ requirements regarding logistics services, sawmills need to identify the requirements and relate them to other competitive bases such as price. Further, every sawmill needs to have a developed logistics strategy that enables for the sawmills to respond to their customers’ logistics service requirements.
1.2. Previous studies

Several researchers have studied general strategies in the sawmill industry. Most research has been focused on Porters generic competitive strategies or on identifying sub-strategies such as marketing or production strategies. However, research is lacking regarding logistics strategies and customers service requirements in the sawmill industry. (Previous studies on strategies in the sawmill industry are presented in the second part of the second chapter.)

Concerning logistics strategies in general, previous research has been carried out focusing on the identification of logistics strategy typologies. The research is inductive, and is based on studies of American manufacturing companies (traditional manufacturing companies with convergent material flows) from which it follows that the specifics of these industries are those primarily considered. (See chapter 4. Logistics strategies - Theoretical framework) Consequently, there is a need to distinguish theoretically a broader definition of logistics strategy.

1.3. Research questions, purpose, and limitations

Structural changes amongst the sawmills’ customers as well as within the sawmill industry have an affect on the individual sawmills. Developing and deploying a logistics strategy that enables a sawmill to respond to its customers’ logistics service requirements will affect the sawmill’s future position in the industry. Knowing customer logistics service requirements, and possible logistics strategies to utilize, will be important for the sawmills.

There is a need to broaden the concept of the logistics strategy by adjusting it to different industrial settings and thereby increasing the applicability of the concept. Furthermore, previous research with regards to strategies in the sawmill industry has not focused on logistics, and more specifically not on its customers’ logistics service requirements.

In order to study sawmills’ logistics strategies regarding their capacity to respond to their customers’ logistics service requirements, the concept of logistics strategies needs to be defined and realized, as well as the logistics service requirements need to be identified and described.
The general research question is;

Which logistics strategies do the sawmills utilize in order to be able to respond to their customers’ logistics service requirements?

In order to answer the general research question, the following sub-questions need to be explored;

Sub-question 1; Which are the customers’ logistics service requirements on the sawmill industry?

Sub-question 2; How should logistics strategy be defined?

Sub-question 3; Which logistics strategies are utilized in the sawmill industry?

The purpose is to identify and describe the customers’ logistics service requirements as well as to describe and analyze logistic strategies utilized in the sawmill industry in order to meet customers’ logistics service requirements.

As a part of this work an attempt is made to define and clarify the logistics strategy concept and identify logistics service requirements and logistics strategies utilized in the Swedish sawmill industry.

This dissertation is conducted with the following limitations:
  o This dissertation is limited only to softwood lumber.
  o The study considers only the Swedish sawmill industry.
  o The dissertation regards only the following customer groups; the housebuilding industry, Do-It-Yourself multiple retailers (further on referred to as DIY multiple retailers) and traditional retailers. Even though there are other customer groups, these are not taken into consideration.
1.4. Methodology

This dissertation consists of one theoretical part; defining the logistic strategy concept and two empirical parts; customers’ logistics service requirements and the utilization of logistics strategies in the sawmill industry. Logistics service requirements have been studied in individual studies (in the Licentiate thesis presented in Appendix A and in a paper presented in Appendix B), whereas logistics strategy, both theoretically and empirically, is presented directly in the dissertation.

In order to examine logistics service requirements, both qualitative and quantitative studies have been carried out. Explorative interviews have been conducted in order to identify the individual logistics service requirements, whereas quantitative studies (by questionnaire) have been carried out in order to quantify and rank the individual logistics service requirements.

The study of the general concept of logistics strategy has been conducted with a deductive approach, whereas the utilization of logistics strategies in the sawmill industry has been investigated in an interview study.

The individual parts and their respective methodology are illustrated in Figure 1.

Figure 1. The main parts of the dissertation and their respective methodology
The research questions and the purpose determine the methodology (i.e. the technique used when conducting research), as different research methods are primarily suited for different research questions and purposes. At the same time, the reliability and validity of the findings are dependent on how the chosen methodology is designed and carried out. In order to enable the reader to evaluate the conclusions, a description of the applied methodology is needed with considerations taken to reliability and validity.

Reliability refers to "demonstrating that the operations of a study - such as the data collection procedures, can be repeated with the same results" (i.e. to avoid influence of chance) (Yin 2003), whereas validity refers to the absence of systematic error of measurement. There are three types of validity; construct, internal, and external validity (Yin 2003);

- **Construct validity** is "establishing correct operational measures for the concepts being studied".
- **Internal validity** is "establishing a causal relationship, whereby certain conditions are shown to lead to other conditions, as distinguished from spurious relationships".
- **External validity** is "establishing the domain to which a study’s findings can be generalized".

### 1.4.1. The study of logistics service requirements

Logistics service requirements regard the first sub-question;

*Which are the customers’ logistics service requirements on the sawmill industry?*

A survey is an appropriate method to use when the study concerns finding distinct features in a population (Befring 1994; Yin 2003) (i.e. carry out a descriptive study among a population). A survey can contain both large numbers of variables and / or a big population, implying that by using a survey it becomes possible to obtain a good deal of information about many actors. Basically there are two ways to perform surveys; questionnaires and interviews. These methods can be used separately, but they can also be combined in order to complement one another.

Empirical data have been collected within the framework of a survey and is based on explorative interviews and quantitative studies. The following paragraphs describe the general procedure, which has been conducted in three steps.

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1 Not applicable in this study

2 This section refers to the research reported in Appendix A and Appendix B
1) The first step constituted explorative interviews performed in order to characterize the distribution channels and to identify important service requirements.

2) The second step was conducted through questionnaires, with the purpose of ranking important logistic service requirements, price and product quality as well as quantifying basic logistic service requirements.

3) The third step constituted of a set of follow-up interviews.

The first step consisted of series of interviews, which were conducted with purchasing managers (in companies randomly selected). The interviews were conducted until no additional aspects were revealed. The interviews were exploratory and touched upon three broad areas for discussion; business and relationships with suppliers, order-cycle process, service requirements, and changes, with regards to suppliers and service requirements, for the future. Personal interviews were the main method of collecting information, although some telephone interviews complemented the personal interviews where necessary. The interviewees were asked to speak freely about areas of interest and the interviewer took a passive role, posing the areas and putting forward additional questions if and when needed. Further the interviewer encouraged the interviewees to broaden their perspective in the way of considering service requirements for the future in order to make them aware of the possibility of identifying service requirements. Purchasing managers raised the same issues and discussions, which indicates construct validity of the operational measures of the logistics service requirement concept.

Based on the interviews, a questionnaire was designed. In order to secure reliability and construct validity, draft questionnaires were designed and tested on representatives from both industries and other researchers. They were asked to identify unclear questions, make comments on the existing questions, and to add missing issues. No vital comments were made, and the final questionnaires were sent to purchasing managers in the respective industries. Each respondent was sent an introductory letter, a questionnaire, and a postage-paid reply envelope. The introductory letter clarified the purpose of the questionnaire, assured anonymity, promised a summary of the results at the end, and asked each respondent to mark and return the questionnaire even if it did not apply to their company. (Recommended by Dillman 1978)

In order to assess reliability and external validity, series of follow-up interviews were conducted. The interviews were conducted in the same manner as the first set of interviews, with the addition of the results from the questionnaires. The interviews were personal or conducted by phone. The respondents discussed the areas in the same manner as the interviewees in the first interviews, and agreed on the results from the questionnaire. This ought to imply that researchers fol-

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3 This is in accordance with Grounded theory as presented by Glaser and Strauss (1967)
lowing the procedure described above ought to achieve the same results and that it should be possible to generalize the findings.

Further depth in explanatory data regarding, for instance, drivers of individual logistics service requirements has not been provided in this research, which would have been possible with a case study. A case study on the other hand would not have provided information concerning all the actors.

1.4.2. The study of logistics strategy

Logistics strategy has been approached firstly from a theoretical perspective and secondly from an empirical perspective. The second sub-question refers to the theoretical part, while the third sub-question refers to the empirical part.

Sub-question 2; *How should logistics strategy be defined?*

Sub-question 3; *Which logistics strategies are utilized in the sawmill industry?*

The research process defining logistics strategy is to be referred to as deductive. The goal with the provided definition of logistics strategy is to cover a broader range of industrial settings. The definition should also be possible to study in reality (operationalize).

In order to be able to define the concept of logistics strategy, it became necessary to turn to the two basic concepts; logistics and strategy, as the definition needed to include the basic ideas of each of these concepts. Articles and books have been searched for in databases (key words used were "logistic* and strateg*", "logistic*", and "strateg*"). "Logistic* and strateg*" resulted in many sources (books as well as articles), stressing the importance of logistics strategy. However, most of them lacked a definition of logistics strategy. Therefore, the theoretical part is primarily based on search result with "logistic*" and "strateg*" as key words.

The theoretical part of logistics strategy (sub-question 2) is followed by an interview study on logistics strategies in the sawmill industry (sub-question 3). The study could have been conducted in depth by case studies or action research⁴. However, this study was not conducted according to either of these, due to its requirements regarding access and time. An advantage of interviews in contrary to surveys (mail) is that the possibilities of posing different types of questions are

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⁴ By using case studies or action research, it would have been possible to study which specific logistics strategies that are applied in order to meet individual logistics service requirements.
practically unlimited and it therefore allows for complex questions (Holme and Solvang 1986). The main disadvantages are the cost of each interview and the possibility that the interviewer may influence the interviewee’s answers. In this case the interviewer tried to balance the role by posing the questions from different aspects as well as defining the contents of the concepts and at the same time not influence the respondents. However, its affect on each individual interviewee is difficult to determine.

In order to achieve relevant information in interview studies, it is important to identify and choose the appropriate interviewees (Bell 1995). For this research, customer segments and sawmill groupings have been used. Customer segment refers to the sawmills’ customer groups; the retail industry (divided into DIY multiple retailers and traditional retailers) and the house-building industry. In total seven interviews at five different sawmills were conducted with different sawmill managers. The individual sawmills belonged to different groups (private sawmills with their own forest and private sawmills without their own forest), and varied with regards to production volume.

The interviews were personal semi-structured interviews with specific areas for discussion. The interviewees had access to the discussion areas beforehand, in order to be well prepared and to invite others to participate in the interview (either during the whole interview or just in order to answer specific questions). The specific areas and checkpoints for the interviews are presented in Appendix C. The specific areas (including checkpoints) had previously been tested on colleagues and industrial representatives in order to establish that they were understood as intended.

Continuously during the interviews (each lasting for about two hours), the contents of each concept were discussed and explained in order for the interviewees to be familiar with them. All interviews were recorded, with the permission of the interviewees, thereby allowing the interviewer to be more active in the interview at the same time as no information was missing. However, during the interviews notes were taken simultaneously. Afterwards all interviews were transcribed and the raw material protocols were thereafter transformed into descriptions, directly based on the interviews. The interviews are reported in Gustafsson (2006).

According to Yin (2003), reliability could be improved if the researcher thoroughly describes the different steps of the research process, from research question to conclusion. To increase the reliability of this research, the research process has been explained as clearly as possible, in order for the reader to determine if the conducted research process is possible to repeat with the same results and thereby fulfill the requirements of reliability.

Construct validity has been assured by asking the interviewees to add additional logistics practices utilized by their respective sawmills in order to develop their
processes and process performances. None of the interviewees made any additions.

Bringing back the results to additional representatives from the sawmill industry has ensured external validity. The additional representatives were asked the questions in line with the specific areas and checkpoints for the interviews and thereafter asked to comment on the results from the study. No additional aspects were discussed, and the sawmill representatives agreed on the results of the study.

1.5. Planning of the work

This dissertation takes its starting point in the author’s licentiate thesis (presented in Appendix A). The licentiate thesis focuses on logistics service requirements in the retail industry, and includes three papers. This dissertation extends the research with a study regarding logistics service requirements in the house-building industry (paper presented in Appendix B), followed by the theoretical and empirical work on logistics strategy. The planning of work is illustrated in Figure 2.

![Figure 2. Planning of the work](image-url)
1.6. Readers’ guide through the dissertation

The focus of this dissertation is on the customers’ logistics service requirements and on utilization of logistics strategy in the sawmill industry. The connections between the research sub-questions and different dissertation’s chapters are illustrated in Figure 3.

*Sub-question 1;* Which are the customers’ logistics service requirements on the sawmill industry?

*Sub-question 2;* How should logistics strategy be defined?

*Sub-question 3;* Which logistics strategies are utilized in the sawmill industry?

*Chapter 3;* Logistics service requirements

*Chapter 4;* Logistics strategies – Theoretical framework

*Chapter 5;* Logistics strategies in the sawmill industry

*General research question;* Which logistics strategies do the sawmills utilize in order to be able to respond to their customers’ logistics service requirements?

Figure 3. Connections between sub-questions and the dissertation’s chapters
The dissertation contains the following chapters (chapter one excluded).

Chapter 2. *The sawmill industry*. This chapter reports on the specifics of the Swedish sawmill industry as well as it summarizes previous studies of strategies in the sawmill industry.

Chapter 3. *Logistics service requirements*. This chapter summarizes the house-builders as well as it retailers’ logistics service requirements.

Chapter 4. *Logistics strategies – Theoretical framework*. This chapter provides a theoretical definition and operationalization of the logistics strategy concept.

Chapter 5. *Logistics strategies in the sawmill industry*. The chapter explores the utilization of generic logistics strategies in the Swedish sawmill industry.

Chapter 6. *Meeting logistics service requirements*. This chapter examines logistics service requirements, as well as generic logistics strategies in the sawmill industry.

Chapter 7. *Conclusion*. This chapter summarizes the logistics service requirements as well as the framework of logistics strategies in the sawmill industry. The chapter also includes a discussion of theoretical and practical implications complemented by future research.
2. The sawmill industry

This chapter describes the Swedish sawmill industry, its conditions and characteristics as well as it reports on previous studies of strategies in the sawmill industry. The Swedish sawmill industry is described from a supply chain perspective, with the sawmill as the focal company.

2.1. The Swedish sawmill industry

In order to illustrate the Swedish sawmill industry, the supply chain concept has been used. The aim of the supply chain is to pinpoint the actors involved in the processes and the activities that produce value in the form of products and services. Mentzer et al. (2001) identify three types of supply chains; direct, extended, and ultimate, and they provide the following definition of a supply chain.

A supply chain is a set of three or more entities (organisations or individuals) directly involved in the upstream and downstream flows of products, services, finances, and/or information from a source to a customer.

The supply chain for softwood lumber is to be considered as an extended supply chain as it includes suppliers of the immediate supplier and customers of the immediate customer all involved in the upstream and/or downstream flow of products. The following paragraphs describe the supply chain for softwood lumber from a sawmill perspective. Hence the sawmills’ customers, characteristics of the sawmill industry, and suppliers are described as well as the characteristics of softwood lumber. The supply chain for softwood lumber is illustrated in Figure 4.

Customers

The sawmill industry has several types of customers purchasing softwood lumber, for instance the retail industry and the house-building industry. The retail industry mainly consists of two different categories; traditional retailers (consisting of the following categories; private retailers with no affiliation, private retailers in purchasing corporations, builder merchants) and Do-It-Yourself multiple retailers, while the house-building industry is considered to be more uniform. The house-building industry is an industrial customer and assembles houses (i.e. prefabricate houses to various extents) more or less completely at the factory and transport modules in order to finalize assembly at the delivery site.
The group of *Traditional retailers* consists of many Swedish retailers that purchase softwood lumber in a somewhat “old-fashioned manner”. They conclude agreements (where the period of validity depends on price situation) and thereafter place orders. Traditional retailers deliver softwood lumber mainly to contractors and end-consumers. (Gustafsson 2003) The *Do-It-Yourself multiple retailers*, on the contrary, consist of some large actors that make agreements on a yearly basis and handle all suppliers (independently of products) in a standardized way. The DIY multiple retailers focus on the end-consumer and have a limited number of suppliers, which are selected based on the lowest prices (still meeting all the specified requirements)(Gustafsson et al. submitted). The *house-building industry* consists of actors either producing strictly standardized houses or more or less architect-designed houses. Softwood lumber is purchased directly from the sawmills in a manner similar to the traditional retailers (Gustafsson 2004). There are also house-builders that own, or have owned, their own sawmills.

The retail industry and the house-building industry differ with regards for instance to size, purchasing volumes, and ways of doing business. The DIY multiple retailers can be referred to as power retailers as they state specific requirements that the sawmills have to fulfil. However, preferred supplier is thereafter accredited to deliver all products within a specified assortment. The general order qualifying criteria concerning softwood lumber on the Swedish market are; accurate products are delivered complete, orders are filled completely, and quick correction of mistakes (Gustafsson 2003).

### The sawmill industry

The Swedish sawmill industry can be divided into four groups according to their ownership and supply of timber: a) private sawmills with their own forests, b) private sawmills without their own forests c) forest owners associations and d) forest companies (public). The first two categories are referred to as purchasing sawmills, which account for 66 percent of the total production of softwood lumber. A majority of the purchasing sawmills are located in the south of Sweden (region 4) (Staland et al. 2002).

The sawmill industry differs from traditional industries in a number of ways such as divergent material flows complemented by the fact that the material is not static. Therefore differences between timber appears as well as uncertainties in the quality of incoming material (biological). (Adolfson et al. 2000)

A majority (53 percent) of the Swedish sawmills are commodity-oriented with a cost leadership orientation. If the sawmills whose value-added activities consist of planing and drying were also added to the group, the share would further increase by about 10 percent (Roos et al. 2002). The number of sawmills decreases and existing sawmills increase their production volume, which is a result of continuous improvements of the existing sawmills’ productivity. The productivity in terms of cubic meters per working hour has increased by about 15 percent from
1995 to 2000 (Staland et al. 2002). The annual production of softwood lumber has increased at the same time as the export share has remained stable (Skogsvårdsstyrelsen 2005). The production equipment is general and available to all members of the sawmill industry (Johansson 1995). The general profit of the purchasing sawmills is about 3-4 percent, which has been enabled by the increased prices for softwood lumber during the past years (http://www.skogsindustrierna.org/litiuminformation/site/page.asp?Page=31&IncPage=2999&Destination=1787). Generally, the export price of softwood lumber has dropped from an index of 100 in 1990 to one of 89 in 2003 (Skogsvårdsstyrelsen 2005).

The general procurement process of Swedish purchasing sawmills consists of the following steps; purchase, logging, and transport. The contractual form used for each specific purchase determines the content of each step. Further, each step consists of decisions and activities that influence the production process and other logistics functions. (Harstela 1993; Keipi 1978) There are different ways for a sawmill to acquire timber; purchase it directly from forest owners, from other sawmills or forest owners associations or to import it. When purchasing timber from Swedish forest owners, the following contractual forms may be used;

- **Delivery timber** refers to timber to be picked up at the roadside (measured at the sawmill and priced according to the price list).
- **Standing timber for sale** refers to contracts that allow a purchaser himself to assess the trees marketed. Quality and volume are determined before felling takes place.
- **Cutting commission** refers to contracts that allow the purchaser himself to fell the trees (within a specified time period). Quality and volume are measured at the sawmill.
- **Delivery stumpage**, the standing timber is sold at an agreed price per quality, and the volume is measured after logging.

The general production steps in a sawmill are; green board sorting, sawing (according to different sawing patterns), (kiln) dried, final length and grade sorting, and part-planing. The production of commodity products implies strong cost-effective production capability and a general tendency towards automated equipment and fixed costs (Shapiro 1979). The production of softwood lumber also produces by-products (for instance chips) and other consequential products. In general there are two approaches to the production of softwood lumber; either to focus on a fast production system with a predetermined sawing pattern or to focus on the effective use of the incoming material which implies the flexible handling of the sawing patterns on behalf of the speed of the production process (Alkbring 2003).

The production costs are about 30 percent (Gustafsson 2006) and the sawmill industry has focused its development on production-oriented issues (Lönner 1985). The production process is capital intensive and focuses on economies of scale. However, studies show that scale advantages are only valid to a certain degree (Månsson 2003).
Concluding, the general profitability in the sawmill industry is low and there is a general concentration process, resulting in fewer and larger production units (Staland et al. 2002). Switching costs are low and being able to sell softwood lumber to the DIY multiple retailers is just a matter of offering the lowest price (and still meeting the other requirements), while the traditional retailers and the house-building industry prefer long-term relationships (Gustafsson 2003; Gustafsson 2004). Therefore the threat of new entrants selling softwood lumber is dependent on customer type.

**Suppliers**

About two thirds (63 percent) of the Swedish sawmill industry with a capacity exceeding 50 000 m³ needs to be supplied with timber from the open market (Staland et al. 2002). Purchasing sawmills are closely connected to their neighbourhood (Adolfson et al. 2000), because stocking and transporting timber require specific handling. Timber purchase accounts for about 60-65 percent of the total cost for a sawmill (Bergqvist et al. 1988; Gustafsson 2006) and in order for the sawmills to communicate their demands for timber, sawmills issue price lists specifying lengths in different diameters and quality classes (Carlsson and Rönqvist 1999). From a general point of view, the demand for timber exceeds the supply (Adolfson et al. 2000). Furthermore, sawmills compete with the pulp and paper industry for raw material.

**Softwood lumber**

The production of softwood lumber in Sweden has increased by 30 per cent during the 1990s and in total about 16 million cubic meters was produced in 2000, of which about 11 million cubic meters were exported (Europe being the main export area). Softwood lumber is in many cases referred to as a commodity product (Roos et al. 2002) and it is thereby produced in general standard lumber sizes (Hansen et al. 2002). Competition amongst suppliers of commodity products is primarily based on price (Shapiro 1979) and the focus is efficiency through stability and control (Pine 1993). Further, commodity products are characterised by consistent quality, stable demand, large homogenous markets, and long product life cycles (Pine 1993).

The demand as well as the substitution of softwood lumber is ultimately determined by end-consumer preferences. Softwood lumber is used for several purposes, amongst others as indoor and construction material. End-consumers value softwood lumber with regards to functional and non-functional criteria in a subjective or objective way (Jonsson 2004). Softwood lumber is perceived, by end-consumers at least, as a touch of genuine nature, and beautiful in itself (Anon 1998).

95 percent of family houses in Sweden are built with softwood lumber as the main building material. The use of softwood lumber has an historical basis, which differs between countries. Traditionally, softwood lumber has lacked in quality and this together with legal restrictions and increased demand for quality
assurance, has increased the risk for substitution to other material than softwood lumber. (Anon 1992)

Wood as a building material has lost market shares to other materials (such as steel and aluminum) and therefore the main challenge is to develop system solutions and products that will improve the competitiveness of softwood lumber. The increased substitution could be explained by the increased need to be able to deliver components rather than products, decreasing quality, and an increased importance of maintaining low maintenance costs. (Lönner 1985)

In conclusion, the substitution of softwood lumber primarily affects softwood lumber as a construction material. The substitution of materials appears constantly as softwood lumber becomes exchanged with other materials such as steel. Construction material needs to fulfil some basic requirements and at the same time be easy to work with.

### 2.2. Previous studies of strategies in the sawmill industry

Juslin and Tarkkanen (1987) and Niemelä (1993) present research aiming at facilitating the sawmills in their work with developing successful strategies. Further, Niemelä and Smith (1997) take as their starting point generic types of competitive strategies, as presented by Porter (1985). The authors describe, compare, and evaluate the competitive strategies of softwood sawmills (in Finland, USA and Canada), using interviews as their data collection method. The article concludes that the studied sawmills all combined, or aimed at combining, cost leadership with differentiation.

Cohen (1994) and Brigsby (1994) have provided historical overviews. Cohen described marketing of British Columbia softwood lumber over 90-years. The study concluded that success lay in cooperation between forest product companies through industry associations as well as between different levels of government and industry within the confines of fair trade policies. Brigsby (1994) quantified the structure of the Australian sawmill industry from 1950-1951 to 1984-1985 through an econometric study of the industry’s production structure. The study concluded that during these years, the Australian sawmill industry had been realising economies of scale although these declined over time, which appeared to be the way of reducing costs given the lack of any other suitable inputs.

Björheden and Helstad (2005) study raw material in the sawmills’ business level strategy in a case study, and conclude that in fragmented industries, such as the sawmill industry, a way to achieve competitive advantage is to become inde-
dependent of other companies and the external environment, as well as to lead the development (for instance customised products and services).

Roos el al (2000, 2001, 2002) based a series of articles on the Swedish sawmill inventory (questionnaire study) and the application of value-adding production strategies. Roos et al. (2000) identified and analysed value-adding dimensions in Swedish sawmills and the study concluded that different types of value-adding processes were connected with specific sawmill’ characteristics. The study further concluded that sawmills try to reduce costs through larger volumes or increased labour productivity and increase profit by the value-adding process. The second study by Roos et el. identified six different clusters based on the value-added shares, size, and labour productivity. The study concluded that sawmills focus on different competitive strategies, where some are cost leadership oriented and some focus on value-added processes as the most important strategic element. However, the highest profit is identified in sawmills with a high share of value-added production. The third article identified nine clusters in the Swedish sawmill industry based on their value-adding strategies. The research concluded that commodity-oriented sawmills accounted for half of the number of sawmills, and if planning and customised drying were added, the share would increase by about 10 percent. There were also sawmills that specialised in specific markets with strict requirements. The results suggested that different value-added strategies can be explained to a large extent by the achievement of competitive advantage in specialised markets. (Roos et al. 2002) Further strategic groups apparent in the Swedish sawmill industry, based on industrial housing perspective, has been suggested by Nord (2005).

Niemelä and Smith (1995) identified and compared customer strategy, product strategy, and market area strategy of large sawmills in Finland, western United States, and Canada. The research concluded that Finnish sawmills generally follow a more focused customer strategy of a few, known and well defined end-users segments as compared to the other respondents representing the other regions. The product strategy is related to the size of the firm, and export orientation and market area strategy emphasize a few well-defined countries/regions. An additional study aims at examining the marketing strategies of the sawmill industry in Finland and North America. The study concluded that effectiveness of marketing, customer contacts, and price are important dimensions in their respective marketing strategy (Niemelä and Smith 1996). The data collection method for these two studies is interviews based on a fixed questionnaire format.

Hansen et al. (2002) explored the marketing strategies employed by softwood sawmills in western North America by a survey study conducted via personal interviews using a structured surveyed questionnaire. The research concluded that sawmills are often not focused exclusively on one strategy.
2.3. Concluding comments

Competition within the sawmill industry is intense, and its situation is challenging: suppliers are focused on high timber prices, at the same time as some customers purchase softwood lumber at the lowest price offered, while others are traditionally connected to their suppliers. Substitution of construction material is an on-going affair at the same time as new entrants are about to start selling softwood lumber on the Swedish market.

The supply chain for softwood lumber focusing on the sawmill industry and its immediate surrounding actors is illustrated in Figure 4.

![Figure 4. Supply chain for softwood lumber, including the material flow, focusing on the sawmill industry and its immediate surrounding actors](image)

In order to manage the situation and become competitive, some sawmills focus on value-added activities such as customised products as well as specific offers adjusted to individual customers’ requirements. This implies that sawmills are transforming their products from being a commodity product aimed for a broad customer group towards product differentiation aimed at a narrow group of customers. Consequently, the sawmills need to segment their customer base in order to be able to focus on specific customer groups. Another possibility for a sawmill is to integrate both forwards and backwards in the supply chain, implying that
sawmills might considering ownerships of sections and members of the distribution channel, start retail set-up or that they purchase forest in order to secure supplies of timber.

Previous studies of strategies in the sawmill industry focus primarily on applications of generic strategies provided by Porter (1985) and on different value-adding strategies. Following these studies, Swedish sawmills could focus on cost leadership or value-added dimensions. However studies conducted by Månsson conclude that economies of scale in the Swedish sawmill industry are limited to a certain production level. According to studies conducted by Roos et al., the Swedish sawmill industry consists of different value-adding clusters. Based on these studies, the Swedish sawmill industry follows the general trend of other sawmills (i.e. focusing on value-added dimensions as compared to cost leadership).

The challenge for the sawmill industry is to find ways to handle uncertainties in its environment. Substitutes and buyers are to be considered as uncertainties that exert unpredictability on the sawmill industry. The management’s task is thereby twofold; to secure the position of the sawmill in the industry and improve its process and process performance in order to be able to meet customers’ requirements.

The sawmills’ customers differ in several ways, for instance in business concept and requirements, implying that the sawmills need know and understand their customers in order to be able to meet their requirements. Delivering softwood lumber to DIY multiple retailers implies delivering products according a specified agreement, whereas delivering softwood lumber to traditional retailers and house-builders involve meeting the agreement as well as general logistics service requirements not included in the agreements. Traditional retailers have started to place logistics service requirements and the sawmills need to know these requirements as well as their relationship to other bases for competition. For the sawmills to handle this situation and meet specific logistics service requirements, they might benefit from developing and deploying a logistics strategy that is applicable in the sawmill industry and that render the required logistics services requirements.
3. Logistics service requirements

This chapter contains a brief summary of the appended paper (presented in Appendix B) as well as it reviews logistics service requirements from a retail perspective (presented in Appendix A). The chapter provides a summary in accordance with each part's contribution towards answering the research questions and purpose for this dissertation.

3.1. House-building industry

The paper focuses on the house-building industry, and its purpose is to identify logistics service requirements and relate these requirements to price and physical product quality regarding softwood lumber in the house-building industry.

Empirical data has been gathered in two steps, firstly by interviews (in order to identify the logistics service requirements) and secondly by a questionnaire (in order to be able to rank the individual logistics service requirements). The identified logistic service requirements and their internal ranking order (including their ranking order compared to physical product quality and price) is suggested to be as follows.

1) Physical product quality
2) Accurate products are delivered completely
3) Order cycle time is reliable
4) Orders are fulfilled completely
5) Quick correction of mistakes
6) Price (low)
7) Short lead-time
8) Possibility to meet special requests concerning deliveries
9) Specified delivery date when ordering

Logistics service requirements are defined as "all value-added activities concerning the order-to-delivery process, and providing accurate information and services in accordance with the material flow" (Mattsson 2002).
10) Possibility to order in entities
11) Keeping supplier stock at production site
12) Bar-coded products

Basic logistics service requirements concern the lead-time. The following figure shows the two variables of delivery time; actual and required lead-time.

Figure 5. Requested and actual lead-time in the house-building industry

A majority of house-builders require deliveries within two weeks (i.e. 10 working days), while 40 per cent receive their deliveries with a delivery time of three weeks.

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Order in entities refers to the possibility of ordering and receiving all softwood lumber needed for one house at the same time

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3.2. Retail industry

The retail industry can be categorized as follows; DIY multiple retailers, traditional retailers (private retailers with no affiliation, private retailers in purchasing co-operatives, and industrial distributors of building material) (Gustafsson, 2003). The retail industry is heterogeneous as DIY multiple retailers place strict non-negotiable requirements whereas the traditional retailers’ logistics service requirements are more or less vaguely expressed. (Gustafsson et al. submitted; Gustafsson, 2003)

3.2.1. DIY multiple retailers

DIY multiple retailers handle all suppliers discriminately of origin and require bar-coded products, consumer packaged, fixed delivery times, knowledge of demand for each store, large volumes, large number of units, opening hours, several product categories, small package sizes, and special campaign arrangements (i.e. deliveries of fill-up orders, large additional volumes and special campaign programs) from their suppliers. These requirements are included in their general agreements and are hence not possible to bargain on for the suppliers. (Gustafsson et al. submitted)

3.2.2. Traditional retailers

Traditional retailers (Swedish owned) have identified ability to meet special requests, accurate and timely information, accurate products are delivered complete, bar-coding, computerized info transfer, consumer packages, order cycle time is reliable, orders are fulfilled completely, packages containing different assortments, possibility of delivering 1/2 packages, possibility of delivering 1/4 packages, quick correction of mistakes and short lead-time to be important logistics service requirements for their suppliers to meet (Gustafsson 2003). Relating these logistics service requirements to physical product quality and price provides the following ranking order (Gustafsson 2002).

1. Accurate product is delivered complete
2. Product quality
3. Orders are fulfilled completely
4. Order cycle time is reliable
5. Quick correction of mistakes
6. Accurate and timely information
7. Short lead-time
8. Price (low)
9. Possibility of delivering 1/2 packages
10. Ability to meet special requests concerning deliveries
11. Possibility of delivering 1/4 packages
12. Consumer packages
13. Packages containing different assortments
14. Computerized info transfer
15. Bar-coding (bar-coded products)

Retailers purchase softwood lumber in full truckloads, due to what they consider high transportation costs, and the volume therefore depends on the size of the truck. Two of the traditional retailers basic logistics service requirements are delivery time and size of packages and dispatch. Delivery time contains two variables; actual and required delivery time. The two dimensions are shown in Figure 6.7

Figure 6. Actual and required delivery time

Source; Gustafsson, 2003

67 percent of the deliveries are performed within one week and 91 percent are delivered within two weeks (i.e. ten working days). There is a difference between actual and required delivery time (5 vs. 4 days). The products are normally delivered in complete packages in full truckloads. However, the retailers require their suppliers to deliver smaller package sizes.

7 Number of days is referred to as working days measured from the time the order is placed until the products are delivered or are available for pick up for the retailer at the sawmill. The agreements state the conditions for delivery, for instance FOB, and other delivery conditions such as the frequency of orders, time between ordering and delivery, and amount of products to be delivered on each occasion
4. Logistics strategies - Theoretical framework

This chapter provides a generic definition of logistics strategy generated by conceptual analysis of previous research. The chapter provides the theoretical framework for the empirical study of logistics strategies in the Swedish sawmill industry.

The term “strategy” is often used rather broadly in business settings. It refers to a general concept of operations that directs all a company’s activities towards a common goal. Strategic management and the strategy concept first received attention in business literature in the 1960s (Ansoff 1988). Two authorities in strategy are Ansoff and Mintzberg. Ansoff (1968) defines strategy as a rule for making decisions, whereas Mintzberg (1998) presents five definitions, (the five "P's") of strategy. Strategy is a; Plan, (some sort of intentionally planned course of action and a guideline (or a set of guidelines) on how to deal with different situations. In this definition, strategies refer to planning processes and have two essential characteristics; they have to be made in advance of the actions to which they will apply, and they are deliberately and purposefully developed, Ploy (a detailed plan on how to outmanoeuvre a competitor), Pattern (strategy is regularity in behaviour, whether deliberate or not, and it should be viewed as the pattern in a stream of actions all aiming at the same goal), Position (locating a company in its business setting with respect to a single competitor but also with regards to all its competitors), and Perspective (strategy is viewed as a concept, where all strategies are abstractions that exist only in the mind of interested parties).

In general there are five basic criteria that a strategy has to fulfil. These criteria are (Harrison and van Hoek 2002);

- **Time horizon**: long-term rather than short-term
- **Pattern of decision**: decisions are consistent with each other over time
- **Impact**: substantial changes rather than small-scale changes
- **Concentration of effort**: the focus is on selected defined capabilities
- **Comprehensiveness**: all processes are coordinated
4.1. Previous studies of logistics strategy

In the 1970ies, Heskett’s research stressed the advantage of integrating the logistics function into the company’s overall business strategy. In general, a business strategy sets the direction, focuses on the efforts, defines the organisation, and provides consistency within the organisation (Mintzberg 1998). From a logistics strategy perspective, logistics is perceived to support the company’s business strategy and is thereby intended to improve the organisation’s performance (Bourlakis and Bourlakis 2001). Further, functional strategies need to be consistent with each other as well as with the company’s corporate strategy (Fine and Hax 1985). It is therefore a requirement that companies consider functional strategies in order to avoid their developing independently of each other as well as of business and/or corporate strategy (Hill 1997; Rao et al. 1994). Consequently, a logistics strategy needs to be consistent with other functional strategies as well as being in line with the general characteristics of a company’s business strategy, and thereby fulfil the basic criteria for a strategy.

For individual companies with activities along the supply chain, it is necessary to develop a strategy that meets both the requirements from customers as well as from other partners in the supply chain (Towill and Christopher 2002). The general objective of a logistics strategy is to provide consistency in activities, functions and goals that otherwise might have been contradictory in a company as well as it needs to recognize and deal with important conditions in the company’s external environment (La Londe and Masters 1994). Furthermore, logistics principles are often seen as a company’s foundation for logistical response to external forces (La Londe and Mason 1993).

Until the late 1970s logistics literature focused on developing the operational optimum within the given logistics system (McGinnis and Kohn 1993). Heskett (1977) discussed the importance of logistics to corporate strategy, and in the 1980ies logistics literature began to examine the concept of logistics strategy. However, most articles concerning logistics strategies are either quite general or tightly focused on specific areas such as warehousing in the post-1992 European market (Clinton and Closs 1997).

Some definitions of logistics strategy have been provided in previous research. The following two definitions illustrate two viewpoints regarding logistics strategy definitions. Magee et al. (1985) defines logistics strategy as "the process of developing a more efficient physical-distribution and supply-system." Whereas Chow et al. (1995) defines logistics strategy as "a pattern of action plans designed for the purpose of achieving logistics goals."
A logistics strategy ought to be related to the entire logistics concept and hence a definition of logistics is needed. The following well-established definition of logistics (management) has been provided by the Council of Supply Chain Management Professionals (further on referred to as CSCMP); (http://www.cscmp.org)

"... is that part of supply chain management that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services, and related information between the point of origin and the point of consumption in order to meet customers' requirements. Logistics management activities typically include inbound and outbound transportation management, fleet management, warehousing, materials handling, order fulfilment, logistics network design, inventory management, supply/demand planning, and management of third party logistics services providers. To varying degrees, the logistics function also includes sourcing and procurement, production planning and scheduling, packaging and assembly, and customer service."

Logistics, according to CSCMP, involves all activities and information between the point of origin and the point of consumption, in which some of the activities are; the storage of raw materials, the in-process inventory and the finished goods. These activities go hand in hand with main areas of logistics (i.e. procurement, manufacturing and distribution).

Previous empirical research on logistics strategy has been mainly conducted in order to identify different logistics strategy typologies. Table 1. identifies the originators of the different logistics strategy typologies, while the subsequent paragraph describes the individual studies and the variables that they are based upon.

<table>
<thead>
<tr>
<th>Originators</th>
<th>Logistics strategy typology</th>
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</thead>
<tbody>
<tr>
<td>Bowersox and Daugherty (1987)</td>
<td>Process, market, and information</td>
</tr>
<tr>
<td>Kohn et al. (1990)</td>
<td>Intensive and extensive</td>
</tr>
<tr>
<td>McGinnis and Kohn (1993)</td>
<td>Intense, balanced, and unfocused</td>
</tr>
<tr>
<td>Cooper (1993)</td>
<td>Minimum costs, global centralisation, high levels of customer service</td>
</tr>
</tbody>
</table>

8 A theoretical typology has been provided by Shapiro (1984), who constructed his logistics strategy typology from a theoretical discussion regarding service and the impact of logistics on service related dimensions. The dimensions were based upon the degree of speculation vs. postponement and breadth of product line.
Bowersox and Daugherty (1987) carried out semi-structured interviews with executives in manufacturing companies in the USA (selected from Fortune 500). The study concluded that there are three distinct different logistics organizations (process, market, and information) based on companies’ basic corporate strategic orientation. McGinnis and Kohn (1990) conducted a questionnaire study in the USA and identified four categories of logistics strategies based on companies’ development of logistics. The study suggested that a main issue in logistics strategy is the amount and intensity of the integration and coordination of logistics activities (both internally and externally). Kohn et al. (1990) carried out a questionnaire study of manufacturing companies of various sizes in USA, representing several industries in different geographical areas. By factor analysis, the following factors were identified; customer service commitment, an integrated computer system, co-ordinated logistics, integrated customer service, and logistics co-ordination effectiveness. This study concluded that logistics strategies vary significantly between companies depending on business strategy and the level of external environmental hostility. In the following study, McGinnis and Kohn (1993) based their logistics strategy categories (intense, balanced, and unfocused) on a questionnaire sent to logistics managers of manufacturing companies in USA. The logistics strategy typology is based on the following parameters; external environment challenge (level of competitiveness and unpredictability) and strategic emphasis (level of company/division competitive responsiveness). Cooper (1993) based his identification of logistics strategies on product value density and product price as a driver in the market place. Product value density is based on the value of a product in relation to its weight and volume and as a consequence commodity products, having low value density, are usually shipped to local catchments areas while products with a high value density are distributed from a relatively few points of supply. Cooper pointed out the importance of being able to change logistics strategy priorities as market conditions or characteristics of the products change (for instance changes in a products life cycle).

Several authors use the Bowersox and Daugherty (1987) logistics strategy typology (see for instance McGinnis and Kohn 2002; Clinton and Calantone 1997). However, a complementary study, based on factor analysis, shows that there were considerable differences between companies employing the different logistics strategy typologies (provided by Bowersox and Daugherty, 1987) respectively. Overlapping between the different logistics strategy typologies also appears when viewed in the context of operational logistics work (Clinton and Closs 1997).
4.2. Defining logistics strategy

The focus of strategy has changed from the long range planning of the 1960s towards focusing on the need for being flexible and the ability for a company to meet changes in the environment. Thereby strategic actions could be taken with a short-term as well as long-term perspective. At the same time the concept of organizational culture has been incorporated into the strategy concept.

Previously presented definitions of logistics strategy focus either on the process of formulating a logistics strategy (Magee et al. 1985) or on the actual logistics strategy (formulated in advance) (Chow et al. 1995). The provided definitions thereby appear to mix the logistics strategy formation process and the actual logistics strategy. Further, earlier provided definitions of logistics strategy could be categorized with regards to Mintzberg’s perspective pattern, which refers to regularity in behaviour and the planning process. This might not be surprising as logistics, by definition, aims for consistency among the functions and hence the company needs to have a structured way of working i.e. a consistency in behaviour.

Earlier provided research of typologies of logistics strategies is based on American manufacturing companies execution of the logistics functions and principles. Despite the general belief of logistics aiming to meet customer demand, neither of the typologies mentions customer requirements nor customer satisfaction.

Following previous discussions on logistics strategy, the author suggests the following definition;

*Logistics strategy concerns the process of meeting customers’ requirements and is constituted by a pattern of decisions regarding the company’s main logistics fields of application, in order to achieve sustainable profitability. The logistics strategy is situation specific.*

The definition of logistics strategy is focused on the general aim of logistics, as its overall purpose is to meet customer requirements. The suggested definition of logistics strategy further concludes how a company should compete in a given business. It also emphasises that it shall include all major logistics areas and be aligned with the company’s environment.
The provided definition meets the five basic strategy’ criteria, as the following characteristics have been taken into consideration:

- **Time horizon**: the provided definition considers long-term rather than short-term by the attribute of sustainable.
- **Pattern of decision**: the presented definition refers to a "pattern of decisions ".
- **Impact**: the definition focuses on significant impact because the logistic fields of application are involved.
- **Concentration of effort**: the definition focuses on logistic fields of application.
- **Comprehensiveness**: the core of the definition aims for the coordination and understanding of the logistic fields of application.

The definition is in line with the general strategy’ criteria. However, it differs from earlier provided definitions by its generic view (with regards to logistic fields to application) at the same time as it focuses on a tactic/strategic level (situational factors) as well as it includes the economic aspect (sustainable profitability). Furthermore, the definition constitutes the foundation for a unified generic description that is applicable to different types of industries by being situation specific.

The generation of the provided definition is prescriptive and could be associated with Mintzberg’s perspective of strategy for positioning the company in its environment and how the company plans and co-ordinates its functions and activities.

The logistic field of application generally concerns logistics areas, where each logistics area pertains to different decision points. Each decision point is to be considered independently and each might be valid for each individual logistics area. Logistics areas presented in the SCOR-model are process-based, focusing on the logistic activities. (Further developed in chapter 4.3)

A logistics strategy is dependent upon and interacting with its environment by being situation specific. Burns and Stalker introduced the concept of situational factors in 1960ies and the original idea of different organizations’ appropriateness depending upon the situation has thereafter been further developed and applied in different disciplines. Within the logistics field some studies have been conducted with the aim of identifying situational factors. Kohn et al. (1990) identified level of organizational environmental hostility and logistics challenge (defined as materials and components cost percentage, decentralized corporate culture with independent business units, and extensive dealer/distributor network) to be situational factors. Pfohl and Zöllner (1987) identified the following factors; environmental relations, product line, market homogeneity, and production technology. Clinton (1997) presented the logistics contingency model in which environmental dynamism, environmental hostility, logistics I.T. operating systems, and logistics I.T. planning systems are presented as environmental vari-
ables. In Mattsson (1994) (previously presented and extended in Mattsson (1987)) the product, customer order, production, logistics and other factors (such as quality of basic information) were presented as situation variables in the choice between different material planning concepts.) Rask and Andersson (2000) identified product attributes, market attributes, technology attributes, business logic, corporate level strategy, and importance of logistics as contingency variables in the sawmill industry.

A company’s applied logistics strategy is constituted by its operational actions in order to be able to meet customer requirements by increasing process performance. Hence a company executes its logistics strategies by applying one or many generic logistics strategies. (Further developed in chapter 4.4)

### 4.3. Logistics fields of application

Logistic fields of application consist of three main areas (or logistical functions); inbound logistics (procurement), materials management (production), and outbound logistics (distribution) ((Meade and Sarkis 1998; Guedes et al. 1993)), where each individual area consists of a number of sub-areas. For instance the distribution function consists of inventory, warehousing and transport (Christopher 1986).

The main operational logistics fields of application are; procurement, production, and distribution. The operational logistics fields of application include decisions regarding the following issues (http://www.supply-chain.org);

- **Procurement.** Procurement considers scheduling deliveries, identifying and selecting sources (when they are not predetermined), assessing supplier performance, and managing inventory, capital assessments, incoming products and supplier networks etc. The activities taking place are determined by product type (i.e. products stocked, made-to-order or engineered-to-order).
- **Production.** Production relates to scheduling production activities, issuing products, producing and testing, staging products and releasing products to deliver. The activities are dependent upon product type (made-to-stock (process or discrete), made-to-order (process or discrete), and engineered-to-order products production execution (discrete)).
- **Distribution.** Distribution refers to issues such as routing, warehouse management, transportation, and invoicing. Order, warehouse, transportation, and Installation Management for stocked, made-to-order and engineered-to-order products.
Further, a schematic model of a company’s activities and processes is presented in the value chain (See Porter, 1985). The Supply Chain Operations Reference-model (further on referred to as the SCOR-model) has been developed by the Supply Chain Council and aims at describing business activities associated with all phases of satisfying customer’s demand. The model contains different levels; process types, configuration level, process element level, and implementation level and is it organized around five primary management processes; Plan, Source, Make, Deliver, and Return (http://www.supply-chain.org).

- **Plan**: constitutes the overall process that balance aggregated demand and supply to develop a course of action which best meets sourcing, production and delivery requirements.
- **Source**: processes that procure goods and services to meet planned or actual demands. The operational function concerns stocked, made-to-order and engineered to order products.
- **Make**: processes that transform products to a finished state to meet planned or actual demands. The operational function concerns make-to-stock (process or discrete), made-to-order (process or discrete), and engineered-to-order products production execution (discrete).
- **Deliver**: processes that provide finished goods and services to meet planned or actual demands. The operational function concerns order, warehouse, transportation, and Installation Management for stocked, made-to-order and engineered to order products.
- **Return**: processes associated with returning or receiving returned products for any reason.

## 4.4. Generic logistics strategies

The concept of generic logistics strategy is to be understood as a specific pattern of decisions regarding a variety of activities related to the logistics process. To meet customer’s logistics service requirements in an effective and efficient way, one or a combination of generic logistics strategies ought to be implemented and applied. These generic logistics strategies are, to a large extent, constituted by fundamental logistics principles in order to improve process performance. Persson (1995) put forward the most important principles for improving process performance, whereas La Londe and Mason (1993) present some principles of logistics that are forming a foundation for logistics response to external forces.
The following common principles for improving process performance have been defined by Persson (1995): reduce or redistribute lead times, reduce or adapt to the uncertainties, redistribute or increase frequencies, eliminate or adapt to expected pattern of demand, simplify structures, systems, and processes, differentiate, postpone, improve the information processing and decision support system, and strengthen the internal and external integration. Each of the different logistics principles is described in the following paragraphs.

Reduce or re-distribute lead-times; Lead-time is a common concept within logistics, and the general aim is to reduce or eliminate activities that do not add value to the company’s customers. Reducing or redistributing lead-times are valid for all levels in the material or information flows. There are different types of lead-times; operational, administrative and strategic. A reduction, or a redistribution of lead-times, can be carried out in inbound, internal, and outbound activities (Persson 1995). However, a reduction of lead-times needs to be linked with customer requirements and the companies’ marketing efforts. Reducing lead-times should thereby have a positive impact on the companies’ competitiveness (Stalk 1993). Lead-times may be reduced in the following ways; run activities parallel to each other, decrease waiting time, and synchronize activities (Persson 1995). However, according to Womack et al. (1991), reducing waiting time is the primary reason for reducing lead-times. Waiting times originate from two different perspectives of optimization. The traditional perspective implies that the machines keep a steady pace (no shortages in supply of material), and the second perspective implies optimization of the production flow. Further lead-times can be viewed from two perspectives; customers and company. From a customer perspective, lead-time refers to the elapsed time from order to delivery (consisting of activities such as order entry and order processing) and from a supplier perspective the ultimate lead-time refers to the time it takes to convert an order into money (Christopher 1992). As the lead times are uncertain, companies tend to assure accessibility of material by higher inventory levels (Ballou 1992).

Reduce or adapt to the uncertainties; There are several types of uncertainties related to the material and information flows such as lead-time, quantities, and capacity (Persson 1995). Uncertainty can be categorized into internal and external uncertainty; internal uncertainty refers to any uncertainty caused by the company’s lack of knowledge, and external uncertainty is caused by the unpredictability in the market place (Erramilli and D'Souza 1995). External uncertainty can also arise from insufficient information regarding important variables or from unpredictability of the environment (Miller 1992). In order to reduce the impact of uncertainties, it is necessary to understand their source and magnitude of impact (Lee et al. 1997). Different techniques might be used in order to reduce

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uncertainties, for instance forecasting techniques may reduce demand uncertainty (Persson 1995). Forecasts should be based on customer information from as far down stream in the supply chain as possible (Lee et al. 1997). Information of customer demand becomes distorted as it is passed on in the supply chain. Hence the ordering pattern from different actors in the supply chain amplitudes as the demand variability increase as one moves upstream in the supply chain. This is referred to the phenomenon "Bullwip effect". (see for instance (Chen et al. 2000; Lee et al. 1997) Additionally, the greater the degree of uncertainty the greater the need for the company to keep high inventory levels (Pope and Prasad 1998).

Re-distribute or increase frequencies; Frequencies are often related to batch sizes. Increased frequency allows for smaller batch sizes in production and fewer quantities to be delivered. Thereby the inventory levels will be reduced. (Persson 1995) In general, inventory is a major use of working capital and hence it affects a company’s profitability. Efficient inventory management ought to improve profitability by lowering costs and support sales. The frequency is directly related to the inventory levels as it refers to the replenishment of products. There are different types of inventory such as cycle stock, in-transit inventories, and safety stock (Lambert et al. 1998). Cycle stock is primarily influenced by changes in frequencies. According to Person (1995), the major issue is to eliminate the obstacles for re-distributing or increasing frequencies rather than determining the optimal frequency.

Eliminate or adapt to expected pattern of demand; The logistics system should not be designed for a pre-determined demand pattern, as the demand is more or less difficult to predict. Variances in expected demand and actual demand may be reduced by; fixing of prices, co-operation with major customers and incorporation into the customers’ planning process. This principle is important for an effective utilization of capacity and for the reduction of waste in the logistics system. (Persson 1995) Demand patterns of inventory products can be classified into; statistically unpredictable patterns, low demand and statistically predictable patterns (Kobbacy and Liang 1999). Examples of changes in customer demand are those determined by a company’s competitive actions, or even changes in government regulations. Consequently, the decision on maintaining additional inventory (safety stock) or risking potential losses of sales revenue due to inventory stock-outs has to be taken. (Lambert et al. 1998) Bjornland et al. (2003) stress that many patterns of demand are created by the ordering procedure, due to the ordering point not being initiated by the customers’ actual demand.

10 Other common names of this phenomenon are; Forrester effect and Whiplash Effect
Simplify structures, systems, and processes; When making and carrying through strategic decisions, the supply chain will be designed. Simplification of structures, systems and processes implies a reduction of decision elements, such as reductions and re-organization of the supply base and standardization of components, material and processes. The simplification of products and processes directly reduce the number of decision elements and indirectly standardize components (Persson 1995). For some products a direct structure with manufacturing company and customer company is suitable, whereas in other cases there is a need for intermediaries to be involved. Direct supply chains are preferable when the product is complex, is difficult to substitute, has a high unit cost, the market is geographically dense and the volume high, or there is a small number of customers. Indirect supply chains are preferable when the product is easy to substitute, there are several customers each buying a small volume, and the customers require frequent deliveries (Bjornland et al. 2003). A general trend during the last decades has been towards reducing and eliminating the number of traditional intermediaries (Vandermerwe 1999). A tendency towards direct supply chains is driven by the need for information (Bucklin et al. 1996).

Differentiate; Differentiation implies ways to categorize and group customers, suppliers, products, systems, and processes. By differentiating it becomes possible to apply different methods and procedures to each category (Persson 1995). Differentiation is based on the notion that the studied entities demonstrate heterogeneity in the behaviour and thereby should be treated differently (Dibb 1998). Adding value through differentiation is a mean of achieving advantage in the market place (Christopher 1992). Differentiation is one of two possible strategies for commodity suppliers in order to increase competitiveness in the market place (the other strategy being to create cost advantage) (Mattsson 2000).

Postpone; Postponement can be considered as a natural follow up to shifting from forecast-driven systems towards demand-driven systems (Yang et al. 2005). The principle of postponement can be stated as “The time of shipment and the location of final product processing in the distribution of a product should be delayed until a customer order is received” (Zinn and Bowersox 1988). Postponement creates flexibility and implies that the completion of the products is conducted as late in the process as possible (Persson 1995) and thereby demand is more easily forecasted (Lambert et al. 1998). Postponement thereby creates flexibility to changes in demand (Persson 1995). Studies by Zinn and Bowersox (1988) conclude that demand uncertainty is the most determinant reason for postponement. Person (1995) proposes two types of postponement; geographical (for instance central inventory) and value-added (for instance packaging of products), whereas Zinn and Bowersox (1988) propose five postponement activities/types; labelling, packaging, assembly, manufacturing and time. Generally, postponement facilitates keeping low inventory levels as it is based upon a number of standard components that becomes customized as the customer places the order (Segerstedt 1999). Studies conducted by Yang el al (2005) confirm that
companies can achieve a better performance from implementation of postponement.

*Improve the information processing and decision support system:* Information systems should provide management with information that enables it to make different types of decisions (Lambert et al. 1998), at the same time as they should assist managers in focusing on essential information and simplifying the decision process (Persson 1995). Further information technology can be used to reduce lead-times and increase the accuracy when transferring information in the supply chain (Persson 1995). Data for logistics information systems can come from many sources such as order processing and operating data (Lambert et al. 1998). Mattsson (2002) stresses the importance of information quality and defines it as; "to what extent information available for a certain decision fulfils realistic demands to create decisions for an optimal decision-making". Further, systems need to focus on transaction simplification, substitution and systems consistency (referring to the interaction between systems) (Persson 1995).

*Strengthen the internal and external integration:* According to Lambert et al. (1998), co-operating in a supply chains implies determining key chain members with whom to link processes, what processes should be linked with whom, and the level of integration for each link.

Integration can be viewed from two perspectives; internal and external, where internal organization refers to integrations within a company’s own organization and external integration refers to integration with for instance customers. (Christopher 1992) Internal integration might be grouped into three categories; informal, formal, and organizational. External integration could be either horizontal or vertical. Horizontal integration refers to companies on the same "level" (for instance producers) cooperating in order to be able to deliver products to specific markets (Storhagen, 2003). Vertical integration concerns companies developing relationships with suppliers (upstream) and/or customers (downstream) (Persson 1995). Downstream integration implies that a producer might take the role of an intermediary and sell products directly to retailers, whereas upstream integration might imply that the retailer conducts wholesaler functions (Storhagen 2003). By integrating with suppliers and customers, further opportunities for improving internal operations might be exposed (Lee and Billington 1992). Vertical integration is based on the notion of transaction cost analysis (TCA\textsuperscript{11}), as it was primarily put forward by Williamsson (1979) and Williamsson (1976) Further, external integration is to be considered as a strategic distribution channel decision (Storhagen 2003). A study conducted by Schmitz et al. (1995) concludes that vertical integration without financial ownership is a potential strategic alternative. Within the logistics field, emphasis ought to be placed upon the linkage of organization through information (Christopher

\textsuperscript{11} The basic premise of TCA being that the lowest cost channel structure is the ideal channel structure
A pre-requisite for external integration is usually the differentiation of the customer base and the supply base respectively (Persson 1995). When companies have decided to integrate their operational functions, mutual trust, shared vision regarding interdependency and principles of collaboration have to be included. Lee (2000) identified three dimensions of supply chain integration, which are presented in Table 2.

<table>
<thead>
<tr>
<th>Table 2. Dimensions of Supply Chain Integration</th>
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<tr>
<td><strong>Dimension</strong></td>
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<td>----------------</td>
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<tr>
<td>Information integration</td>
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<tr>
<td>Coordination and resource sharing</td>
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<tr>
<td>Organizational relationship linkage</td>
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La Londe and Mason (1993) suggest the following common principles of logistics; selective risks, information selectivity, information substitution, transaction simplification, variance reduction, inventory velocity, postponement, and shared/shifted risk.

Selective risks emphasise that the logistics system should be planned so that its performance is directly related to the importance of the customer or product. If a service failure appears, it should appear in the area where the risk is lowest. As a consequence, detailed knowledge about the customer is necessary in order to implement this principle. (La Londe and Mason 1993)

Information selectivity implies that information should be handled with the same operational, tactical and strategic importance as any other of the company’s resources (such as capital and human). It further requires that the logistics manager should design and implement logistics information systems that focus on the more important events. By applying this principle, required information can be extracted from the total information system. (La Londe and Mason 1993)

Information substitution is based on the notion that the cost of information is less than the cost of other resources and therefore information should substitute other resources whenever possible (La Londe and Mason 1993). Information could be substituted for traditional production factors such as capital and material via its incorporation in the production factors (Chen 1994). Even though information is not directly related to the actual production and does not automatically increase production, managing information may help transforming abundant information into productivity (Tu and Sui 2005).
Transaction simplification aims at enhancing the efficiency and effectiveness of the company’s transactional process (for instance order entry) (La Londe and Mason 1993).

Variance reduction points towards reducing unplanned variance, which can significantly influence productivity, in the system (La Londe and Mason 1993). As variances in a system increase, queues increase and average output decrease, concluding that an alternative to buffering is to reduce the variability with which the system has to cope (Hurley and Whybark 1999). Variance reduction can also be achieved from an investment in and commitment to continuous learning (Moskowitz et al. 2001).

Inventory velocity, concerns the logistics role of facilitating the flow of inventory from raw material to end-user (La Londe and Mason 1993). Inventory velocity is measured by inventory turnover and a rapid turning inventory may be a driver for decentralization (Wanke and Zinn 2004). Companies use for instance information processing in order to increase inventory velocity (La Londe and Masters 1994).

Postponement\textsuperscript{12} aims at reducing the amount of inventory necessary in order to meet specific and varied customer service levels (La Londe and Mason 1993).

Shared/shifted risk implies shifting the cost of the logistics structure from a fixed cost basis to a variable cost basis. The cost can also be shifted upstream or downstream in the supply chain. (La Londe and Mason 1993).

\textsuperscript{12} See previous description
Of the principles suggested by La Londe and Mason (1993) and Persson (1995) respectively; one principal is identical (postponement), some are related, whereas some differs. The principles of logistics provided by La Londe and Mason (1993) could however be included in the logistics principles for process performance provided by Persson (1995) (See Figure 7). Selective risks becomes the outcome of differentiation as it emphasis that the outcome of the logistics system should be directly related to the importance of the customer or product (require differentiation). Information selectivity is based on the importance of information as a resource and that a logistics system should focus on important events. Information selectivity is thereby covered by simplification of structures, systems and processes and improves the information processing and decision support systems. Further, information substitution and transaction simplification are embedded in the logistics principle improve the information processing and decision support systems and with reference to the physical flow also simplification of structures, systems and processes. Variance reduction concerns handling of internal uncertainties in for instance the production process, inventory velocity implies smoothing the material process and is thereby connected to the frequencies in the material flow whereas shared/shifted risk concerns integration related aspects.

Thereby, the logistics principles provided by La Londe and Mason (1993) becomes consolidated into the principles for process performance suggested by Persson (1995). These principles for process performance constitute the foundation for generic logistics strategies.

Several generic logistics strategies have been identified and some of them are prerequisites for each other as well as dependent upon each other, for instance; the logistics principles external integration and simplification of structures, systems and processes require differentiation and implies that the sawmills are working closely with some of its customers and/or suppliers. Further, frequencies and lead-times overlap and have an affect on each other.

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13 Information selectivity, Selective risks, Information selectivity, Information substitution, Transaction simplification, Variance reduction, Shared/shifted risk, and Inventory velocity.
Figure 7. Consolidating logistics principles (suggested by La Londe and Mason 1993) to principles for improving process performance (suggested by Persson 1995)
5. Logistics strategies in the sawmill industry

This chapter is based on empirical data from interviews with representatives of the sawmill industry. The objective of the chapter is to explore generic logistics strategies from a sawmill perspective, and to discuss their utilization in the sawmill industry. The aim is to explore generic logistics strategies in a variety of sawmills rather than their statistical representativeness. The empirical data is reported in Gustafsson (2006).

Reducing or redistributing lead-times

A company should focus on optimizing its material and information flows rather than on optimizing its use of resources.

Practice

The sawmills studied use different contractual forms and procure timber based on the contractual form suggested by the individual supplier for that specific delivery. Softwood lumber is mainly procured from private forest owners, forest owners associations and other sawmills. Private forest owners apply different contractual forms, where sawmills usually administer the transportation of timber from the forest to the sawmill (either by using their own trucks, or by contractors), whereas timber procured from forest owners associations and other sawmills is usually delivered to the sawmill by the seller.

In general, sawmills focus their production to specific species (some weeks sawing spruce, some weeks sawing pine). The timber is sawn either according to saw yield or value yield. The lead-times within and between the different operations in the sawmill are in most cases dependent upon dimensions. In general, sawmills’ operations are internally optimized, and investments are usually made in those operations that are lacking in capacity. The lead-time from log to softwood lumber is 2-3 weeks. Sawmills generally keep stocks of softwood lumber (one stock of customized products and one stock of semi-finished products).

\[\text{14 Saw yield implies getting as much softwood lumber from the timber as possible whereas value yield implies that each product is provided with a price and a cost, and thereafter the profit for each log of timber is calculated}\]

\[\text{15 Could be delivered at once to customers}\]

\[\text{16 Has to be adjusted to customer order before delivery}\]
in order to be able to meet customer requirements regarding, for instance, lead times. If it happens that a sawmill cannot deliver softwood lumber directly from the production or from either of its own two stocks, it purchases the required products from another sawmill in order to be able to deliver them to its customer. Deliveries within Sweden are direct deliveries, whereas deliveries to international markets are generally conducted through intermediaries such as agents.

**Discussion**

The studied sawmill’s procurement procedure, its production processes and the general characteristics of softwood lumber determine the sawmill’s lead-times. Different contractual forms imply different levels of management, as well as the possibility to vary lead-times;

- **Standing timber for sale;** the sawmill determines the bucking. However it takes time to do the bucking and transport the timber to the sawmill. The sawmill has the possibility of determining the timing and thereby securing its supply of timber when required. The time limit is determined by each individual agreement.

- **Cutting commission;** the sawmill determines and manages the bucking. However it takes time to do the bucking and transport the timber to the sawmill. The sawmill has the possibility of determining the time for the bucking and thereby securing its supply of timber. The sawmill is restricted to fulfill the agreement within the specified time period.

- **Delivered timber;** the sawmill supervises the lengths per dimension of the timber by price lists which are communicated to the private forest owners in advance. The private forest owners inform the sawmill when the timber is accessible at the roadside. The transport time is determined by the sawmill’s possibility to manage the delivery of timber into the sawmill.

The administrative lead-times regarding procurement of timber varies between individual suppliers as well as between the different contractual forms. A sawmill might work with suppliers for many years, although shorter periods are not uncommon; for instance private forest owners call and ask the sawmill to procure their timber.

The production flow in a sawmill is to be referred to as sequential, as each operation follows the previous one. An issue of reducing or redistributing lead-times in the production process can therefore be focused on decreasing waiting times. The sawmill’s operations are synchronized and the lead-times appear as a result of the differences in time consumption for each operation. Consequently the sawmills have a traditional perspective on waiting times.

Producing softwood lumber takes several weeks, depending on the quality of the incoming material as well as on the sawmills’ internal operations. Therefore, actual customers’ orders can be taken into consideration in production either if the
customers accept delivery times of several weeks or if the sawmills know of their customers’ orders in advance. However, if the customers require shorter lead times and have not provided the sawmill with forecasts, the sawmill is forced to run its production according to its own estimation of customer demand, and build stocks of softwood lumber (customized and semi-finished products) thereafter.

Reducing or adapting to uncertainties

A company should strive towards managing internal and external uncertainties affecting its business.

Practice

The sawmills studied perceive the supply of timber, weather conditions, and international market to be uncertainties of the sawmill industry.

Supply of timber. The lack of timber (demand exceeding supply) on the market constitutes an uncertainty regarding the supply of timber as well as timber prices\(^{17}\). The timber price is international and hence it is not possible to import timber in the long run (even if the timber is cheap, the transportation costs are considered as high). Consequently, sawmills become tightly associated with their region. Usually it is difficult to get enough timber to the cover production needs, as well as being difficult to predict the volume of timber and the combination of species.

In order to manage the lack of timber, sawmills focus on their timber suppliers (private forest owners in particular) and try to establish a tight relationship with them. Sawmills keep a large stock of timber and make sure to pay high timber prices in order to make the private forest owners feel appreciated. Sawmills also buy timber on "cutting commissions" and "standing timber for sale" in order to act as a buffer and secure incoming material.

Weather conditions. The industry is weather dependent, affecting the supply of timber (for instance the freezing and thawing of the ground) as well as the production processes and finished products (for instance the risk of damage to the timber, for instance by blue stain).

In order to adjust to different weather conditions, sawmills plan their operations in advance and are continuously supervising and managing their flows.

International market. The price development of softwood lumber is instable and determined on the international market. In general there is a surplus of softwood lumber on the international market and hence customers possess the possibility of pressing prices. Interest rates and currency can also affect the sawmills’ profitability.

\(^{17}\) Timber price constitutes 60 % of the total costs.
As the market for softwood lumber is international, the prices are determined internationally and sawmills with a large export share stress the securing of currency rates.

The sawmill industry is energy intensive and energy prices are also perceived as an uncertainty.

**Discussion**

The sawmills’ perceived uncertainties are to be referred to as external uncertainties; unpredictability on the supplier market and the customer market respectively. The sawmills are aware of these, and try to adapt in order to be prepared for changes. Unpredictability on the supplier market, and the risk of lacking raw material makes the studied sawmills procure timber on speculation, whereas uncertainties in customer markets are partly handled by adjusting the prices of softwood lumber. The third uncertainty, namely “weather conditions”, ought to be considered partly as a business condition of the sawmill industry rather than an uncertainty.

Surprisingly, none of the sawmills studied mentioned uncertainty regarding logistics service requirements. This indicates that the sawmills are rather comfortable and secure in that their customers are going to buy softwood lumber (the uncertainty lies rather in the price the customers will pay).

**Redistributing or increasing frequencies**

*A company should focus on eliminating obstacles for increasing frequencies. Increased frequencies result in lower inventory levels as it allows for shorter batch sizes and smaller delivery sizes.*

**Practice**

Swedish forestry practices include clearfelling, i.e. harvesting of complete stands, resulting in a variety of delivered products with regards to for instance volume and quality. Further, cutting has to be conducted in specific seasons due to weather conditions.

The proportion of the different products in the sawmill is partly determined by species and sawing pattern, where the yield optimization routine determines the frequencies of different products in the material flow. In general all functions are internally optimized (i.e. maximized utilization of the individual production operations), implying that there is a small stock of products between some of the operations (which is based on the differences in equipment capacity). There are some limitations with regards to frequencies in the different production operations, and in order to limit their affects on frequencies, additional equipment is usually bought, or workers do overtime when needed. In order to secure the availability of the equipment, typically sawmills conduct time studies. As the softwood lumber is partly or completely finished, the products are placed in ei-
ther customized inventories or semi-finished inventories. The transportation costs are considered as high for softwood lumber, and hence customers and sawmills want to fill up the transport capacity for each specific delivery.

**Discussion**

The sawmills have limited possibilities to manage the incoming material according to, for instance, particular frequencies of timber dimensions as a result of the Swedish clearfelling practice.

Further, the production frequency of a specific assortment of softwood lumber is determined by a strategic decision of maximizing the capacity of each production operation, as well as of a decision regarding sawing pattern. The other operations are subsequently adjusted to the outcome of the sawing, following that the frequency of assortment becomes strategic.

Transportation capacity is utilized well, as softwood lumber is bulky and transportation costs (compared to the price of softwood lumber itself) are considered as high. Therefore, softwood lumber is mainly delivered in full truckloads.
Eliminating or adapting to expected pattern of demand

A company should strive towards synchronizing its logistics capacity with customer demand. Knowledge of customer demand could be achieved by, for instance, working closely with the customers in their planning processes.

**Practice**

In general customers’ requirements regarding volume are specified in the agreements. Table 3. illustrates volume specification in agreements for each customer type respectively. Prices are also included in the agreements, however it is possible to negotiate on prices from time to time.

<table>
<thead>
<tr>
<th>Main Customer type of the sawmill</th>
<th>Volume specification in agreements</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIY multiple retailers</td>
<td>Identified per year</td>
</tr>
<tr>
<td>Traditional retailers</td>
<td>Not identified by the customers, the sawmills make forecasts on behalf of the customers</td>
</tr>
<tr>
<td>House-builders</td>
<td>Identified per year</td>
</tr>
</tbody>
</table>

The *DIY multiple retailers* specify volume per product for the period of the agreement. For customers that are not able to conduct these forecasts themselves, sawmills presents the previous years volumes and leaves the decision regarding an increase or decrease in volume for the coming year to the customers. The outcome of the volume estimation in the agreements generally meets the actual demand.

In general, sawmills delivering softwood lumber to *traditional retailers* conduct the forecasts themselves, as they perceive they can make better forecasts than their customers can. It even happens that a sawmill does not want their customers to provide the sawmill with forecasts. In order to make accurate forecasts, the sales personnel need to be closely connected to the market. However, the market and product assortment is perceived to be static (only the prices differ) and therefore these sawmills usually make their forecasts according to the following motto:

“The same types of products as last year, but just a little more.”

The sawmills delivering softwood lumber to the *house-building industry* produce softwood lumber in order to meet the volumes stated in the agreements. The volumes stated in the agreements correspond to the actual ordering.

**Discussion**

In some cases, sawmills procure standing timber for sale and a cutting commission in order to secure incoming material, and are thereby able to alter the bucking according to customer demand. However, as the production time exceeds the customers’ required lead time, information of coming demands needs to be communicated to the sawmill before the actual order is placed. If this is not conducted the sawmills become forced to produce softwood lumber on speculation
and deliver it to their own stock. However, the demand for softwood lumber appears to have a predictable pattern and hence sawmills have the possibility of conducting the forecasts themselves. DIY multiple retailers and house-builders identify their volume requirements, and hence sawmills delivering to these customer types ought to be able to manage the procurement (bucking in particular) of timber that enables them to produce the softwood lumber required.

Due to a compelled lead-time in production, sawmills either base their production on their own forecasts (implying storage of softwood lumber before delivery to customers), or on forecasts provided by the customers. Customers providing forecasts is a necessity in order for sawmills to be able to meet their requirements regarding lead time, without keeping all their products in stock.

In some cases, individual sawmills do not want their customers to provide them with forecasts, since they do not want to be held responsible for not being able to deliver products. It is perceived that it is better to let customers order softwood lumber when they need it, and to determine at the time if it is feasible (for the sawmill) to deliver the products or not.

Traditional retailers do not provide their suppliers with forecasts of their coming demands, indicating that they do not feel there are any major problems in being able to buy softwood lumber.

In general sawmills adapt to expected patterns of demand by their production forecasts (either provided by their customers or conducted by the individual sawmill).

**Simplifying structures, systems, and processes**
*A company should strive towards standardizing its structures, systems and processes by using, for instance, a number of standardized components from preferred suppliers and customers.*

**Practice**
The supply base is fragmented. Forest owners associations and other sawmills conclude yearly agreements (including total volume and price), whereas private forest owners sell timber irregularly to the sawmills being studied. Agreements regarding timber with forest owners associations and other sawmills include the sawmills selling of pulp chips back to one of the timber supplier. The studied sawmills perceive that if they abolish selling for pulp chips, they would not have the possibility of procuring timber from certain suppliers.

In general there are no specified process owners in the sawmills, and therefore simplification and standardization is included in the daily work of each responsible manager and/or the CEO. In the groups of sawmills within corporate structure, overviews are initiated and managed by the central staff. Most work is focused on the sawmills’ utilization of their production equipment, followed by the continuous flow of products from raw material to the different stocks. Further-
more, the development at each sawmill is focused either on offering more value-added services or on the actual handling of the softwood lumber itself (it being considered a bulk product).

Some sawmills have tried to reduce the variety of softwood lumber on offer, but they experienced that their customers required only the ordinary products. Even though one of the sawmills closed agreements with general purchasing departments or sales managers, the same products were nevertheless ordered even though they were not included in the general agreements. Generally sawmills feel resistance from their customers regarding reducing variances, as they keep on asking for the same ordinary products.

Deliveries to the domestic market are classed as direct deliveries, whereas deliveries to the international market are conducted through intermediaries.

**Discussion**

The sawmill industry is extremely dependent on regional suppliers and needs to be able to handle every product they are willing to sell. Furthermore, sawmills perceive that they are tied to their other suppliers by the sale of, for instance, pulp chips. Despite the aim of simplifying structure, systems and processes with preferred suppliers from a fragmented supply base, the characteristics of the sawmills’ supply base make it difficult for the sawmills to simplify their structures, systems and processes regarding their suppliers.

Groups of sawmills within corporate structure focus on simplification of the production process as they have focused their production at each sawmill on species and dimensions. The other sawmills do not explicitly work with simplifying their own structures, systems and processes, even though some have attempted to reduce the variances in their assortment.

The sawmills’ customer base differs with regards to simplifying structures, systems and processes. DIY multiple retailers, and to some extent house-builders, stress simplifying structures, systems and processes, whereas traditional retailers do not appear to focus on these issues.
Differentiating

A company should aim at categorizing its customers, suppliers, products, systems and processes in order to be able to handle them according to their characteristics and importance for the company. Differentiation implies increasing value in an economical way by treating whole groups, instead of customers, suppliers or products.

Practice

Each of the studied sawmill stresses the value of the private forest owners. Hence it pays attention to them and offers them services such as support in forestry. However, differentiation of suppliers is only considered in one of the groups of sawmills within corporate structure, where private forest owners are differentiated based on volume, location (closeness to the sawmills), and accessibility (concerns standing timber for sale and cutting commissions, and also the sawmill’s possibility of accessing the forest at different times of the year). For these private forest owners, differentiation means one of price. In the other cases, prices are the same for all private forest owners.

The sawmills use differentiation with regards to their customers (see Table 4) and in some cases also their suppliers. Customers are differentiated by;

- **Location**: customers located in the sawmills’ neighborhood or region.
- **Loyalty**: customers with whom the sawmills have a long relationship.
- **Volume**: the customers’ importance for the sawmills’ disposal of softwood lumber.

The sawmills’ means of differentiation are;

- **Availability of products**: selected customers are given the possibility to order the most desirable dimensions and lengths of softwood lumber.
- **Better services**: selected customers are given the possibility of ordering small quantities of softwood lumber, whereas the other customers have to order complete packages or truck loads.
- **Price**: customers continuously ordering large volumes of softwood lumber get a lower price.

<table>
<thead>
<tr>
<th>Main Customer type of the sawmill</th>
<th>Differentiation Source</th>
<th>Differentiation means</th>
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</thead>
<tbody>
<tr>
<td>DIY multiple retailers</td>
<td>- Volume</td>
<td>- Price</td>
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<tr>
<td></td>
<td></td>
<td>- Availability of products</td>
</tr>
<tr>
<td>Traditional retailers</td>
<td>- Volume</td>
<td>- Availability of products</td>
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<tr>
<td></td>
<td>- Location</td>
<td>- Better services (smaller quantities)</td>
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<td></td>
<td>- Loyalty</td>
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</tr>
<tr>
<td>House-Builders</td>
<td>- Volume</td>
<td>- Availability of products</td>
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<tr>
<td></td>
<td>- Loyalty</td>
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</table>
Discussion
The sawmill industry differentiates its suppliers as well as its customers located closely as it is important for sawmills to be well considered in the region, by both suppliers and customers. Closely located customers are provided with a better availability of products as well as other services, whereas suppliers are offered for instance additional services and in some cases also higher prices. Customer differentiation is also based on the customers’ importance (purchasing volume) and their faithfulness in purchasing softwood lumber.

Postponing
A company should delay its final customization if its customers have placed the order. The later the product becomes customized, the greater the company’s flexibility. Postponement concerns producing and delivering products according to customer orders.

Practice
The sawmills studied manage the bucking of timber from private forest owners (contractual form "delivery timber") by price lists, and they up-date their price lists as often as they perceive it necessary. However, as the product assortment is perceived to be static, the same lengths are needed and therefore the pricelists are not often up-dated.

The sawing of timber is based either on saw yield or value yield. Customer ordered products are set to a high price and will therefore be prioritized in the production in preference to standard products (that the sawmills know they will sell at a specific price).

The group of sawmills within corporate structure delivering softwood lumber to DIY multiple retailers mainly concludes yearly agreements (containing volume per products for the period of the agreement) with its customers. These figures are thereafter divided into three months production plans, which are transmitted to each sawmill as well as the procuring department. Consequently all products that are produced are customer-ordered with a pre-defined destination. The resulting products are stored in a semi-finalized state at each individual sawmill until the same other customer requests delivery.

Sawmills keep stocks of semi-finished products as well as customized products. Semi-finished products are taken from stock and adjusted to customers’ orders (as the customers have placed the order), whereas the stock of customized products is aimed at emergent orders. It is perceived that keeping a central stock of semi-finished products, and thereafter adjusting them according to customers’ orders, provides the best service for everyone. Softwood lumber might also be delivered directly to the customer, without being placed in stock.

Currently one of the sawmills differs. All softwood lumber that it produces has a customer order and hence the production system is connected to the individual
orders. The sales department is the “managing department” at the sawmill, and it determines and manages the operations of the sawmill’s other departments. If the sawmill is lacking actual orders, the sales department makes its own forecasts and the products produced are thereafter stored at the sawmill until they are ordered. However, the sawmill in question now perceives that this procedure is becoming impossible to manage, and it is therefore working on developing two types of inventories; one containing semi-finished products, and one with customized products. The sales department will then assess which products that are to be produced and placed into the two types of stock.

Discussion
Sawmills create flexibility by adjusting softwood lumber from the stock of semi-finished products and are thereby applying value-added postponement by completing the delivery as the customers place their orders. The value-added postponement could take several forms, such as labeling and packaging.

Improving information processing and decision support systems
A company should strive towards unifying its information systems. Consequently administrating routines for gathering information need to be automated.

Practice
All sawmills use internal business systems that are applied on statuses in each step of the production. Groups of sawmills within corporate structure use network systems that allow all employees to see the information they need for conducting their work. The business systems are either standard systems or ones designed and built by each individual sawmill. In general, business systems store historical data.

Orders are generally received by telephone regarding traditional retailers and house-builders, whereas DIY multiple retailers differ with regards to individual agreements.

Discussion
The studied sawmills have developed their systems in accordance with their needs, and consequently their administrative routines need to be clearly specified. Furthermore, the studied sawmills appear to have focused and developed their business systems in accordance with their general focus on production-related issues. The distribution and sales departments do not appear to have any developed business systems, amplifying the sawmills’ general focus on production.
Strengthening the internal and external integration

Integration in the supply chain could be conducted in different ways, and hence the company needs to determine which peers, customers and suppliers to work closely with.

Practice

The studied sawmills’ external integration and cooperation with their suppliers and customers are illustrated in Figure 8.

Sawmills belonging to a group of sawmills within corporate structure are internally integrated and make use of the same networks. They have one procurement and one sales department for each group, while their production has been focused in the individual sawmills. A result of this is that each sawmill uses different timber dimensions and produces different assortments.

Despite the importance of independent private forest owners, none of the sawmills appears to have any integration or co-operation with them. Concerning the other suppliers, yearly agreements are made including volume and price, as well as with those sawmills trading with pulpwood and chips.

The group of sawmill within corporate structure delivering to DIY multiple retailers administers inventory (including continuous replacements) at some of their customers’ sites. The group has the responsibility of always having products at the customers’ place of business (after receiving estimated consumption, higher and lower stock levels, and continuous sales volumes). Currently, the group does not share any other information with its customers (only sending notices for deliveries to customers that specifically ask for them). However, the group feels that an exchange of information would be beneficial for them as well as their customers.

Sawmills delivering softwood lumber to traditional retailers co-operate in some cases where big tenders are concerned. In other cases, the sawmills do not integrate or co-operate with any of their customers, as they want to have control over their softwood lumber and individually determine who should be allowed to buy the most desirable products (this is aimed at loyal customers). Further, the sawmills perceive that it is preferable if the customers make all decisions, and then ordered their softwood lumber as needed. Some sawmills prefer it if their customers use several suppliers of softwood lumber and thereby do not become dependent upon their deliveries. These sawmills neither do nor want to share any information with any of their customers, as they perceive that they would loose power at the same time as they perceive that sharing information implies problems, administrative as well as with regard to routines. Additionally, the sawmills do not want to reveal their stock situation to their customers; it is easy to produce the products that their customers want, even though they are not in stock at the time the customers are searching for them. If stock levels are high, than the customers might try to negotiate lower prices.
The sawmills delivering softwood lumber to the house-building industry might keep stocks of finished products at the house builders’ production site. The house builders can then pick out their softwood lumber from the stock of finished products as required. Stocktaking and invoices are conducted once a month, and the sawmills thereafter fill up the needed volumes. Currently, the sawmills do not share information with any customers.

**Discussion**

Vertical external integration varies, whereas horizontal integration appears to be lacking. The sawmills studied delivering to traditional retailers do not integrate with their customers, as it is perceived to require additional administrative work (which is perceived as unnecessary). As a result they find it beneficial if the customer orders the products themselves. On the other hand, the group of sawmills within corporate structure selling softwood lumber to DIY multiple retailers perceives that this is beneficial way of working, as the customers become dependent on them as suppliers; in the long run the administration costs are less than for ordinary customers (despite considerable administrative work at the beginning of the integration).

The aim of vertical integration is to have streamlined business processes between the sawmills and their suppliers and customers. Presently, the level of vertical integration clearly differs between sawmills and their customers. The level of vertical integration between the group of sawmills within corporate structure and DIY multiple retailers is to be referred to as co-ordination and resource sharing, implying decision delegation. The integration regarding sawmills and house-builders refer to some kind of information integration, implying replenishment.
The sawmill industry is a basic industry in Sweden, and traditionally its focus has been on the yield and optimization of the sawmills’ production operations. It follows therefore that the strategic focus of a majority of the Swedish sawmills is to be regarded as cost leadership, and that the sawmills thereby stress economies of scale in the individual production operations. The sawmill industry is characterized by closeness and dependence on its region, due for instance to high transportation prices, with regards to timber deliveries as well as customers.

Currently, sawmills appear to utilize (more or less intentionally) some of the identified generic logistics strategies, on the other hand some of the generic logistics strategies’ pre-requisites appear to be lacking. Despite lacking pre-requisites, sawmills might find it beneficial to consider the generic logistics strategies in order to improve their own process performance.
6. Meeting logistics service requirements

This chapter examines customers’ logistics service requirements as well as generic logistics strategies in the sawmill industry. The chapter is divided into two main parts: logistics service requirements and generic logistics strategies in the sawmill industry.

6.1. Logistics service requirements

This dissertation concerns the following three customer groups; house builders, DIY multiple retailers and traditional retailers.

The house building industry implies deliveries of large volumes of a standard assortment at the same time as being able to fulfill the agreed lead-times. The logistics service requirements are focused on deliveries and planning, where actual deliveries (accurate products are delivered complete, orders are filled completely, and quick correction of mistakes are applicable) and specified delivery dates concern the availability of material. Further, the house-building industry appears to require logistics services adjusted to each individual house-builder, and to stress the deliveries of softwood lumber aimed at reducing their own stock levels.

The house-building industry uses softwood lumber as an incoming material in its production process and it is necessary that the softwood lumber is delivered according to agreed lead times, as failing deliveries might cause production stops in the house-builders’ production process. In order not to be exposed to this risk, house-builders keep safety stock on site. House-builders generally aim for capital reductions and therefore they ask for deliveries in entities.\(^\text{18}\) The requirement to receive softwood lumber in entities focuses on receiving the necessary products in a JIT-manner, followed by a possible reduction of the cycle stock. However, receiving softwood lumber in entities presumes that house-builders plan their

\(^{18}\) Order in entities refers to the possibility of ordering and receiving all softwood lumber needed for one house at the same time. Compare with concepts of material kit or assembly kits.
production in advance and provide sawmills with constructional drawings and/or production plans. Thus the sawmills will have the possibility of delivering the softwood lumber as required. At the same time, the sawmills’ employees need to possess the ability to convert this information into their customers’ needs for softwood lumber (in cases where this is not done at the house-builders plant). Furthermore, sawmills need to have a developed distribution network in order to be able to deliver small amounts of a specified assortment. Keeping supplier stock at the customers’ production site implies integration between the house-builder and the individual sawmill. The level of integration between the actors within different dyads might differ; however, mutual trust, information exchange, rational handling and clearly defined products (including quality requirements) are required.

The house-building industry appears to value traditional and basic logistics service requirements, while other logistics service requirements are not highly valued. Additionally, the house-building industry regards physical product quality and some logistics service requirements as more important than price, implying that they are willing to pay for these services.

**DIY multiple retailers**’ customers are primarily end-consumers, implying that softwood lumber is intended for personal use; hence the DIY multiple retailers require to be provided with consumer-packaged products. Tied up capital is reduced by small package sizes, and administration and handling at each store is facilitated by the use of bar-coded products.

Delivering softwood lumber to DIY multiple retailers implies handling softwood lumber as customized products in large volumes with frequent deliveries (due to restrictions in space at the DIY multiple retailers’). DIY multiple retailers require their suppliers to coordinate and manage deliveries to their individual stores. This forces the suppliers to focus on designing their distribution channels (selecting distribution channel members and consecutive relationships) as well as inventory policies.

**Traditional retailers** require a wide range of logistics service requirements from the sawmills; this implies large as well as small volumes of a standardized assortments, as well as from a non-standardized assortment.

Differences in logistics service requirements stem from the traditional retailers’ different customers types; some support selling of softwood lumber to industrial customers, and some facilitate selling softwood lumber directly to end-consumers (see DIY multiple retailers). Requirements regarding small package sizes and packages containing different assortments concern the retailers’ aim to reduce tied up capital, as well as being able to meet their customers’ demands. The retailers thereby require the sawmill to offer services that facilitate their efforts to reduce tied up capital, at the same time as they have all products in store or can offer products promptly. The different customers types force the retailers
to emphasize their lead times and fulfillment of the agreements, both from their own suppliers and to their customers. Retailers might customize softwood lumber before selling it on. This stresses the importance of getting the actual deliveries on time, as well as a fulfillment of product quality requirements.

Each traditional retailer usually has only one or a limited number of depots taking in deliveries. The sawmills thereby apply direct delivery systems and deliver the softwood lumber as the retailers place their orders. Consequently, the individual sawmill ought to have the possibility of providing the retailer with a delivery time at their ordering point. In general, sawmills keep stocks of customized and semi-finished products from which to deliver softwood lumber, and hence there ought to be few changes in the delivery time given to the retailer.

Traditional retailers regard physical product quality and some logistics service requirements as more important than price, and therefore ought to be willing to pay for these services.

To understand the variation of logistics service requirements among different groups of customers’ one has to understand the customers’ business concepts such as their production processes\(^\text{19}\), size, and types of customer. The *house-building industry* uses softwood lumber as an incoming material in its production process and hence it needs a continuous supply of softwood lumber in order to be able to run its production. The *traditional retailers* have two main customer types; contractors and end-consumers, while *DIY multiple retailers* sell softwood lumber mainly to end-consumers. Contractors purchase softwood lumber for industrial use for individual objects; it follows that their demands are difficult to predict, particularly regarding specific products. End-consumers purchase softwood lumber primarily for their personal use, and their demand is dependent to various degrees upon personal preferences. As a consequence of end-consumers doing home repairs and construction work, softwood lumber needs to be easy to handle. The size of the retailers imposes differences in exerting power on their sawmills. DIY multiple retailers, as opposed to the sawmills’ other customers, have been categorized as category killers and force their logistics service requirements on the sawmills.

\(^{19}\) Usage of softwood lumber
6.2. Generic logistics strategies in the sawmill industry

The logistics strategy of a specific company can be implemented by the application of one or a number of generic logistics strategies. The basis for generic logistics strategies ought to be the company’s environment and the identified logistics service requirements.

Reducing or redistributing lead-times

Sawmills appear to have difficulties in significantly influencing total lead-times. For instance, lead-times from signing contracts with forest owners (including the availability of material) until the timber is delivered to the sawmills is partly dependent on weather conditions and contractual forms (determined by the forest owners). On the other hand, in-plant lead-time to produce softwood lumber is managed by the sawmills themselves, as the sawmills possess the ability to affect both batch sizes and order of priority. The reason for lead-times being difficult to cut might be that production is capital intensive, and a change in production lead-times generally involves heavy investment in production equipment. Therefore, the lead-time components of procurement and production are partly predetermined, and/or involve large investments.\(^ {20} \)

The production of softwood lumber is conducted either according to actual customers’ orders or forecasts (provided by the customers or conducted by the sawmill), and the softwood lumber is placed either in inventory for customized products or in semi-finished products. The time the products are placed in either of these two stocks is dependent upon customer orders.

Domestic deliveries are to be referred to as direct deliveries, and hence the distribution lead-time is the actual transport time. Allocation of finished products’ inventory has an affect on the lead-times to the customers. The studied sawmills delivering softwood lumber to traditional retailers and house-builders keep inventories at the sawmill, while sawmills delivering to DIY multiple retailers keep inventory in regional and/or local storages.

The sawmills’ possibilities to reduce or redistribute lead-times are therefore most significant in the distribution function. Sawmills delivering to house-builders and traditional retailers apply direct deliveries starting at the sawmill, stemming from a small number of customers ordering softwood lumber irregularly. Further,\(^ {20} \)

\(^ {20} \) However, sawmills increase their possibilities to effect the lead-times and secure incoming material by procuring standing timber for sale.
these customers order softwood lumber in full truckloads due to the perceived high transportation costs. As sawmills delivering to DIY multiple retailers get new customers, the total distribution network is evaluated and designed in order to meet the DIY retailers’ logistics service requirements regarding for instance strict lead-times. Sawmills delivering to DIY multiple retailers need to have adjusted and well-developed distribution channels which ought to include both regional and local storages, as well as intermediaries.

Reducing or adapting to uncertainties
The studied sawmills perceive external uncertainties regarding their suppliers and customers. Sawmills have adjusted their organizations by stating that their staff possess the knowledge required in order to adapt and counterbalance the identified uncertainties.

Perceived uncertainties could be viewed from either a long-term or a short-term perspective. Lack of timber is an uncertainty referring to a long-term perspective whereas in the short-term, the sawmills perceive uncertainties in the market place regarding price fluctuations. Studied sawmills perceive an uncertainty regarding the supply of timber, and they adapt to this uncertainty by procuring as much timber as possible. They therefore keep a speculation stock of timber and ought to prefer for instance the contractual form "standing timber for sale". At the same time, the studied sawmills perceive uncertainty regarding price fluctuations, but not regarding customers’ requirements. The sawmills have adjusted to customers’ requirements by applying postponement, and this might be one reason these requirements not being perceived as a prominent uncertainty. Price competition, on the other hand, is expected in a marketplace for commodity products.

Unexpectedly, none of the sawmills has mentioned the uncertainties regarding customers’ willingness to buy softwood lumber. The general procedure could result in the sawmills keeping extremely high stock levels, and therefore it seems that the uncertainty of customer requirements is subordinate to the overriding uncertainty of being short of timber.

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21 Keeping general stocks of customized and semi-finished products from which products are either delivered directly to customers or taken out in order to be adapted to customer requirements before delivery.
Redistributing or increasing frequency
Frequencies of timber delivered to the studied sawmills, and the production of specific products in the individual sawmill, are predetermined by strategic decisions such as sawing pattern and utilization of production equipment. As a consequence, the possibility of redistributing or increasing frequency mainly depends on the pattern of deliveries of softwood lumber to the customers. Presently softwood lumber is mainly delivered in full truckloads to traditional retailers and house-builders, due to what is considered as high transportation costs and bulkiness, whereas deliveries to DIY multiple retailers focus on delivering the quantities ordered.

In order to increase delivery frequency to each customer, individual sawmills need to determine their general warehousing structures by considering, for instance, local or regional storage.

Eliminating or adapting to expected pattern of demand
Among the studied sawmills’ customers, some identify volume requirements per year in advance, whereas other customers do not know of their volume requirements even for the coming months, and therefore rough estimates must be made.

Some of the studied sawmills require their customers to identify their volume requirements in advance, whereas other sawmills instead find it beneficial not to know of their customers’ volume requirements. These differences might lie in the desire of the different sawmills to continuously determine which customers should have the possibility to buy their softwood lumber. Alternatively, the sawmills feel insecure of incoming material, and hence do not want to commit themselves to sell specific volumes to predefined customers.

The sawmills’ use of different contractual forms (as well as the price list) for the supply of timber makes it possible for them to get access to specific timber dimensions (if they do not carry the needed timber dimensions in stock). In addition, if the studied sawmills do not know actual demand, they have to adapt to expected patterns of demand by producing softwood lumber according to forecasts (either customers’ forecasts or their own). They therefore build stocks of semi-finished as well as customized products, in order to be able to deliver the products as ordered. The sawmills studied also negotiate on price with their customers, in order to adapt to expected patterns of demand; this results for instance in updating the customers’ price lists, or by including extra volumes of softwood lumber to make it more appealing.
Simplifying structures, systems and processes

Simplification of structures, systems and processes are conducted differently in those sawmills studied. Groups of sawmills within corporate structure have specialized their production and focused their functional departments to conduct work for the whole group. For instance, procurement of timber is centralized, and the procuring department is responsible for all incoming material to the sawmills within the group. The other sawmills interviewed do not explicitly work with simplification of structures, systems and processes. General improvements take place as obvious matters appear.

The sawmill industry is capital intensive, and therefore sawmills focus on production and the best utilization of production equipment. Consequently sawmills appear to focus on the production function at the cost of other functions.

Differentiating

Currently, the studied sawmills differentiate their customers (based on volume, location and loyalty) and in some case also their suppliers (based on closeness and accessibility). Other bases for differentiation, such as products and systems, have not been explored by any of the studied sawmills.

Customers are differentiated by, for instance, loyalty and volume. By offering these customers better accessibility to products than other customers, the sawmills secure their market for softwood lumber. This might be one reason for the sawmills not perceiving uncertainties regarding their customers, but only regarding the prices they accept. Further, by selecting customers located close to their sawmills, the sawmills aim to be well considered in the region.

Postponing

At the sawmills studied, flexibility to meet customer demand is created by adjusting softwood from the semi-finished stock as the customers place their orders, while already customized products intended for emergent orders with strict short lead-time requirements. Applying postponement is one way for the sawmills to handle their divergent material flows, where consequence products are placed in semi-finished stock and is adjusted in accordance with customers’ orders. By this procedure, sawmills adjust to the uncertainties regarding their customers, and create flexibility to meet their customers’ logistics service requirements as well as changes in those requirements.
Improving information processing and decision support systems

Due to the studied sawmills’ focus on production and production optimization, information systems for optimizing and connecting the sawmills’ production operations were developed early on. Groups of sawmills within corporate structures have networks that link all the individual sawmills’ operations and departments.

None of the sawmills has integrated information exchange systems with its suppliers. Regarding customers, the studied sawmills delivering softwood lumber to traditional retailers or house-builders have no exchanges of information, while procedures regarding sawmills delivering to the different DIY multiple retailers differ with regards to the individual retailer.

Strengthening the internal and external integration

Presently, all studied sawmills have internally integrated their operations and processes, while the external integration differs with regards to suppliers and customers. External integration with regard to the suppliers has not taken place at any of the sawmills. On the other hand, the integration between the sawmills and their customers differs dependent on sawmills’ customers, and type of business deal.

External integration with suppliers might be difficult due to the situation on the supplier market (with many small individual suppliers selling irregularly, both in time and quantity). However, external integration with some of the sawmills’ selected customers could be beneficial for the sawmills, as they would get a stable market for their softwood lumber, and at a predetermined price. It would therefore be possible to produce the softwood lumber intended for these customers and deliver it directly without placing it in inventory for semi-finished or customized products.
6.3. Concluding comments

To deliver softwood lumber to each customer type has somewhat different implications, for instance:

- Delivering softwood lumber to **house-builders** implies a need for a development of information exchanges and vertical integration, where the sawmills keep stock at the house-builders’ production sites as well managing small and adjusted deliveries. Some of the house-builders’ logistics service requirements emphasize the sawmills employees’ knowledge of plans and construction drawings, as they are required to take on board some of the house-builders’ traditional responsibilities.

- Delivering softwood lumber to **DIY multiple retailers** implies a need for horizontal as well as vertical integration, including development of distribution channels. In order for a small and mid-sized sawmill to be able to deliver the amount of softwood lumber that each DIY multiple retailer asks for, it either needs to sell its entire volume to that specific DIY multiple retailer, or cooperate with other sawmills in order to be able to meet the volume requirements. Furthermore, DIY multiple retailers place strict delivery requirements, for instance constant and short lead-times. In order to be able to fulfill these requirements, sawmills need to have a structured and well managed distribution channel with regards to intermediaries as well as transport modes.

- Sawmills delivering softwood lumber to **traditional retailers** need to be able to offer them a variety of services, meeting the traditional retailers’ possibilities to sell softwood lumber to both industrial users and end-consumers. For instance, the sawmills need to be able to deliver a variety of package sizes (including bar-coding), as well as consumer-packaged products.

The traditional retailers and house-builders appear to require similar services (even though their perceptions of lead-times differ), whereas the DIY multiple retailers’ requirements differ mainly with regards to volume. Consequently, individual sawmills of all sizes can combine delivering softwood lumber to both traditional retailers and house-builders, while small and mid-sized sawmill ought to consider to cooperate (i.e. horizontal integration) with each other in order to be able to deliver softwood lumber to DIY multiple retailers.

The sawmill industry has some general characteristics that restrict its possibilities to utilize some of the generic logistics strategies. In the first instance, operating on a fragmented supplier market including uncertainties of quality of incoming material, and secondly, in many cases producing and selling a commodity product with a divergent material flow.
The procurement procedure differs from time to time, and from supplier to supplier. However, in order for the forest owners to offer individual sawmills to procure their timber, it is necessary that the sawmills take everything that the forest owner wants to sell (regardless of quality). The sawmill industry is raw-material focused and procurement and distribution are closely connected; the sawmills need to be well regarded in the region (by both suppliers and customers) in order to get access to the raw material located close to the sawmill, and consequently they differentiate their customers based on location and loyalty.

Softwood lumber is to be considered a commodity product with consistent quality and stable demand in the mature stage of its Product Life Cycle. Commodity products imply that competition is mainly based on price, whereby sawmills continuously need to focus on their cost structure, particularly regarding capital intensity in production. Consequently many sawmills adhere to economies of scale in production. The sawmills initial focus appears to have been on the production process and optimization of the individual production operations at the expense of distribution. Furthermore, the quality of the final products might be difficult to predict, as the material structure and quality of incoming material might not be known in advance.

Producing softwood lumber results in by- and consequence products, and these products need to handled and sold by the sawmill. By-products are generally sold to the pulp and paper industry, which makes the sawmills dependent upon them as customers at the same time as they are competitors regarding the incoming material. Consequence products, on the other hand, need to be handled by the sawmill and sold to softwood lumber customers. As a result, sawmills have a stock of “not particularly” wanted softwood lumber. These products are in general kept in semi-finished inventory or used for other purposes, for instance finger jointing. The issue of divergent material flows stresses the needs for postponement, and the sawmills possibility to store softwood lumber and adjust it to customers’ orders.
7. Conclusion

In the concluding chapter, some of the results in relation to the research questions and purpose are addressed. Implications for theory and practice are also assessed as well as some interesting issues for future research.

This research is focused on logistics service requirements and logistics strategy. The first sub-question concerns logistics service requirements. The research focuses on the house-building industry, DIY multiple retailers, and traditional retailers. Logistics service requirements, concerning house-builders and traditional retailers have been identified in interviews as well as quantified and ranked by using a questionnaire. On the other hand, logistics service requirements regarding DIY multiple retailers have been identified through an interview study. House-builders and traditional retailers have not clearly stated their logistics service requirements and ask for similar logistics service requirements whereas the logistics service requirements of the DIY multiple retailers are clearly stated in agreements and differ from the other customer types, mainly with regard to volume.

The second and third sub-research questions concern logistics strategy. Logistics strategy might be a common word in logistics literature, but definitions appear to be lacking. Based on theory, the author provides the following definition of logistics strategy;

*Logistics strategy concerns the process of meeting customers’ requirements and is constituted by a pattern of decisions regarding the company’s main logistics fields of application, in order to achieve sustainable profitability. The logistics strategy is situation specific.*

Logistics strategy is realized by applying generic logistics strategies and their respective utilization in the sawmill industry has been explored in an interview study. Currently, the sawmill industry makes use of several generic logistics strategies such as differentiation and postponement. However, the sawmills could improve their process performance by extending the utilization of those generic logistics strategies not presently employed. Needless to say, the sawmill industry’s possibilities to utilize some of the generic logistics strategies are restricted by its supplier market (including uncertainties of quality of incoming material), and by the inherent nature of any commodity product as well as a divergent material flow.
7.1. Implications

The implications of this dissertation regarding theory and practice are briefly discussed in the following paragraphs.

7.1.1. Theoretical Implications

The theoretical contribution lies in the increased understanding of several aspects; the customers’ logistics service requirements, the customers’ logistics service requirements in relation to their environment, the development of the logistics strategy concept, and finally the applicability of the generic logistics strategies in a real life business setting.

Customers’ logistics service requirements have been studied in two different industries, producing somewhat different results. These studies have increased the understanding of differences in customers’ logistics service requirements, and conclude that differences are partly dependent upon the customers’ usage of the product (i.e. industrial use or end-consumers), and partly dependent upon type of business and company structure. Logistics service requirements are therefore to be considered as situation specific and need to be studied in accordance with their situation in order to be profoundly understood.

Logistics strategy is a widely used concept, but few have tried to offer a definition. This dissertation provides a contribution to the logistics strategy framework by clarification of the logistics strategy concept as well as illustrating one possibility to realize it. The definition includes the primary goal of logistics as well as being adjusted to the basic criteria of a strategy. The suggested definition is thereby to be considered to counterbalance previous logistics strategy definitions. Logistics strategies ought to be considered in relation to the logistics fields of application in which they are applied.

This dissertation further shows that it is possible to analyze logistics strategies by studying how generic logistics strategies are applied. The generic logistics strategies have been studied in real life business settings, and their appropriateness to use in a business setting has thereby been tested.

Concluding, this research contributes to previous research regarding sub-strategies in the sawmill industry.
7.1.2. Practical Implications

The practical implication of this dissertation lies in its contribution regarding customers’ logistics service requirements, as well as the generic logistics strategies utilized in the sawmill industry.

This research identifies and describes the customers’ logistics service requirements. Being able to meet their customers’ logistics service requirements, as well as understanding the driving forces behind them, will be important for the sawmills in the future. Further, the customers logistics service requirements identified in this study will be emphasized, and develop differently over time; hence the sawmills need to understand the individual logistics service requirements of their customers in order to be able to meet them.

The research further provides the sawmills with useful information regarding their customers, as it describes the characteristics of the separate customer segments. The research thereby also provides the sawmills with an indication of which logistics service requirements they can expect, as well as the possibility of relating the identified logistics service requirements of the other customer segments (not included in the study).

This research also looks at logistics strategies and identifies and describes the generic logistics strategies utilized in the sawmill industry; it thereby highlights future development paths for sawmills in order to increase their process performance. By applying generic logistics strategies, the sawmills ought to increase their ability to meet their customers’ logistics service requirements in an effective and efficient way.

This research ought further to increase the sawmills’ knowledge of their own industry, including both its restrictions and its possibilities. The research thereby ought to increase the sawmills’ understanding of their own position, and find innovative suggestions for developing their businesses and processes.
7.2. Further studies

Throughout the research process additional research questions have emerged, some focusing on complementing this study, and some focusing on the enlargement of the present results;

- The connection between applied generic logistics strategies and individual logistics service requirements ought to be studied by in depth dyadic case studies.

- By using case study methodology, further studies ought to be conducted focusing on the processes and drivers of logistics service requirements.

- This research is based on a sawmill perspective. Additional studies ought to be conducted from a customer perspective and focus on the customers’ strategic development.

- Logistics service requirements are dependant upon the situation variables as stated. In order to be able to determine the drivers for logistics service requirements, additional studies on situational variables are needed.

- Sawmills have several types of customers, and hence the logistics service requirements of the other customer types not studied might be conducted.
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Appendix A
Acknowledgements

Although I think of this thesis as mine, it is only with the help of others it has come into being.

I would like to thank Veronica Svensson for inspiring me to accept the position as a PhD student within this area of research and to Dan Igeklint for his companionship in writing the second article.

At the same time, I would also like to express my appreciation to Lars-Olof Rask for coaching me through the process of this research, Rolf Björheden for his encouragement, and Stig-Arne Mattson for his contribution in the final steps of the research process.

I would also like to thank "Wood Design and Technology" and "Centre for Industrial Competitiveness" for their financial support.

Finally, I would like to express my thankfulness and appreciation to my colleagues at Växjö University, both at the School of Industrial Engineering and the School of Business and Economics, and all those others who have participated in one way or the other in order to prepare this thesis.
Abstract
The future of the sawmill industry is uncertain. Many sawmills suffer from low profitability, and the industry is permeated by drive for cost reductions as, for instance, through centralization (due to economies of scale).

At the same time, the sawmills' customer base is continuously changing. New retailers are entering the market place and incumbent retailers are starting to push demands on their suppliers of softwood lumber. In order to understand their customers and their customers' needs, the sawmills need to increase their knowledge of the retail industry for softwood lumber and of its logistic service requirements.

Based on the sawmills' present situation and the lack of empirical studies, the overall purpose of this thesis is to increase the knowledge of the retailers' requirements on logistic services and their drivers.

The study takes a quantitative approach and the research methodology was a survey study. The survey study contains three parts, two sets of interviews and a questionnaire. Two main theories were employed for the thesis; distribution channels (in order to view logistic service requirements in their contexts) and logistic service requirements.

Findings from three papers, each dealing with different parts of the purpose, are reported in the thesis. The papers are; "Logistic service requirements of Do-It-Yourself multiple retailers", "Retailers requirements on logistic services, price, and product quality regarding softwood lumber", and "Logistic services as competitive mean - Segmenting the retail market for softwood lumber".

The thesis establishes the concept of "3C's of logistic service" and concludes that logistic service requirements regarded as core activities are the most important logistic service requirements for the retailers. However, there are retailers that value the other activities (i.e. control and complementary) and hence the sawmills need to prepare for these requirements. These findings are discussed further in connection with the characteristics of softwood lumber, distribution channels and the retail industry.

Keywords: softwood lumber, logistic service requirement
List of papers

This thesis contains the following three papers. The papers are appended and referred to, in the text, by their respective number, e.g. Paper 1:

Paper 1
Logistic service requirements of Do-It-Yourself multiple retailers.

Gustafsson, Å., Rask, L-O., Nilsson, P., and Svensson, T.
Submitted and revised for Journal of Forest Products and Business research

Paper 2
Retailers requirements on logistic services, price, and product quality regarding softwood lumber.

Gustafsson, Å., and Igeklint, D.
In: Proceedings on the Biennial Meeting of the Scandinavian Society of Forest Economics, May 2002

Paper 3
Logistic services as competitive means - Segmenting the retail market for softwood lumber.

Gustafsson, Å. Accepted at Silva Fennica 2003-05-07
The distribution channel for softwood lumber and its logistical requirements

Thesis for the Degree of Licentiate of Business Administration

Åsa Gustafsson
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1. Introduction

This initial chapter gives the reader an introduction to the research area, a background to the work that has been concluded in the problem formulation and purpose, as well as the methodology and working procedure. It will also provide the reader with a guideline for the thesis.

1.1. The wood working industry

The forestry sector represents an important part of Swedish economy with a net export value of forest products of about 90 billion SEK.\(^1\) The sawmill industry contributes about 20 percent\(^2\) of this and is hence an important provider to the Swedish economy.

Several types of customer purchase softwood lumber from the sawmills, such as retailers and industrial users. About 25 percent\(^3\) of the Swedish sawmills’ production is delivered to the retail industry. The retail industry, in turn, sells its products to professional contractors (of all sizes) and consumers. In the retail industry, about 30 percent of the turnover comes from softwood lumber\(^4\) with an average value of about 8.4 million Swedish crowns per year for each retailer.\(^5\) In total, the retail industry administers about 70 percent of the building materials to the Swedish market.\(^6\)

The retailers' demand for softwood lumber originates from the consumers' demand. Lately, consumers have changed their preferences for structural softwood tremendously, at the same time as they have increased their knowledge of the market place. The consumers' interest in construction and repairing follows a perceived increase in value of the object. Carrying out the work is considered as rather easy, since the products are customised and education is offered. The demand for softwood lumber is expected to increase in the future and this enhancement is amplified by a number of television shows.\(^7\) Today, there is a programme dealing with interior as well as external fittings on almost every Swedish TV channel. These programs

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\(^1\) Skogsstyrelsen, 2002  
\(^2\) Skogsstyrelsen, 2002  
\(^3\) Johansson, 1995  
\(^4\) Bengtsson, 2001-11-06  
\(^5\) Lepikko, 2002  
\(^6\) Nilsson-Blick, NTT-trä  
\(^7\) Rådström, 2002-05-06
have a large audience; for instance "Äntligen hemma" started sending their programs in 1997 and every show has over 1 million viewers.

The **Swedish sawmill industry** is a mature industry going back hundreds of years. During the last decades, a general trend of *centralisation of production processes* has taken place, resulting in fewer and larger production units. In 1990 and 1995, sawmills with a production over 50 000 cubic meters accounted for 50 and 68 percent respectively. In 2000, the equivalent amount was 80 percent. This concentration in the sawmill industry is predicted to continue.

Swedish sawmills produced about 16.4 million cubic meters softwood lumber in 2000 and the products are often sold and delivered as so-called *commodity products*. Commodity products are exceptionally exposed to *fluctuations in market prices*. During the last years, the price of softwood lumber has dropped from index 100 in 1990 to index 85 in 2001. At the same time, the raw material cost is constant and competition from former Eastern Europe has become intensified.

Swedish sawmills can be divided into four groups according to their ownership and supply of timber: a) private sawmills with their own forest, b) private sawmills without their own forest c) forest owner associations and d) forest companies. 66 percent of the sawmills are private sawmills without their own or only a little forest and they have to be supplied with timber by the open market. Transporting raw material too far will cause high transportation costs and increase the risk of quality deficiencies through careless handling. The sawmills are therefore closely connected to their neighborhood in order to have access to incoming material. This also implies that the sawmills are forced to buy those logs that the forest owners (in the neighborhood) are willing to sell to them.

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8 Ekblad, 2002-07-10  
9 Hansen and Bush, 1996  
10 Staland et al, 2002  
11 Staland et al, 2002  
12 Vlosky et al, 1998 and Weinfurther and Hansen, 1999  
13 Skogsstyrelsen, 2002, see also http://www.unece.org/press/pr2002/02tim02e.htm  
14 Staland et al, 2002  
15 Adolfson et al, 2000
The material is **heterogeneous** and it is difficult to predict the quality of the processed products by examining the properties of the incoming material. The characteristics of the products also vary with time, for instance some material has a tendency to twist and turn (depending on which part of the log the product stems from and other conditions such as moistness) as time passes.\(^{16}\) The production of softwood lumber also produces by-products (for instance chips) and *consequence products* (without customer orders, hence they are placed in stock) some of which cannot be sold, while some (after modifications) can be sold as softwood lumber.

Swedish sawmills have a production capacity that exceeds the supply of timber and the *total cost* is dominated by the raw material price.\(^{17}\) The raw material counts for 60–65 percent of the total costs, while the operative expenses account for 23 percent (the rest i.e. 14 percent is, for instance, capital costs).\(^{18}\) The profitability in many sawmills is extremely poor. However, forecasts indicate further rationalization will take place\(^{19}\) and focus ought to be drawn towards **reducing costs**.

\(^{16}\) Säll, 2002

\(^{17}\) Schotte, 1981

\(^{18}\) Bergqvist et al, 1988

The sawmills' situation is illustrated in the following figure.

**Figure 1. The sawmills' situation**

Several more or less dynamic factors affect the sawmill industry to different degrees. Sawmills can influence some of them, while some of them are impossible to affect (for instance weather conditions). Two major factors are suppliers and customers. Due to the supply base and nature of the product, it is almost impossible to predict the exact properties of the incoming material. This results in extreme difficulties in making accurate production plans. However, sawmills often produce according to "the highest yield principle", following their consideration of softwood lumber as a commodity product and consequently not being connected with any customisation. 
The intense situation, together with the consumers' increased demand for softwood lumber, has led to an increased awareness amongst the retailers. They have started to view the consumers as a potential for growth, and in order to be able to sell softwood lumber to professionals and consumers, the retailers need to meet a wide range of specific demands. Putting all these demands together and imposing requirements, both internal and external, upon suppliers creates a complex situation.

Traditionally, sawmills have attempted to increase their market share by accomplishing and developing sustainable production advantages. At the same time as sawmills use economies of scale, the retailers work continually trying to reduce their supply base (number of suppliers). As the retailers work with reducing their supply base, it becomes of increasing importance for sawmills to be aware of these specific requirements, and to meet them.

By tradition, the sawmills have been the so-called channel leaders, but now the retailers are challenging them. During the past few years, the retail industry has become more powerful, and it is possible for them to place requirements on their suppliers.

1.2. Retail changes

The retail industry is changing, and this effects the situation for the sawmills. The retailers have started to place requirements on the sawmills at the same time as they are working with reducing their supply base. In order for the sawmills to survive, they need to adapt to changes in the retail industry and to identify the new structures and requirements that are evolving.

Logistics is becoming of essential importance, especially in mature industries, since it is an important cost driver and competition is basically based on price. This is specifically true in the sawmill industry, where distribution has a considerable impact on total costs. However, as customers more and more state their requirements, there is a possibility for individual members to differentiate their offerings by including services. Logistic services are the outcome of the logistics process and there is a

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20 Vlosky et al, 1998
21 Spina et al, 2000
22 Rask and Andersson, 2001
common understanding that superior logistic services might be a source of competitive advantage. In order to be able to provide effective logistics services, it is necessary to determine customer needs accurately and to respond to them in a consistent manner.

The sawmills' market place is dynamic due to the retail industry's continual changes. During the last years the "Do-It-Yourself" multiple retailer\(^{23}\) entered the market place with a new perspective of both products and customers. The DIY multiple retailers' market is defined as;

\[,,, \text{the market place where the retailers sell products to consumers and the private consumer undertakes the required work in order to install the products.}\] \(^{24}\)

The number of DIY multiple retailers is growing at a tremendous speed. It is anticipated that they will grow continuously and by the year 2005 handle about 20 percent of the Swedish market for building materials.\(^{25}\) With consumers being their target customer group, the DIY multiple retailers are forced to adapt to their demands. This has shaped the business strategy of the DIY multiple retailers, and hence they now sell softwood lumber as a customised product. To be able to do this in a profitable way, the DIY multiple retailers place very strict requirements on their suppliers, such as demanding that products should be delivered as they are exposed in the stores. Hence, the suppliers need to provide for such things as consumer packages and bar-coded products.

The retail industry is a valuable customer group for the sawmills\(^{26}\), both in terms of the amounts they are buying today, but also regarding the amounts they will most likely buy in the future. However, the future of softwood lumber and the members in the distribution channel ultimately stems from consumers' preferences. Retailers create value by transforming lumber from a commodity product into a customised product in order to meet consumers' demands, and consequently they have started to place specific requirements upon their suppliers.

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\(^{23}\) Further on referred to as DIY multiple retailer
\(^{24}\) Translated from Prognoscentret, 1999
\(^{25}\) Rådström, 2002-12-03
\(^{26}\) Michael, 1999
The sawmills experience that changes turn their world upside down, as new retailers enter the market place and incumbent retailers change their behaviour. However, as the amount of softwood lumber sold through the retailers increases, something which is expected to increase even more in the future, the retailers and their service requirements are becoming more and more essential for the sawmills. As the retail industry is continuously changing and becoming more powerful, new and more specified requirements are being placed on the sawmills. Changes can be turned into opportunities, leading to growth and prosperity for the sawmills that identify the on-going changes, understand them, and then transform them into opportunities that create value. In this situation logistics will become an important factor in developing their competitive advantages. Retailers are willing to pay for better offers, and this could be the main starting point for the sawmills.27

The sawmills are caught between the suppliers of timber and the retailers. The timber suppliers state that they have no impact on the raw material at the same time as the retailers place additional and varying emphasis on the products they are going to buy. This situation puts the sawmills in a difficult position, where they have to make products and offer services that the retailers want to buy with material over which they have little or no influence.

The behaviour of the timber suppliers is not changing noticeably. However, the retail industry is continually changing behaviour due to the increase in demands from their customers and an extended rivalry in the market place. Therefore, knowing the retail industry and its service requirements is of essential importance for the sawmills.

1.3. Previous literature on the distribution channel and its service requirements

Research conducted in the specific area of distribution channels for softwood lumber is primarily focused on the supply chain, on specific issues concerning DIY multiple retailers, or ranking pre-determined service requirements in relation to, for instance, product quality issues.

27 Hansen and Bush, 1996
1.3.1. Distribution channel

A number of authors have written about the supply chain concept, but almost all research has been conducted and applied on the initial part and hence on upstream members (from the sawmills' perspective). Downstream members have been discussed indiscriminately. However, some research has been made with the focus on the distribution channel by, for instance, Rask and Andersson (2001) (who claim to study the supply chain, when actually meaning the distribution channel).

There has been research done on specific parts of the distribution channel. One study explores how trust is gained between sawmills and distributors, how it can be used to benefit both members and how it ought to be built and maintained.\(^{28}\) Another study indicates that a relationship with satisfied members is probably a high-trust and high-committed relationship and that shared values and opportunistic behaviour are quite important for creating high trust and commitment.\(^{29}\)

A further study indicated that the most important factor for a retailer, when making a purchasing decision, is the relationship with the sawmills. The same study indicates that in-exhibit price reductions on material had the greatest influence in retailers' purchase decisions.\(^{30}\)

One study shows that there is little logistics activity (JIT and FOB or FOB delivery) taking place between sawmills and distributors at the same time as the sawmills are not featured in the distributors' promotion.\(^{31}\)

Most previous research of retailers for softwood lumber is focused on the specific issues of DIY multiple retailers. The research focuses on the DIY multiple retailers' use of different technology such as point-of-sale scanning of bar-coded products and e-business exchange between them and the suppliers.\(^{32}\)

Consequently, limited research has been conducted on the distribution channel for softwood lumber.

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28 Kozak and Cohen, 1997  
29 Zineldin and Jonsson, 2000  
30 Michael, 1999  
31 Wilson and Vlosky 1997  
1.3.2. Service requirements

Research has been conducted with the aim of ranking the importance of pre-determined service requirements and product quality related issues. However, previous research is either handling all customer categories indiscriminately, or is only based on industrial users.

In a study based on a questionnaire sent to industrial users, wood treaters and Home centers, the following ranking order was suggested: lumber characteristics (such as straightness and absence of end split), supplier/sales characteristics (for instance consistency in schedule deliveries and accuracy in billing systems), lumber performance (for instance ease of nailing and stiffness), supplier services (such as protective wrapping and credit terms) and supplier facilities (for instance, physical facilities and equipment).

A study, identifying the gap in perception of importance between sawmills and their customers, defined supplier/salesperson (such as supplier understanding needs and friendliness) and lumber characteristics (for instance straightness and accuracy and consistency in grading) as most important according to the customers. Items of dimension lumber performance (for instance durability and fastener retention) were rated slightly lower and dimension supplier services (for instance variety of species and credit terms) were rated lowest. All dimensions received fairly high ratings and the spread of the ratings was largest in supplier services.

A Finnish study produced the following ranking between factors when German companies trading wood products choose their suppliers; high product quality, reliability of supplier, price level and consistency in price, customer oriented services (willingness to provide customised products and fast deliveries). At the same time, they came to the conclusion that construction material retailers and DIY multiple retailers put more emphasis on payment arrangements and reliability than do the wood product intermediaries.

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33 Could be considered as DIY multiple retailers
34 Hansen and Bush, 1996, see also Hansen et al, 1996
35 Weinfurter and Hansen, 1999
36 Järvinen et al, 2002
A comparison between importance ratings of selected material attributes influencing the purchasing decisions of U.S. homebuilders in 1994 and 1998 gave the following ranking order.37

<table>
<thead>
<tr>
<th>1994</th>
<th>Strength, Straightness</th>
<th>1998</th>
<th>Straightness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability, Overall price level</td>
<td></td>
<td>Price stability, Lack of defects</td>
<td>Availability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Price stability, Lack of defects</td>
<td>Overall price level</td>
</tr>
</tbody>
</table>

Table 1. Ranking in order of importance

Another study states that industrial users value reliability of supply, price level, and price stability over timber quality.38

There is one master thesis, in Sweden, concerning service requirements stated by strictly industrial users. This study39 makes a contribution on delivery service requirements stated by industrial users. It claims that the Scandinavian industrial users generally perceive product availability, order cycle time, physical distribution and information as the most important delivery service elements. However, preference customers would rather have information about order changes, delivery precision, notification (that the correct product is delivered complete), and that deliveries are for the most part made on time. The study also contains the following ranking of marketing variables; product (32 percent), price (25 percent), and delivery service (24 percent).

37 Eastin et al, 2001
38 Eastin et al, 1998
39 Ankarling, 1995
Previous research on logistic services is illustrated in the following figure.

![Diagram](image)

**Figure 2. Previous literature on logistic services for softwood lumber**

### 1.4. Specification of the study

Changes in the environment lead to tremendous changes in the distribution channel for softwood lumber; sawmills, delivering to the retailers, are experiencing immense changes as retailers have started to place new requirements and reduce their supply base. Reduction of the supply base implies that closer and longer-term relationships will be established with a few suppliers, something which will be critical to the retailers.⁴⁰ The future of the sawmills is determined by their ability to adjust to changes in the market place, finding competitive advantages, adapting their core competencies, and formulating appropriate strategies in order not to lose ground to the retailers.

Theoretical knowledge and empirical studies, covering logistics service and retailers (see figure 2) as well as the distribution channel for softwood lumber, are lacking on this specific issue and hence need to be improved. Even though both theoretical knowledge and empirical studies are lacking, the importance of them are immeasurable. Due to the fact that as soon these issues are known and highlighted, the sawmills will find new ways of working and increase their competitiveness.

⁴⁰ Goffin et al, 1997
1.4.1. Research questions
In order to understand the retailers' requirements on logistic services, the following question needs to be answered:

*What logistic service requirements do the retailers have on their suppliers of softwood lumber?*

In order to answer this question, the following questions first need to be investigated:

- What are the overall characteristics of the distribution channel for softwood lumber?
- What logistic service requirements do the retailers demand and what are their importance?

1.4.2. Purpose
The purpose is to contribute to the knowledge of the retailers' logistic services requirements and their drivers.

1.4.3. Delimitation
This empirical research is conducted mainly from a Swedish retailer perspective.

1.4.4. Methodology
Methodology implies the technique used to conduct research. The choice of methodology for a study is seldom obvious, and the reliability and validity of the findings is dependant on how the chosen methodology is designed and carried out. In order to make the conclusions credible, and to make it possible to reproduce the research, a basic description of the methodology is necessary.

This research is inductive and hence the empirical data is of essential value. The research questions, and consequently the purpose usually determine the methodology (illustrated in the following figure).
Table 2. Relevant research methods  
Source; Modified Yin, 1994, page 6

<table>
<thead>
<tr>
<th>Form of research question</th>
<th>Methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td>How, why</td>
<td>Experiment</td>
</tr>
<tr>
<td>Who, what, where, how many, how much?</td>
<td>Survey</td>
</tr>
<tr>
<td>How, why</td>
<td>Case study</td>
</tr>
</tbody>
</table>

Research questions to be answered, for this thesis, are;

- **What** are the overall characteristics of the distribution channel for softwood lumber?
- **What** logistic service requirements do the retailers demand and **what** are their importance?

In order to answer these research questions, an appropriate methodology to use is a survey study.

Furthermore, a survey study is also an appropriate method to use when the study concerns finding distinct features in a population (i.e. carry out a descriptive study among a population). A survey study can contain both large numbers of variables and / or a big population. This implies that, by using a survey study, it is possible to obtain a good deal of information about many actors.

Basically there are two ways to perform survey studies, either through questionnaires or interviews. These ways can be used separately, but they can also be combined in order to complement one another. The quality of the study can be improved through maximising the validity and reliability. Validity refers to the absence of systematic error of measurement, and there are some general tests for judging the quality of the research. These are; construct validity, internal validity, external validity, and reliability. 

⇒ **Construct validity is " establishing correct operational measures for the concepts being studied"**

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41 Befring, 1994, page 33, see also Yin, 1994, page 6
42 Befring, 1994, page 85 ff
43 Patel & Tebelius, 1987, page 61 and 102
44 Yin, 1994, page 32 ff
45 Yin, 1994, page 32
46 Yin, 1994, page 33
⇒ Internal validity\(^{47}\) is "establishing a casual relationship, whereby certain conditions are shown to lead to other conditions, as distinguished from spurious relationships"\(^{48}\)
⇒ External validity is "establishing the domain to which a study's findings can be generalised"\(^{49}\)
⇒ Reliability is "demonstrating that the operations of a study - such as the data collection procedures, can be repeated with the same results"\(^{50}\) i.e. to avoid influence of chance.

Empirical data has been collected within the framework of a survey study. The work has been conducted in three steps. The first step constituted of explorative interviews performed in order to characterise the distribution channel and to identify important service requirements. The second step was a questionnaire, with the purpose of ranking important logistic service requirements and quantifying basic logistic service requirements. The third and final step was a set of follow-up interviews.

Logistic service has its roots in business logistics and hence the fundamental perceptive is flow oriented. The flow perspective permeates business logistics and consequently the order-cycle process dominates both theoretically and empirically. The order-cycle process for softwood lumber is presented in appendix 1.

The first series of interviews were conducted with six purchasing managers, who were randomly selected. In total, six interviews were conducted until no additional aspects were revealed.\(^{51}\) The interviews were exploratory and touched upon three broad areas for discussion. These broad areas were; business and relationships with suppliers, service requirements, and changes for the future. Personal interviews were the main method of collecting information, although some telephone interviews complemented the personal interviews where necessary. The respondents were asked to speak freely about areas of interest and the interviewer took a passive role, posing the areas and putting forward additional questions if and when needed. Face

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\(^{47}\) Not applicable in this study
\(^{48}\) Yin, 1994, page 33
\(^{49}\) Yin, 1994, page 33
\(^{50}\) Yin, 1994, page 33
\(^{51}\) This is in accordance with Grounded theory presented by Glaser and Strauss
validity was ensured by interviewing several retailers, and the answers and discussions were with regards to the same issues.

Based on the interviews, a questionnaire was designed. In order to fulfill all the requirements and to secure construct validity and reliability, a draft questionnaire was designed and tested on both retailers and other researchers. They were asked to identify unclear questions, make comments on the existing questions, and to add missing issues. No vital comments were made and the final questionnaire was sent to the Swedish retailers (purchasing managers) on the first of October 2001. Two letters had to be sent out to prompt those respondents who had not answered the questionnaire directly; the first time 381 letters were sent out and the second 208 letters.

Each respondent was sent an introductory letter, a questionnaire, and a postage-paid reply envelope. The introductory letter clarified the purpose of the questionnaire, assured anonymity, promised a summary of the results at the end, and asked each respondent to mark and return the questionnaire even if it did not apply to their company. A total of 98 questionnaires were returned stating that it did not apply to their company because of, for instance, it had gone out of business, had their own sawmill, or used such a small amount of sawnwood products. Therefore the population for this purpose was reduced to 282, and useable data varied between 40 -44 percentage.

In order to assess external validity and reliability, a series of follow-up interviews were conducted. The respondents were selected based on category, size and, supply base. The interviews were conducted in the same manner as the first interviews, with the addition of the results from the questionnaire. The respondents had access to the results from the questionnaire beforehand, in order to be well prepared. The interviews were personal or conducted by phone. The respondents discussed the areas in the same manner as before and agreed on the results from the questionnaire. This ought to imply that it should be possible to generalize the findings, and researchers following the same procedure ought to achieve the same results.

The empirical data is presented in Appendix 1.

52 Members of "Sveriges bygg- och trävaruhandelsförbund"
53 Recommended by Dillman, 1978
Conducting this research included making some methodological decisions. The advantage of collecting data through interviews, over other questioning methods, is the unlimited possibility of posing different questions along the interviews. The main disadvantages are the cost of each interview and the possibility that the interviewer may influence the respondents' answers. However, even if the interviewer took a passive role, its effect on the respondents is difficult to determine. Therefore, it should also have been possible to use action research (where the researcher takes an active role in the organisation and observes the reality) for this part of the research. However, this research was not conducted according to action research, due to its requirements regarding access and time.

1.4.5. Working procedure
The work started in the beginning of 2001 with the first set of interviews. During the spring and summer of year 2001, working on the logistic service requirements and the design of the questionnaire took place. In the fall of 2001, the questionnaires were sent, and processing of empirical data started early in year 2002.
The complete working procedure is shown in the following figure.

**Figure 3. Working procedure for the work**

### 1.5. Links between papers, research questions, and purpose

The thesis contains three individual papers each contributing different parts of the research supplementary to the theoretical aspects.

The first paper is based on interviews and observations and is entitled "Logistic service requirements of Do-It-Yourself Multiple Retailers". The purpose of the paper is to; specify the characteristics and logistic service requirements, as well as their underlying drivers. The paper results in characteristics, connected to the logistics of the DIY multiple retailers, as well as their logistic service requirements. The paper is thereby illustrating the new type of retailer entering the market place.
The second paper "Retailers' requirements on logistic services, price and product quality regarding softwood lumber" has the following purpose; "to determine and relate important retail service requirements to price and product quality".

The third paper "Logistic services as competitive means - Segmenting the retail market for softwood lumber" aims at specifying retailers' basic logistic service requirements, quantifying the requirements and distinguishing potential retail segments regarding these requirements.

The papers and their purpose are presented in the following table.

<table>
<thead>
<tr>
<th>Paper</th>
<th>Title</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Logistic service requirements of Do-It-Yourself Multiple Retailers</td>
<td>- identify characteristics of Do-It-Yourself Multiple Retailers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- identify logistic service requirements and their drivers</td>
</tr>
<tr>
<td>2.</td>
<td>Retailers' requirements on logistic services, price and product quality regarding softwood lumber</td>
<td>- determine and relate important retail service requirements to price and product quality</td>
</tr>
<tr>
<td>3.</td>
<td>Logistic services as competitive means - Segmenting the retail market for softwood lumber</td>
<td>- specify retailers' basic logistic service requirements</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- quantify requirements</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- distinguish potential retail segments</td>
</tr>
</tbody>
</table>

*Table 3. Paper title and purposes*
The links between the papers, research questions, and purpose of each is shown in the following figure.

**Figure 4. Links between papers, research questions and overall purpose ("Empirical data")**
1.6. Reader's guide - disposition of the thesis

The focus of this licentiate thesis is on the retailers' requirements on logistic service. Logistic service requirements ought to be viewed in context and hence an overall knowledge of the distribution channel is needed.

Chapter two describes the overall knowledge of the distribution channel applied to the softwood lumber case. The chapter starts with a theoretical foundation and proceeds with an empirical discussion concerning the concepts.

Chapter three gives a background to logistic service requirements and presents a review of earlier operationalisations of the concept from a retail perspective.

Chapter four identifies logistic service requirements placed by retailers for softwood lumber and embraces the second and third papers. The chapter is mainly empirical and provides the reader with a ranking of the individual requirements as well as a study of basic logistic service requirements.

Chapter five contains a discussion about the concept of softwood lumber, its distribution channels and logistic service requirements, as well as implications for the sawmills and research.

In the final chapter, chapter six, the conclusions are presented in abridged form, together with ideas for future research.
2. Overall characteristics of a distribution channel

This chapter aims at giving an understanding of the distribution channel concept with a focus on the retail industry. It is hence connected with the first research question and constitutes a background to the purpose of the thesis.

Distribution channels have existed to a lesser or greater extent since trade with products started and they ought to be viewed as networks that generate value for the consumer through the generation of form, possession, time, and place utility. The main focus of a distribution channel is the delivery function, since it is impossible for consumers to acquire products unless they are distributed to places where they are accessible.\(^{54}\)

Distribution channels are evolving and functioning in dynamic environments and they develop and transform in response to for instance; economical, technological, and political changes. For instance, the development of wholesaler is a response to changes in the economic environment.\(^{55}\) However, distribution channels could also be viewed as environmental systems with a behavioural focus, which includes aspects such as; dependence, power, co-operation, and conflict\(^ {56}\).

A general definition to identify a distribution channel is that it:\(^ {57}\)

\[\ldots, \text{comprises a set of interdependent institutions and agencies involved in the task of moving anything of value from its point of conception, extraction, or production to its point of consumption.}\]

Today, managing distribution channels is considered, by individual companies, as a means to create strategic advantages and achieve exceptional financial performance\(^ {58}\); therefore selecting partners in the distribution channel becomes essential\(^ {59}\). Distribution channels can be organised and managed in several ways and this will most likely influence

\(^{54}\) Stern and El- Ansary, 1992, page 1 ff
\(^{55}\) Stern and El- Ansary, 1992, page 1 ff
\(^{56}\) Stern and Reve, 1980
\(^{57}\) Stern and El- Ansary, 1992, page 9
\(^{58}\) Weitz and Jap, 1995
\(^{59}\) Morgan and Hunt, 1994
the market orientation of entire industries as well as the development of individual companies\textsuperscript{60}.

Retailers have always been crucial members of the distribution channel. The retail environment has been subject to many changes (for instance increased competition and changes in consumer preferences) and the retail industry is a result of a continuous process of structural changes\textsuperscript{61}. During the last years, the changes have been accelerating\textsuperscript{62} and becoming more diverse; as a result rivalry within the retail industry is increasing\textsuperscript{63}.

The word retailing stems from the word tailor (one who cuts into pieces)\textsuperscript{64} and retailing consists of;\textsuperscript{65}

\textit{,, activities involved in selling goods and services to ultimate consumers.}

During the previous years, the following three essential and interrelated changes have taken place in the retail industry; there has been a shift in the balance of power, traditional independent retailers have lost market share to the multiple retail chains, and markets have become increasingly consolidated and concentrated\textsuperscript{66}. During the past years, the major retail trend has been the concentration of the retail industry (i.e. the buying power in the distribution channel is focused to fewer and larger retailers). There are several reasons for the shift in power, for instance label development and increased international sourcing\textsuperscript{67}. Retailers exert their power over the suppliers and carry only the products and brands they wish to sell. The result is that retailers have a possibility to influence the consumer shopping behaviour, because the consumer can only buy products that the retailers carry\textsuperscript{68}.

\textsuperscript{60} Frazier, 1999
\textsuperscript{61} Dawson, 2000
\textsuperscript{62} Gilbert, 1999, page 1
\textsuperscript{63} McGoldrick, 1990, page 25
\textsuperscript{64} Mulhearn, 1997
\textsuperscript{65} Stern and El- Ansary, 1992, page 42
\textsuperscript{66} Gilbert, 1999, page 13
\textsuperscript{67} Dawson and Shaw, 1990, page 30
\textsuperscript{68} Gilbert, 1999, page 3 ff
The increased competition has improved the retailers' understanding of the distribution channel\textsuperscript{69} and the benefits of supply chain management in order to meet consumer demands as efficiently as possible.\textsuperscript{70}

### 2.1. Distribution channel - The theoretical aspect

#### 2.1.1. Channel structure

A distribution channel could take nearly any form, but the form it actually takes depends on several factors. The most important factor is the consumers' demand for service output. In order to work with the design of the distribution channel several steps are needed, such as; examining products/services that are sold, end-user segmentation, investigating external and internal constraints and opportunities, and confronting the constraints/objectives.\textsuperscript{71} The determination of channel structure is shown in the following figure.

*Figure 5. The determination of channel structure*

Source: Stern and El-Ansary, 1992, page 21

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\textsuperscript{69} Dawson, 2000

\textsuperscript{70} Fernie, 1994, page 265

\textsuperscript{71} Stern and El-Ansary, 1992, page 203 ff
Formulating strategy and designing the distribution channel begin with determining the customers' demands on service and on which service element is most critical. Given service level and prioritisation of service elements, the configuration of the distribution channel begins. The strategy for improving customer service must be in line with the long-range profit and Return on Investment objectives for the involved companies.72

The structure of a distribution channel is to a considerable extent determined by the principle of speculation and postponement.73 These concepts can be viewed from a production as well as a distribution perspective. Speculation is activities performed without customer order and is therefore based on expectations and forecasts. Production speculation promotes production (at the production site) of all products and distribution speculation implies keeping central stock sites. Postponement, on the other hand, endorses carrying out activities after customer orders have been received. This implies that as soon the customers have placed their orders, only then is production completed and distribution to local stock sites started.74

The different members work more or less close to each other and this is usually referred to as the degree of external integration (channel integration). The major advantage of channel integration is the possibility to meet demand and lower inventory levels (done by for instance Electronic Data Interchange). Channel integration is a critical component of a company's marketing strategy.75 External integration could be performed at different levels, but one pre-requisite for intimate external integration is a differentiation of the customer base and/or the supply base.76 Many retailers have integrated backwards in the distribution channel both to the wholesaler's and the manufacturer's function.77 Environmental issues mainly explain the degree of external integration. Instability in the company's output environment contributes to greater channel integration78 as well as promoting a greater dependence on integrated channels.79

72 Stern and El-Ansary, 1992, page 159 ff
73 Stern and El-Ansary, 1992, page 22 ff
74 Mattsson, 2002, page 256 ff
75 Stern and El-Ansary, 1992, page 318
76 Person and Virum, 1998, page 258
77 Stern and El-Ansary, 1992, page 381 ff
78 Frazier, 1999
79 Klein et al, 1990
2.1.2. Channel management

All members of a distribution channel that do business together have some kind of relationship. However, it is not necessary that the relationships are characterised by mutual agreements nor that the members are on equal bases. Companies try to reduce uncertainty and manage their dependency by organising their relationships with the other members (see external integration) in the distribution channel.\(^80\) For a distribution channel, the organisation is developed by channel management (for integrated members) or by a channel leader (for non-integrated members). Usually the channel leader, which is the most powerful member, uses his power to govern the other members.\(^81\)

During the past years there has been a shift in power. In general, manufacturers have (through their size) considered themselves the channel leaders and have hence been managing the distribution channels.\(^82\) Lately wholesalers and retailers have become more powerful and today the retailers are to be considered to be the channel leaders in several distribution channels.\(^83\) However, whichever member who is most suitable for managing distribution channels depends on several individual circumstances and is hence impossible to determine. Big manufacturers have a large amount of reward and coercive power (given their size and dominance), while small manufacturers more or less serve as potential sources of control and direction. Historically, wholesalers were channel leaders, but they have only managed to keep this dominance in channels where the manufacturers and retailers are small and scattered over a wide geographical area. However, during the past years wholesalers have been trying to recapture dominance by developing private brands. Retailers possess accessibility to the consumers and hence they have the possibility to influence their purchases. However, the retailers' possibilities to govern the distribution channels increase as the retailers are getting more powerful.\(^84\)

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\(^{80}\) Heide, 1994
\(^{81}\) Weitz and Jap, 1995
\(^{82}\) Weitz and Jap, 1995
\(^{83}\) Stevenson et al, 1999
\(^{84}\) Stern and El-Ansary, 1992, page 419
2.1.3. Relationships

Channel members tend to focus on specific areas and they are then becoming dependent upon each other in order to fulfil their individual objectives. The members who are working together in a distribution channel are developing their own relationships and in general, manufacturers and wholesalers are involved in fewer relationships than are the retailers. These relationships could for instance be long-term associations, contractual relations, and joint ownership.

Relationships develop over time and usually evolve through the following five phases; awareness, exploration, expansion, commitment, and dissolution. The different phases are distinguished by how the members regard their counterparts. In the early stage norms, rules, and understanding are established in order to facilitate communication between the members. Once the communication is established, the members are more likely to work towards performing their relationships and components more efficiently. As time passes and the relationship develops, the interaction is most likely to increase in scope, and in order for a relationship to work really satisfactory, mutual co-operation is of crucial importance. Co-operation permits the members to find means of co-ordinating activities such as planning. Some kind of co-operation is necessary because without a minimum of co-operation the distribution channel ceases to exist. Co-operation is defined as "similar or complementary co-ordinated actions taken by firms in interdependent relationships to achieve mutual outcomes or single outcomes with expected reciprocation over time". In order to achieve developed co-operation, commitment and trust are of vital importance.

As members work together, they become more dependent upon each other and can also find they have the possibility to influence each other. It is the relative dependence that is determining the extent to which one member has

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85 Stern and El-Ansary, 1992, page 287
86 Dwyer et al, 1987
87 Dwyer et al, 1987 and Weitz and Jap, 1995
88 Weitz and Jap, 1995
89 Skinner et al, 1992
90 Stern and El-Ansary, 1992, page 287
91 Anderson and Naurus, 1990
92 Morgan and Hunt, 1994
influence over, or is influenced by, his partner. A main outcome of relative dependence is hence influence, or **power**.

Individual members are striving towards reaching their individual objectives and hence **conflicts** of interest arise within the distribution channel. As the members strive in different directions, the level of conflict increases and "the greater the interdependence (the greater the opportunity for interference of goals) the greater the potential for conflict". 93

The relationship between suppliers and their customers can be divided into three levels, conventional, associated and partnership. In a conventional relationship, individual orders are placed and delivered, price negotiations are essential, and the receiving member keeps safety stocks. In an associated relationship, general agreements are made (orders are placed), and price is one among several variables when choosing a supplier. Partnership is characterised by activities such as product development and the sharing of information. 94

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93 Stern and El-Ansary, 1992, page 287  
94 Mattsson, 2002, page 127 ff
2.1.4. Flows

Between members a number of flows (identical to functions\textsuperscript{95}) have been identified and they constitute exchanges between the members. There are eight general flows in a distribution channel (illustrated below).

![Figure 6. General flows in a distribution channel](source)

\textit{Source: Modified Stern & El-Ansary, 1992, page 12}

The arrows illustrate the direction of the flows, which could be "backward", "forward" or even a combination of the two. In order for a distribution channel to be successful, every flow needs a responsible member. However it is not necessary that all members are involved in every flow.

2.1.5. Channel members

A distribution channel consists of interdependent institutions and the different members perform one or several activities, such as: carrying of inventory, demand generation or physical distribution. A distribution channel consists of the manufacturer and intermediaries. In general, the

\textsuperscript{95} Stern and El-Ansary, 1992, page 11
functions of the intermediaries are to sort out, accumulate, allocate and assort.\textsuperscript{96} This implies that almost all organisations (except manufacturers) are engaged in intermediary functions such as wholesalers, retailers, distributors, and agents.

The following figure shows the overall members in a distribution channel.

![Distribution Channel Diagram]

\textit{Figure 7. Members in the distribution channel}
\textsuperscript{*} Intermediaries, \textsuperscript{**} point of consumption and ultimate consumer

\textbf{Manufacturer}\textsuperscript{97}

The distribution channels are aimed at distributing the products that the manufacturer produces. From a general point of view, a transformation of resources into products is taking place. The purpose of the manufacturing member is to create a change so that the products are more valuable for the consumers than were the costs of the resources used (including machinery and staff).

\textbf{Wholesalers}\textsuperscript{98}

Wholesalers exist between manufacturer and retailer and could be defined as follows:

\textit{,, concerned with the activities of those persons or establishments which sell to retailers and other merchants, and/or industrial, institutional, and commercial users, but who do not sell in significant amount to ultimate consumers.}\textsuperscript{99}

Wholesalers exist because neither the manufacturer nor the retailer can meet the expense of integrating the function in their own organisations and hence have to rely on the wholesalers in order to obtain supply or keep contact with the market place.

\textsuperscript{96} Stern and El-Ansary, 1992, page 6 ff
\textsuperscript{97} Olhager, 2000, page 16
\textsuperscript{98} Stern and El-Ansary, 1992, page 106 ff
\textsuperscript{99} Stern and El-Ansary, 1992, page 106
Wholesalers bring the differences between the assortment generated by the producer, and the assortment demanded by the retailer, together. Wholesalers thus serve as market coverage and a sales contact function for both manufacturers and retailers (by, for instance, product available function and bulk breaking). The wholesalers' role is increasing in importance (for small and medium size companies) as well their specialisation.

2.2. Retailers in the distribution channel

Retailers have contact with the consumers and are thus selling products/services for personal consumption. Retailers exist in the distribution channel because they offer the consumers, for instance, an availability of products and an accurate product assortment.\(^{100}\)

Retail structure refers to the characteristics of the market such as nature of ownership.\(^{101}\) There are several categories of retailers and the most essential are\(^{102}\); multiple, independent, co-operative, and franchise. *Multiple* retailers are centrally owned and are usually represented by the large retail chains. *Independent* retailers are privately owned and do not cooperate with other retailers.\(^{103}\) *Co-operative* retailers are governed jointly either by a group of suppliers or a group of customers\(^{104}\). *Franchise* retailers are normally privately owned, where the owner has agreed on a certain concept for the store and sells only goods specified by the franchiser.\(^{105}\) The total retail trade in Sweden (early in the 1990ies) was divided as follows; multiples 20 percent, independents 22 percent, co-operatives 16 percent, and others (for instance franchise and catalogue retailers) 42 percent.\(^{106}\)

In general, the retail industry has moved from small-scale independent retailers towards large-scale retailing (multiple retailer chains and store size), in order to gain efficiency and economies of scope; hence independent and co-operative retailers are having to fight to maintain and gain market share.\(^{107}\) However, despite this scenario, the decrease in the number of the

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\(^{100}\) Lambert et al, 1998, page 518 ff

\(^{101}\) Gilbert, 1999, page 318

\(^{102}\) McGoldrick, 1990

\(^{103}\) McGoldrick, 1990, page 33 ff

\(^{104}\) Olsson and Skärvad, 1995, page 27

\(^{105}\) Haderberg and Rieple, 2001, page 609

\(^{106}\) Fernie, 1992

\(^{107}\) Gilbert, 1999, page 2
small retailers now seems to be leveling out, if not actually reversing in some sectors; the market is now becoming more segmented, with retailers focusing on the needs of particular customers.\textsuperscript{108} Co-operative retailers manage competition by increasing their co-operation with their Scandinavian partners (for instance co-operation between Danish co-operative company FDB and the Scandinavian sister companies within KF in Sweden).\textsuperscript{109}

Back in 1890 Alfred Marshal (in his book "The Principles of Economics") already identified the trend that larger establishments were going to drive out small establishments, and this trend is particularly evident in the retail industry.\textsuperscript{110} Changes in consumer preferences and hence the possibility of segmenting consumers have encouraged specialisation in the retail industry. Speciality stores have increased their market share due to better service and/or low prices, at the expense of department and variety stores.\textsuperscript{111}

More recently, a new trend identified as the growth of the so-called "power retailers" has appeared. The development of "power retailers" is a result of consumers' preferences for regular low price instead of sale price (which was previously favoured).\textsuperscript{112} The two best known "power retailers" are probably Toys 'R' Us and IKEA.\textsuperscript{113} These retailers have a category authority and a clear value-price position, which distinguish them from other retailers.\textsuperscript{114} IKEA, for instance, offers low price products, and the following statement, based on "Ikea's new game plan" by I Kamprad, illustrates their business concept;

\begin{quote}
People have thin wallets. We should take care of their interests.
\end{quote}

\textsuperscript{108} Gilbert, 1999, page 1
\textsuperscript{109} Kristenson et al, 2001
\textsuperscript{110} Clarke, 2000
\textsuperscript{111} Fernie, 1992
\textsuperscript{112} Rogers, 1991
\textsuperscript{113} Fernie, 1994, page 265
\textsuperscript{114} Wileman, 1993

Power retailers" could be identified by their way of running a business. According to Corstjens and Corstjens (2000) this us done in accordance with the following principles; customer-driven RVP (Retail value proposition, encompasses the following dimensions; selection, experience, price, and convenience), lead geographic markets or channels, execute better than competitors in the areas of people, technology, and costs, and lead change by continually reinventing themselves.
"Power retailers" control the distribution channel efficiently and they are continuously looking for new catchment areas for growth. Their power and ability to achieve price advantages is more or less based on their reliance on information technology (for instance scanner technology) and logistics.\textsuperscript{115}

New products, new retailers, and new stores are introduced daily\textsuperscript{116}, and in consequence the structure and categories are continuously changing. Many new retailers enter the market place, at the same time as the existing retailers try to adapt to the new situation.\textsuperscript{117} During the past years the independent retailers and co-operatives companies have lost their market shares to multiple retail chains, and an increasing consolidation of the retail sector has appeared.\textsuperscript{118}

Many authors argue that the only constant in retailing is change (for instance economy, marketplace, supply, competition, and customers\textsuperscript{119}) and one major retail challenge is therefore to integrate the consumer, the major suppliers and the existing structure\textsuperscript{120} in a beneficial way. Changes take place in several areas such as specialist catalogue retailers and TV shopping, at the same time as improvements and simplification of information databases and long-term relationships with customers (loyalty club) develop.\textsuperscript{121}

\section*{2.3. Distribution channel for softwood lumber}

Sawmills have, up to the present time, been considered as channel leaders in the distribution channel for softwood lumber. The sawmill industry is an industry that goes back some hundreds years; it is scattered over the wooded districts of Sweden, although over a long period of time their main location has been (slowly but steadily) shifting towards the southern part of Sweden.\textsuperscript{122}

\begin{footnotesize}
\begin{enumerate}
\item[115] Stevenson, 1994
\item[116] Jones and Simmons, 1990, page 449 ff
\item[117] Jones and Simmons, 1990, page 273 ff
\item[118] Gilbert, 1999, page 314
\item[119] Dawson, 2000 and Stevenson, 2000, page 7 ff
\item[120] Jones and Simmons, 1990, page 466
\item[121] Gilbert, 1999, page 348
\item[122] Törnqvist, 1989, page 83
\end{enumerate}
\end{footnotesize}
There are some essential differences between softwood lumber and traditional manufacturing industries. The most obvious differences are:

- **Divergent flows with consequence products.** Along the flow that a number of consequence products are produced; some can not be used as softwood lumber (for instance chips) while some can (after a number of modifications) be used and sold as softwood lumber to consumers.

- **Living material.** The structure of the material is dynamic and it is very difficult to predict the quality of the processed products by determining the properties of the incoming material. The characteristics of the products also vary with the moisture content.

- **Supply base.** Logs can not be transported too far, due to quality deficiencies, and the sawmills are therefore tightly restricted to their neighborhood in order to have access to incoming material. The manufacturers are therefore forced to buy the logs that the forest owners (in the neighborhood) are willing to sell (both pine and spruce of all qualities).\(^{123}\)

### 2.3.1. Distribution channel structure, members and flows

The structure of the distribution channel for softwood lumber contains several members. The following figure is an outline of the distribution channels for softwood lumber.

![Outline of distribution channel for softwood lumber](image)

*Figure 8. Outline of distribution channel for softwood lumber (*To be considered as some kind of retailer and hence intermediary)*

\(^{123}\) Adolfson et al, 2000
Between members, there are several flows that are connected either with the products or the purchase. Those flows connected with the products are ordering (by telephone, e-mail or fax) and physical possession; while those connected with the purchase are ownership, negotiation, and payment. The other flows, specified by Stern and El-Ansary (1992), are barely not existent.

Different retailers have different approaches to the principle of "postponement-speculation". While the "DIY multiple retailers" are adapting to the speculation principle and require the sawmills to produce and keep inventory, the other retailers are more or less adapting to the postponement principle. However, instead of keeping stock they are adjusting the products in the stores when the consumers specify their demands.

Manufacturer
Up to the present time, the focus of sawmills has been on the supply of raw material and of course their operations in the forest. The sawmill industry has experienced the same structural change over the past decades that have appeared in other industries. This change has consisted of the centralisation of production processes, which resulted in fewer and larger production units and more specialised production. There are hence many individual sawmills that have comparable production processes and consequently they have the possibility of producing similar products. This has created an industry with too many members offering very similar products to the retailers.

Wholesaler
The wholesaler's function is a relatively small one in the distribution channel for softwood lumber and only about 12 percent of the total amount purchased by retailers are purchased from wholesalers. Wholesalers usually offer special assortments or handle all purchases for the individual retailers.

Retailer
There are four categories of retailers in Sweden these being; private retailers with no affiliation (independent), private retailers in purchasing

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124 Petersson and Svensson, 2000, p 19
125 Skogforsk, 1995
126 Mattson, 1999, p 14 ff
cooperatives, industrial distributors of building materials, and the DIY multiple retailers. The categories, as identified, are based on structure, governance and target customer group as shown in figure 9.

The retail industry for softwood lumber follows the general trend in retailing. The original (traditional) retailer is the "private retailer with no affiliation". However, changes in the environment have since forced them to co-operate with others in various ways, leading to the development of other categories (not including the DIY multiples).

The following figure illustrates the categories of retailers located in Sweden.

![Diagram of retail categories for softwood lumber located in Sweden](image)

**Figure 9. Definition of retail categories for softwood lumber located in Sweden (Cf paper 1)**

*Private retailers with no affiliation*
Retailers that have no business relation with other retailers represent "Private retailers with no affiliation". These retailers sell products to both customer groups. This category is one of the original retail categories, an example of which is "Trä, Lister och Paneler AB" in Växjö.

_Private retailers in purchasing co-operatives_
"Private retailers in purchasing co-operatives" are privately owned retailers that are organized voluntarily (for instance in Interpares, or Byggtrygg), where some of their functions are centrally managed, such as advertising.

_Industrial distributors of building material_
"Industrial distributors of building material" (for instance Beijers) are centrally owned but handle every day businesses individually. Some functions are centrally managed, some are not; for instance, softwood lumber is not purchased centrally while all other products are.

_DIY multiple retailers_
In the distribution channel for softwood lumber, the DIY multiple retailers entered the market place some years ago. It started in the USA in 1978 with the founding of Home Depot. Home Depot is reputed as the pioneer in the home improvement retailing industry and they combine economies of scope (inherent in a warehouse format) with a relatively high level of customer service. Home Depot is referred to as power retailer, and today there are more than one thousand Home Depot stores located in North and South America.

DIY multiple retailers are hence providing the customers with the core of home improvement materials including tools, building materials and outdoor goods. DIY multiple retailers are the various multinational chains, for instance Bauhaus, and they offer a wide as well as a good assortment of products, including at least one product within each product category as a low price alternative.

In article 1, the DIY multiple retailers have been recognised to exploit economies of scale and growth strategy, which imply that their presence

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127 Stevenson et al, 2002, page 22
will remain, and even become intensified. Both their logistic foundation and their strategy is cost-orientated, with a broad competitive scope.

In the future, the number of "private retailers in purchasing co-operations" is expected to increase at the expense of "private retailers with no affiliation", but in the long-term "private retailers in purchasing co-operations" will most likely decrease in favour of the "centrally managed multiple retailers".  

2.3.2. Relationships

The relationships between the members (mostly traditional retailers and the sawmills) are characterized by their long-term nature, the foundations of which lie on personal contacts. Since the relationships have lasted for a long period of time, both sawmills and retailers have become dependent on each other. Today, the relationship, as well as earlier experiences with a specific sawmill, are the most important reasons for a retailer to make his purchases from the same sawmill.

Most of the relationships have not been further developed and could be recognized to be in one of the two earliest phases, probably due to a lack of mutual norms and mutual understanding, stemming from the time when the sawmills were perceived as obvious channel leaders. However, there is an indication of commitment, but this behavior has been acquired by the retailers' experience and their adjustment to being pushed around by the sawmills and playing by their rules. On the other hand, with time comes experience, and the retailers have learnt to live with and trust the sawmills' behavior. A study of Swedish retailers for softwood lumber indicates that the new type of relationships in which the retailers are satisfied with the sawmills is likely to be a trustful and committing relationship. The way business is conducted and a lack of commitment and trust are probably two reasons why further relationships or integration have not developed.

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129 Rådström, 2002-12-03
130 Michael, 1999
131 Zineldin and Jonsson, 2000
2.4. Summary and concluding remarks

The distribution channel for softwood lumber is fairly simple and the flows that bond the members together do not give the impression that the relationships between the members are thoroughly developed. According to theory, a long relationship (and developing "partnership relationships") is based on commitment and trust, and as a relationship becomes established personal contacts, informal understanding and commitment increase in importance. Even though retailers and sawmills are working together, as they have done for many years, these elements are barely recognized, and the sawmills could be considered as associated suppliers to the retailers. One explanation for this relationship might be that the members are not completely satisfied with the relationship and are hence not interested in developing an intimate relationship and becoming partnership suppliers.

The retail industry for softwood lumber is in an intense phase; Swedish retailers have been challenged on a market surrounded with myth, and the most obvious norms have been questioned. Consumers have shown interest in softwood lumber and suddenly been identified as a profitable market segment; but it is the international DIY multiple retailers that have taken its benefits. The position that the DIY multiple retailers have acquired in such a short time, and their continued good prospects, is mostly a result of the low price policy of customised products together with their strategy. The DIY multiples retailers have a strict relationship with their suppliers, compared to the other retail categories, and this (together with the volume they purchase) have caused a shift in power. This development has been recognised in other distribution channels, and will most likely continue even in the distribution channel for softwood lumber.

Traditionally, sawmills have been the channel leaders and they are used to stating their requirements on the retailers in order for them to be "allowed" to order specific products (by using some kind of penalty as a basis for power). The members are aware of the "power-relationship" and have accepted their individual roles as well as they perceive a conflict and are aware of its sources.
3. Fundamentals of logistic service requirements

The purpose of this chapter is to give the reader an understanding of the logistic service concept and previous operationalisations from a retail perspective. The chapter is therefore connected with the second research question and provides a theoretical background to the purpose.

Offering accurate logistic services\textsuperscript{132} to customers is a profound source for competitive advantage, and as a result logistic services need to be planned on a strategic level. There are three dimensions of logistic service. The first, and most basic level, is the \textit{activity} or functional level, such as order entry and invoicing. The second is \textit{performance} related and it quantifies the specified level (for instance that 95 percent of all orders should be delivered within five days). The last level is related \textit{philosophy} and this emphasizes orientation towards serving customers from the entire company\textsuperscript{133}.

Logistic services can be defined as;

\begin{quote}
\textit{\textquotedblleft all value added activities concerning order to delivery process and providing accurate information and services in accordance with the material flow.}\textsuperscript{134}
\end{quote}

Logistic services are processes for providing value-added benefits to the distribution channel in a cost-effective way\textsuperscript{135} and consequently it measures the effectiveness of the logistic system by creating time and place utility.

\begin{flushright}
\textsuperscript{132} Descended from the physical distribution approach  \\
\textsuperscript{133} La Londe and Zinzer, 1976  \\
\textsuperscript{134} Translated from Mattsson, 2002, page 139  \\
\textsuperscript{135} La Londe et al, 1998
\end{flushright}
Logistic services are the output of a company's processes and hence it is these that determine the customers' perceptions of the company. The role of a company's logistic services, in a business system, is shown in the following figure.

**Figure 10. The role of logistic services**

Source: Modified Fung and Wong, 1998

Logistic services have an important impact on sales of industrial products in mature markets\textsuperscript{136} and they embrace two critical parts; the service (i.e. offering better service and attracting customers, which eventually increases profit) given to the customers and the cost for providing those services.\textsuperscript{137} Costs include direct costs such as transportation costs and costs for loss of sales.\textsuperscript{138} If all information about profit and costs were known, it would be possible to determine the service level that would maximise the service contribution to the company's profit. Costs increase constantly at the same time as profit diminishes, until the optimal level is reached. This relation is illustrated in following figure.

\textsuperscript{136} Darden et al, 1989

\textsuperscript{137} Stephenson and Willett, 1968

\textsuperscript{138} Shycon and Sprague, 1975
Operationalisations of logistic services vary among industries as well as between situations\textsuperscript{139} but the technique for determining requirements is general. The process starts with identifying basic requirements and determining their relative importance. Thereafter it would be advantageous for the company to segment their customers and offer designed service packages. Establishing service management and control procedures then conclude the work.\textsuperscript{140}

\textbf{3.1. Studies on logistic service requirements}

Research on logistic services has been conducted since the 1960s.\textsuperscript{141} This has been done in two ways. The first is development through theory, and theoretical logistic service requirements are often in respect of; order processing time, order assembly time, delivery time, inventory availability, order-size constraints, consolidation allowed (for shipments), and consistency among the elements referred to.\textsuperscript{142}

\textsuperscript{139} Gilmour, 1982
\textsuperscript{140} Christopher, 1985
\textsuperscript{141} Simon, 1965
\textsuperscript{142} Hutchison and Stolle, 1968
The second way of operationalisation is by using interviews or questionnaires. The following empirical studies have been conducted with the aim of applying logistic service requirements from a retail perspective.

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Industries</th>
<th>Logistic service requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Levy(^{143})</td>
<td>1978</td>
<td>Pharmaceutical</td>
<td>- Packaging information sheet&lt;br&gt;- Handling returns&lt;br&gt;- Consistency in lead-times&lt;br&gt;- Extended dating for deliveries&lt;br&gt;- Absorbing cost of handling and freight on returned&lt;br&gt;- Handling returns&lt;br&gt;- Expedite order filling and shipping for reduced lead-times&lt;br&gt;- Computer-to-computer ordering handling&lt;br&gt;- Prepaid shipments&lt;br&gt;- Constant package size&lt;br&gt;- Others(^{144})</td>
</tr>
</tbody>
</table>

\(^{143}\) Names it wholesaler, but the function described is a retail function

\(^{144}\) Pricing structure, representatives, no reduction of terms of sale, sales information, advertising, adjust inventory for slow moving items, sell strictly through wholesaler, allow wholesalers to compete with direct selling and policies, 10 % margin, no suggested selling price, and compensation for recall
<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Industry</th>
<th>Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gilmour</td>
<td>1982</td>
<td>Different</td>
<td>Availability of items, Reliability of delivery, Delivery time,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Efficient telephone handling of orders and queries, Order conveniences, Other</td>
</tr>
<tr>
<td>Sterling and Lambert</td>
<td>1987</td>
<td>Office systems and furniture industry</td>
<td>Ability to meet promised delivery time, Accuracy in filling orders,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Advance notice on shipping days, Order cycle time consistency, Length of</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>promised lead time for quick ship orders, Accuracy of manufacture in</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>forecasting estimated shipping dates, Completeness of contract orders,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ability to expedite rush service, Completeness of quick shipping orders,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Other</td>
</tr>
</tbody>
</table>

145 After sales service and back-up, competent technical rep, demonstration of equipment, and availability of published material

146 Competitiveness of price, special pricing discounts on contract orders, overall manufacturing and design quality relative to price, updated and current price data, specs and promotion material, timely response to requests for assistance from manufacturer's representative, adequate advance notice of price changes received, and overall aesthetics and finish
<table>
<thead>
<tr>
<th>Lambert and Harrington</th>
<th>1989</th>
<th>Plastic</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Accuracy in filling orders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>✓ Consistent lead time (meets expected delivery date)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>✓ Ability to expedite emergency orders in a fast responsive manner</td>
<td></td>
<td></td>
</tr>
<tr>
<td>✓ Info provided when order is placed-projected shipping date</td>
<td></td>
<td></td>
</tr>
<tr>
<td>✓ Advanced notice of shipping delays</td>
<td></td>
<td></td>
</tr>
<tr>
<td>✓ Info provided when order is placed-projected delivery date</td>
<td></td>
<td></td>
</tr>
<tr>
<td>✓ Actions on complaints</td>
<td></td>
<td></td>
</tr>
<tr>
<td>✓ Length of promised lead-time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>✓ Info provided when order is placed-inventory availability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>✓ Other\footnote{Supplier's resins are of consistent quality, quality of sales force- honesty, competitiveness of price, processability, supplier's resins are of consistent color, supplier's resins are of consistent melt flow, adequate notice of price changes, overall quality of resin relative to price, and quality of sales force - prompt follow-up}</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Previous research on operationalisation of logistic service from a retail perspective

### 3.2. Summary and concluding remarks

Research has been conducted in different industries, and pharmaceutical and plastic could be considered as raw material based in relation to the others that could be considered as more ennobled. Softwood lumber is a raw material and therefore ought to be connected to the similar requirements.
4. Logistic service requirements in the retail industry for softwood lumber

This chapter gives a pre-understanding to the papers and summarises the papers included in the thesis. It is connected with the second research question and completes the basic aspects of the purpose.

In general, retailers for softwood lumber accept only suppliers that provide them with products maintaining an acceptable product quality in regard to what they consider to be a reasonable price. This implies that the sawmills need to offer both product quality and prices within a "framework"\textsuperscript{148}, otherwise they are not considered as potential suppliers by the retailers.

The incumbent\textsuperscript{149} retailers' general logistic service requirements have been identified through interviews (summarised in appendix 1). The identified logistic service requirements are shown in the following table.

<table>
<thead>
<tr>
<th>Logistic service requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivers according to promised delivery time</td>
</tr>
<tr>
<td>Short delivery times</td>
</tr>
<tr>
<td>Customisation (of products and / or packages)</td>
</tr>
<tr>
<td>Small package sizes</td>
</tr>
<tr>
<td>Increased frequency and smaller delivery sizes</td>
</tr>
<tr>
<td>Fixed delivery days</td>
</tr>
<tr>
<td>Possibility of fast deliveries</td>
</tr>
</tbody>
</table>

*Table 5. Logistic service requirements identified in interviews*

The respondents were also asked to identify additional requirements within a 5-year period, and these logistic service requirements are presented in the following table.

\textsuperscript{148} See concept of order qualifier
\textsuperscript{149} i.e. Private retailers with no affiliation, Private retailers in purchasing co-operatives, and Industrial distributors of building material
### Additional logistic service requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Derived from</th>
</tr>
</thead>
<tbody>
<tr>
<td>Several assortments (within each package and or delivery)</td>
<td></td>
</tr>
<tr>
<td>Deviation reports</td>
<td></td>
</tr>
<tr>
<td>Bar-coded products</td>
<td></td>
</tr>
<tr>
<td>Smaller delivery sizes (*)</td>
<td></td>
</tr>
</tbody>
</table>

*Table 6. Important service requirements in the future  
(* already mentioned by other retailers, see table 5)*

The logistic service requirements have been developed, clarified and summarised in the following table.

<table>
<thead>
<tr>
<th>Logistic service requirements</th>
<th>Derived from</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order cycle time is reliable</td>
<td>Interviews (Reliability of deliveries (according to consistency in lead-time compared to promised delivery time))</td>
</tr>
<tr>
<td>Short lead-time</td>
<td>Interviews (Delivery time (short))</td>
</tr>
<tr>
<td>Ability to meet special requests</td>
<td>Interviews, mentioned fast deliveries and fixed delivery days</td>
</tr>
<tr>
<td>Possibility of delivering 1/2 packages</td>
<td>Interviews (smaller package size)</td>
</tr>
<tr>
<td>Possibility of delivering 1/4 packages</td>
<td>Interviews (smaller package size)</td>
</tr>
<tr>
<td>Packages containing different assortments</td>
<td>Interviews</td>
</tr>
<tr>
<td>Consumer packages</td>
<td>Interviews</td>
</tr>
<tr>
<td>Bar-coding</td>
<td>Interviews</td>
</tr>
<tr>
<td>The accurate product is delivered is delivered complete</td>
<td>Given in the industry</td>
</tr>
<tr>
<td>Orders are fulfilled completely</td>
<td>Given in the industry</td>
</tr>
<tr>
<td>Quick correction of mistakes</td>
<td>Given in the industry</td>
</tr>
<tr>
<td>Accurate &amp; timely info</td>
<td>Deviation report</td>
</tr>
<tr>
<td>Computerized info transfer</td>
<td>Order placement</td>
</tr>
</tbody>
</table>

*Table 7. Logistic service requirements and their origin*
4.1. Review paper 1

Paper one is titled "Logistic Service Requirements of Do-It-Yourself Multiple Retailers" and it aims at;

,, specifying the characteristics and logistic service requirements, as well as their underlying drivers.

Empirical data have been collected through observations and interviews with retailers in several European countries.

The logistical requirements, such as delivery times and penalty clauses for suppliers not meeting their stated delivery times, are stated in the agreements.

The DIY multiple retailers' logistic service requirements are; large volumes (pre-defined), small package sizes, several product categories, opening hours, special campaign program (in addition to wide product program), bar-coded products, consumer packages, fixed delivery times (consistency in lead-time), ability to meet requests for special deliveries (i.e. additional large volumes and deliveries of fill-up orders), and knowledge of demand for each store.

4.2. Review paper 2

Paper two is titled "Retailers' requirements on logistic services, prices, and product quality regarding softwood lumber". It takes its stating point at the previous list of logistic service requirements (see table 7). The paper ranks the requirements and puts them in relation to both product quality and price (i.e. low price). The paper has the following purpose;

,, to determine and relate important retail service requirements to price and product quality

Empirical data have been gathered through a questionnaire (see 1.4.4. and appendix 1) and the ranking is based on adjusted means. Important to notice is that the standard deviation increases as the adjusted means decrease.
The logistic service requirements\textsuperscript{150} have been ranked in the following order.

1. Accurate product is delivered complete
2. Orders are fulfilled completely
3. Order cycle time is reliable
4. Quick correction of mistakes
5. Accurate and timely information
6. Short lead-time
7. Possibility of delivering 1/2 packages
8. Ability to meet special requests
9. Possibility of delivering 1/4 packages
10. Consumer packages
11. Packages containing different assortments
12. Computerized info transfer
13. Bar-coded products

Considering the entire logistic service concept in relation to product quality and price, the following ranking order appears.

1. Product quality
2. Price
3. Logistic service

The paper also divides logistic services into the following elements; delivery, information, and value-added services.\textsuperscript{151} Each requirement has been spread over the different service elements. The paper indicated the following ranking order between the elements;

1. Delivery service
2. Information service
3. Value-added logistic service

\textsuperscript{150} In paper referred to as criteria
\textsuperscript{151} Stemming from Mattsson, 1999
Dividing the logistic services concept and viewing the elements in relation to product quality and price now produces the following order.

1. Product quality
2. Delivery service
3. Price
4. Information service
5. Value added logistic service

Product quality is even now ranked as number one, while the second element is "delivery service"; at the same time price is ranked ahead of "information service" and "value added logistics service". The standard deviation increases among the lower ranked requirements and hence there are differences between the replies given by the respondents (i.e. some retailers regard these requirements as important for their suppliers to meet).

**4.3. Review paper 3**

Paper three is titled "Logistic services as competitive means - Segmenting the retail market for softwood lumber" and comprises a study of two basic logistic service requirements. It also aims at segmenting the retail industry, in order to structure the sawmills' customer base (retailers).

The paper has the subsequent purpose;

\[., to specify retailers' basic logistic service requirements, quantify the requirements and to distinguish potential retail segments regarding these requirements.\]

Empirical data have been gathered through a questionnaire (see 1.4.4. and appendix 1) and the chosen requirements are based on interviews; their importance is verified in the questionnaire. The studied requirements are; delivery time and size of packages and dispatch.
**Delivery time.**

Delivery time contains two variables; actual and required delivery time. The two dimensions are shown in the following figure.¹⁵²

![Figure 12. Actual and required delivery time](image)

67 percent of the deliveries are performed within one week and 91 percent are delivered within two weeks (i.e. ten working days). There is a difference between actual and required delivery time (5 vs. 4 days). However, the retailers seem to be satisfied with the delivery time offered by the sawmills.

**Size of packages and dispatch**

Today retailers purchase softwood lumber in full truckloads, due to what they consider high transportation costs, and the volume therefore depends on the size of the truck. The retailers would like to purchase and receive smaller delivery sizes as well as package sizes.

¹⁵² Number of days is referred to as working days measured from the time the order is placed until the products are delivered or are available at the sawmill. The agreements state the conditions for delivery, for instance FOB, and other delivery conditions such as the frequency of orders, time between ordering and delivery, and amount of products to be delivered on each occasion.
The paper tests four segmentation variables (supply base, turnover, category, and customer base) and concludes with suggesting the following three hypotheses to be tested.

⇒ Hypothesis 1:
"Small" retailers in purchasing co-operatives" place stricter requirements on delivery service elements than do other retailers.

⇒ Hypothesis 2:
"Private retailers with no affiliation" place stricter requirements on value-added logistical services than other retailers do.

⇒ Hypothesis 3:
Retailers with "end consumers" as their customer base place stricter requirements on value-added logistical services than do other retailers.

### 4.4. Summary and concluding remarks

Logistic service requirements vary between industries. However, incumbent retailers indicate logistic services connected to the actual process as being the most important logistic service requirements for their suppliers to meet. The Swedish retail industry for softwood lumber seems to value the basics of logistics services. This implies that as long as the basic distribution function works, the retailers will get the service they require. However, there are differences between retailers, and this ought to imply that some retailers are about to change their behaviour and move the distribution channel for softwood lumber into a new phase.

The DIY multiple retailers' logistic service requirements for their suppliers to meet include both elements considered as delivery services as well as elements considered as value added logistic services. They have thereby started the change of the distribution channel and are about to provide the suppliers with new business conditions.

Delivery service is ranked ahead of price and could be considered as a so-called order qualifier (in the same manner as product quality and price). This might indicate that delivery services are about to be a part of the basic criteria which need to be fulfilled in order for sawmills to be regarded as potential suppliers by the retailers.
5. Logistic service requirements in their context

Chapter five contains a discussion (in order to view logistic service requirements in their context) of the basic concepts softwood lumber, distribution channel, retail industry, and logistic service requirements (with regards to incumbent retailers), as well as the interplay between them.

Retailers are vital members of the distribution channel, but the future ultimately lies in the hands of the consumers. Consumer changes and preferences will effect the final demand for softwood lumber, and it is important for the retailers to meet and if possible exceed the expectations of the consumers. Consumers' preferences for softwood lumber are the source of several of the logistic service requirements placed by the retailers. The connection between the concepts; softwood lumber, distribution channel and retail industry is illustrated in the following figure and will be explained in the text below.

![Figure 13. Descriptive model of logistic service requirements for softwood lumber](image-url)
5.1. Specifics of softwood lumber

Softwood lumber is heterogeneous and it is as hard for the sawmills to predict the characteristics of the raw material as it is to determine all the characteristics of the processed products. Due to the raw material's high variability, it is difficult to make accurate production plans; at the same time as all purchased timber needs to be taken care off.

The raw material accounts for a major part of the total costs and hence its importance is essential. The manufacturing process is capital intensive and the sawmills exploit economies of scale, resulting in concentration of the industry.

The production of softwood lumber is of a divergent structure, where one log of timber may end up as several different products. The divergent structure is characterised by the generation of main products and consequence products (usually without customer order). The sawmills need to find market areas for all their products.

Softwood lumber delivered from the sawmill is in almost all cases considered as a commodity product by the sawmills. Commodity products are sold in large quantities at low prices and are connected with neither product nor brand name. This implies that softwood lumber is a material (compared to "product") and hence is easily substituted by softwood lumber from other sawmills. Commodity products are exceptionally exposed to fluctuations in market prices. Fluctuating prices tempt sawmills to sell products at markets where the price is high at the expense of markets where the price is low. This makes the sawmills focus on exploiting price differences between markets.

Softwood lumber requires specific handling in order to avoid destruction, such as mould and blue stain; at the same time it is bulky.

Key words: high variability (in quality and time), consequence products, commodity product and specific handling

For further discussion see Rask and Andersson, 2001
5.2. Distribution channel

The flows between the members of the distribution channel for softwood lumber are; negotiations, ordering, physical possession, ownership, and payment. The flows between members in a distribution channel are fundamental, with one member purchasing products from another. Payment and ownership are connected to each other and negotiations, ordering, and physical possession follow each other as expected.

The distribution channel is characterised by long-term relationships, where personal contact and earlier experiences are the bases for a business to take place and where the sawmills ought to be considered as associated suppliers to the retailers. The members have not developed any type of formal integration; instead all orders are placed by telephone, fax, or e-mail and in some cases the sawmills supply deviation reports. The lack of integration might be explained by the absence of foundation (commitment, trust, mutual norms, and understanding).

Today, there is no evident channel leader. Due to their size and customer structure, sawmills have been obliged to act as channel leaders. However, as the customer base is transforming, and new profitable customer categories have entered the market place, the knowledge of the customer is increasingly important. The access to, and knowledge of, customers' needs have increased the retailers' power. However, as the DIY multiple retailers have entered the market, with their size and business concept as a basis, they have been acting as channel leaders.

Key words; fundamental flows (negotiations, ordering, physical possession, ownership, and payment), long-term relationship, lack of integration, and no evident channel leader

5.3. Retail industry

Retailers sell products to consumers and administer a majority of all building material to the Swedish market. The retailers, mainly according to the postponement principal, customise the softwood lumber that is sold to consumers.

Today there are different categories of retailers depending on their structure, governance and target customer group. The structure of the retail
industry for softwood lumber is not static, nor are the different categories. The retailers are sorted into several roughly defined categories, and as the customer base becomes more diverse, new retail categories will undoubtedly evolve.

*New customer types* are also continuously developing, each specialising in a different type of businesses. One new customer category is the so-called "King-cab builder", this customer type is sub-contractor to large building firms and performs limited jobs, thereby possibly categorising them as somewhere between the professional contractor and the consumer. King-Cab builders ought to possess more knowledge than the consumer but less knowledge than the professional contractor. This implies that retailers, selling softwood lumber to this customer type, need to consider additional demands.

The DIY multiple retailers have changed the world for the incumbent retailers and after their entrance on the market place, the competition has become intensified. The entrance of the DIY multiple retailers have caused a *concentration* in the retail industry, where the incumbent retailers are adopting to the newcomer. The change in the retail environment has caused the incumbent retailers to focus more on such matters as costs, which has resulted in a reduction of suppliers.

*Key words; customise products, retail categories, new customer types, and concentration*

### 5.4. Logistic service requirements

Logistic service requirements stem from either consumer demands or the retailers' aim to become competitive. The requirements ought to be met and fulfilled by the suppliers in order for them, in turn, to become competitive compared to the other suppliers.

In order to structure the logistic service concept; core, controlling, and complementary logistic activities have been identified. These activities establish and constitute the basis for the concept *3C's of logistic service*. The concept has been conceived as a model and it is presented in figure 14.
Retailers, with requirements dominated by core logistic activities, ought to focus on the elemental running of the business. However, if the retailers' requirements belong to controlling logistic activities, the retailers have, most likely, developed their business and therefore need to control its performance. In the same manner, requirements belonging to complementary logistic activities ought to indicate that the retailers are fairly well-developed and work actively with their businesses in order to reduce costs and meet customer demands. The following figure is a review of the retailers' requirements according to this principle.

Figure 14. 3C's of logistic service valid for the retail industry for softwood lumber
There is a range of requirements among the activities. However, the core logistic activities dominate the upper part of the ranking list.

<table>
<thead>
<tr>
<th>Ranking number</th>
<th>Requirements</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Accurate product is delivered complete</td>
<td>Core</td>
</tr>
<tr>
<td>2</td>
<td>Orders are fulfilled completely</td>
<td>Core</td>
</tr>
<tr>
<td>3</td>
<td>Order cycle time is reliable</td>
<td>Core</td>
</tr>
<tr>
<td>4</td>
<td>Quick correction of mistakes</td>
<td>Core</td>
</tr>
<tr>
<td>5</td>
<td>Accurate and timely information</td>
<td>Control</td>
</tr>
<tr>
<td>6</td>
<td>Short lead-time</td>
<td>Core</td>
</tr>
<tr>
<td>7</td>
<td>Possibility of delivering 1/2 packages</td>
<td>Complementary</td>
</tr>
<tr>
<td>8</td>
<td>Ability to meet special requests</td>
<td>Core</td>
</tr>
<tr>
<td>9</td>
<td>Possibility of delivering 1/4 packages</td>
<td>Complementary</td>
</tr>
<tr>
<td>10</td>
<td>Consumer packages</td>
<td>Complementary</td>
</tr>
<tr>
<td>11</td>
<td>Packages containing different assortments</td>
<td>Complementary</td>
</tr>
<tr>
<td>12</td>
<td>Computerized info transfer</td>
<td>Control</td>
</tr>
<tr>
<td>13</td>
<td>Bar-coded products</td>
<td>Complementary</td>
</tr>
</tbody>
</table>

Table 8. Ranking order of requirements derived to its activity

The retailers have identified requirements related to core logistic activities as the most important. This indicates that the retailers focus on their business transactions and are satisfied with their suppliers as long as they are able to deliver softwood lumber in a workable manner. However, there are retailers that value control and complementary logistic activities. Control logistic activities are operationalised by the following two requirements; accurate and timely information and computerized information transfer. Accurate and timely information is highly ranked and refers, for instance, to deviation reports. At the same time, computerized information transfer is ranked as rather low. The importance of the control and complementary logistics activities vary among the retailers, which indicates that the activities exist, even though they have been developed and are required by just a few retailers.

The retailers have identified the core logistic activities to be the most important logistic service requirements at the present time. However, there is a possibility that the retailers have identified service requirements in accordance with what they perceive the sawmills are able to meet. This implies that as soon as the sawmills have fulfilled the core logistics activity
requirements, the retailers will require control the logistics activity service requirements.

DIY multiple retailers state demands which contain requirements for each activity, and they do not make any differences between their suppliers. This implies that the requirements are the same for suppliers delivering nails as for suppliers delivering softwood lumber.

The activities and requirements might indicate the distribution channel's level of development. Requirements and activities are developed and well accepted in other industries. However, in the distribution channel and retail industry for softwood lumber they seem to be lacking; however, as distribution channel and retail industry for softwood lumber develop, these criteria will most likely be important in the future.

*Key words; core logistic activities*
5.5. Summary and concluding remarks
The distinctiveness in the concepts; softwood lumber, distribution channel, retail industry and logistic service requirements interplay are summarized in the following figure.

![Diagram](image)

Figure 15. Contribution to the knowledge of the distribution channel for softwood lumber and the retailers' requirements on logistics services.

The demand for softwood lumber and the requirements on service is ultimately determined by the consumers' preferences. During the past years there has been an increase in demand for softwood lumber and there is no reason to believe that the trend will not continue. However, there is a possibility of decline of demand due to saturation. Preferences for interior fittings depend on such things as fashion and sooner than anyone might expect another material might be demanded. Changes in consumer demands and shopping patterns have shown in other industries, such as with...
catalogue retailers and this development is probably not too far-fetched for softwood lumber. However, retailers those are to become successful need to prepare for this development and to adjust their own and their suppliers businesses'. This creates possibilities for smaller retailers and their suppliers to become more competitive, for instance by selling their products using different Internet solutions.

The development of distribution channels is mainly based on adjustment to consumers' demands. However, there are other factors that effect the structure of distribution channels, as for instance the degree of competition and logistical limitations. Competition regarding commodity products is usually intense, focused on price, and suppliers are easily exchanged. However, this is not the case for softwood lumber. The incumbent retailers have purchased their softwood lumber from the same suppliers for many years and their supply base is mainly established on personal experience, long-term relationships, and the suppliers' ability to deliver core logistic activity services. Today, the distribution channel for softwood lumber is fairly simple, with fundamental flows and a lack of integration, which is what could be expected from a distribution channel for commodity products. However, the way business is conducted, limitations that stem from the characteristics of the material (i.e. heterogeneous), the fact that softwood lumber ought not to be transported extremely far and requires specific handling, are probably reasons for the structure and development of the distribution channel for softwood lumber.

The changes that appear in other distribution channels, concerning focusing on end consumers and shorter delivery times, are on their way to the distribution channel for softwood lumber. This will force the members of the distribution channel to consider new ways of organizing and cooperate in order to improve efficiency. However, in order for the relationship to develop, commitment and trust need to be established and a developed long-term perspective ought to be taken into consideration by all members.

The power in the distribution channel ought to be dependent on supply and demand for softwood lumber. This implies that, as the supply of softwood lumber increases, the retail industry becomes more powerful at the expense of the other members, while as the supply diminishes, the sawmill industry becomes more powerful at the expense of the other members. Therefore, the power originates from the supply of timber and other circumstances such as weather conditions. However, there is a possibility that the total supply of
timber will increase as the former Russia and Baltic States start to export softwood lumber, and thereby giving the retail industry more power.

The retail industry is continuously transforming, and the retail industry for softwood lumber is no exception from the general trend. Retailers enter the markets place, challenge other retailers, and force them to continuously develop and renew their businesses in order to stay competitive. The DIY multiple retailers offer customised products and a low price alternative, which is favoured by private consumers. As the DIY multiple retailers offer a low price alternative, they constitute an immense threat to the incumbent retailers. In order to meet the DIY multiple retailers, the incumbent retailers ought to take advantage of the diversity, and focus on value-driven customers; thus new retail categories will evolve.

However, there are other challenges for the incumbent retailers. As consumers hire professionals for specific work, they will also compare prices and not accept prices much higher then they can buy the softwood lumber for themselves in a DIY multiple retail store; thus there will be additional pressure on the price.

As consumers become a valuable customer group for the retailers, the retailers start to place new requirements on both suppliers and products. Consumers purchase softwood lumber as customised products (compared to commodity product) and the retailers' ability to meet their demands becomes of vital importance. There are unfortunately discrepancies between what the retailers require and what the sawmills regard as reasonable requirements, resulting from different perceptions of the product. Retailers purchase commodity products from the sawmills, and sell customised products to the consumers. Hence, the retailers perceive to handle customised products and therefore ought to place specific requirements on the sawmills. At the same time, the sawmills perceive themselves to be selling a commodity product and are hence used to competing on price.

Today, retailers value product quality and price ahead of logistic services. This implies that, in addition to the considerable impact that logistics give to the total costs, retailers view logistics as cost oriented (see the following figure).
Logistic costs are high and naturally retailers focus on economies of scope. Economies of scope arise from selling a greater variety of products that might share the same distribution network and hence concentration is generated. In order to measure concentration the number and size of stores is normally used.\textsuperscript{154}

Concentration in the sawmill industry is already taking place and now the same development is appearing in the retail industry. In the future, there will be two powerful members of the distribution channel each struggling to get and to keep the most powerful position. However, it is the customers who determine the future of the distribution channel and its members. Consequently the member that has contact with the consumers will have an advantage towards becoming the channel leader or run channel management (depending on whether integration is developed or not).

In order for the sawmills to maintain their customers (i.e. retailers), they need to prepare for supplying the retailers with services that enable them to control and add value to their process. The complementary logistic activities will be considered and emphasised when selling products to consumers. This is illustrated by the DIY multiple retailers. Their main customer group is the consumer and the multiple retailers require their suppliers to deliver products adapted for this strategy, such as bar-coded products (which is a part of the complementary logistic activities). This development indicates that the retail industry is becoming more advanced and that the DIY multiple retailers lead the distribution channel for softwood lumber into becoming more process-oriented.

\textsuperscript{154} Andersson et al, 1990, page 27
6. Conclusion

This concluding chapter summarizes the findings, and issues for future research within the distribution channel for softwood lumber are suggested. The last part contains implications for sawmills as well as for research.

The purpose of this thesis is;

"... to contribute to the knowledge of the retailers' requirements on logistic service."

In order to fulfil this purpose, the following figure has been developed.

![Diagram showing the distribution channel and retail industry with core logistic activities, control logistic activities, and complementary logistic activities.]

Figure 17. Description and drivers of logistic service requirements
The distribution channel for softwood lumber is loosely organised, which is what could be expected when one considers the previous role of the sawmills as channel leaders, and their perception of softwood lumber as a commodity product and their former stable environment around this fact. The purpose of having loosely organised distribution channels is the easy exchange of suppliers and customers. However, this possibility is not utilised by any of the members. Instead, they have been working together for a long time, but no integration is visible; in the main the retailers still require services connected to core logistic activities. However, this long-term relationship and trust might be valuable ingredients for enabling the retailers and sawmills to meet the competition from the DIY multiple retailers.

6.1. Implications

6.1.1. Research
This research could be viewed from a contingency perspective, where specifics of the industry are seen as the determining factors for which logistic service requirements are required.

Earlier studies have been performed and the following table summarises their results regarding logistic service requirements stated by retailers.
<table>
<thead>
<tr>
<th>Service elements</th>
<th>Softwood lumber</th>
<th>Plastic</th>
<th>Office &amp; furniture</th>
<th>Different</th>
<th>Pharm.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Core</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accurate product is delivered complete</td>
<td>Accuracy in filling orders</td>
<td>Ability to meet promised delivery time</td>
<td>Availability of items</td>
<td>Handling returns</td>
<td></td>
</tr>
<tr>
<td>Orders are fulfilled completely</td>
<td>Consistent lead time</td>
<td>Accuracy in filling orders</td>
<td>Reliability of delivery</td>
<td>Consistency in lead-time</td>
<td></td>
</tr>
<tr>
<td>Order cycle time is reliable</td>
<td>Ability to expedite emergency orders in a fast responsive manner</td>
<td>Order cycle time consistency</td>
<td>Delivery time</td>
<td>Extended dating for deliveries</td>
<td></td>
</tr>
<tr>
<td>Quick correction of mistakes</td>
<td>Length of promised lead-time</td>
<td>Length of promised lead time for quick ship orders</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short lead-time</td>
<td>Actions on complaints</td>
<td>Completeness of contract orders</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ability to meet special requests</td>
<td>Advanced notice of shipping delays</td>
<td>Ability to expedite rush service</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Completeness of quick ship orders</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Control</strong></td>
<td>Accurate and timely information</td>
<td>Info provided when order is placed- projected shipping date</td>
<td>Advance notice on shipping days</td>
<td>Efficient telephone handling of orders and queries</td>
<td>Computer-to-computer ordering handling</td>
</tr>
<tr>
<td>Computerized info transfer</td>
<td>Info provided when order is placed- projected delivery date</td>
<td>Accuracy of manuf in forecasting estimated ship dates</td>
<td>Order convenience</td>
<td>Handling returns</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Info provided when order is placed- inventory availability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Complementary</strong></td>
<td>Possibility of delivering 1/2 packages</td>
<td></td>
<td></td>
<td>Packaging information sheet</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bar-coded products</td>
<td></td>
<td></td>
<td>Constant package size</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Possibility of delivering 1/4 packages</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Consumer packages</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Packages containing different assortments</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 9. Retail Logistic service requirement

Different industries have identified different requirements. However, most of the requirements could be considered to belong to core logistic activities. A core logistic activity is the innermost of the logistic services and the very core of distribution (from where logistics developed).
The studies, referred to in this thesis, have been performed in different industries, and different logistic service requirements have been identified. This implies that the situation ought to be important as to which requirements are placed. In order to determine the drivers for logistic service requirements and which situation parameters effect these requirements, further studies on this specific issue need to be conducted.

6.1.2. Potential fields for sawmills' application

Retailers are important customers for the sawmills and their importance will most likely increase in the future. As the retail industry is transforming and continuously changing, diversity among the retailers will increase. Retailers, focusing on different customers and working with reducing their supply base, will place different logistic requirements on their suppliers. The diversity among retailers gives the sawmills tremendous possibilities to segment the retail industry. Working with segmentation allows the sawmills to specialise and focus their processes on issues that the retailers are willing to pay for. However in order to work efficiently with segmentation, valid segmentation variables need to be identified. Article three identified potential segmentation variables; size, category, and customer base. Due to the characteristics and structure of the distribution channel for softwood lumber, working with an *ABC- analysis* of their present customers so as to find appropriate retail segments in which to develop relationships might be an accurate method for the sawmills to improve profitability.

In a distribution channel, the members often view other members as potential competitors, and sharing marketing resources is rare. However, there is a possibility for the sawmills to provide the incumbent retailer with services that will help him to compete with the DIY multiple retailers. For instance, other retailers have gained success through working with branding. Working with branding as well as with traditional and environmental issues would present a possibility to make a firm position in the market place.

Sawmills perceive to sell a commodity product and retailers perceive to sell a customised product, which implies possibilities for the sawmills. *To add value and services* to the sales of softwood lumber and to sell customised products to the retailers would allow them to charge higher prices and at the same time gain power compared to the retailers. This procedure implies that
some of the retailers' costs will be repositioned to the sawmill, and the possibilities of rationalisation and economies of scale appear to a larger extent than today. Today it is the retailers who, in most cases, handle the transformation, and hence it is the retailers who earn the profit. Some of the logistic service requirements, considered belonging to complementary logistic activities, are established in the customisation of the product, and being able to meet these requirements in the future ought to be a necessity for sawmills in order for them to improve their profitability.

If the sawmills do not take this possibility, new wholesalers might appear, start taking market shares and even gain power in the distribution channels. Today, wholesalers might not appear as important members of the distribution channels, but there is always a possibility that they might buy softwood lumber as a commodity product and then transform it into a customised product in order to sell it to the retailers. There is also another possibility that the wholesalers might start to develop and take over other members in the distribution channels. However, extension of business and acting as a wholesaler is also a possibility for the sawmills. Producing customised products, instead of commodity products, will allow the sawmills to take better advantage of new markets and new market trends, and simultaneously consequence products can also earn higher profits by adding value and meeting specific customer needs. Offering retailers customised products would allow the sawmills to focus on their customers (retailers) and hence not continuously searching for new markets and paying higher prices. In extension, it ought to be possible for the sawmills to sell their products directly to consumers and hence exclude both wholesalers and retailers.

Retailers value logistic services connected to the core logistic activity and this implies that working with retailers, as customers on a short-term basis, requires the sawmills to control their processes and supply the retailers with the basics of logistics. However, if the logistic service concept is divided into its activities, the core logistic activities will be ranked ahead of price. This implies that the retail industry values services provided by the process (i.e. core logistic activity) and is willing to pay a higher price for softwood lumber as long as the suppliers provide the required basic services. Consequently, in the long-term perspective and in order to achieve competitive advantage, the sawmills need to consider the former perception of logistics as "cost oriented logistics" to become "flow oriented".
For the sawmills, segmenting their customer base and offering their most valued retailers the logistic service they require, will be a matter of survival. Most of the retailers require logistic services connected to the core logistic activities, but some retailers are on the move and will require the sawmills to provide services according to controlling and complementary activities in the future. Therefore, the sawmills need to determine their strategy.

6.2. Further research
This research has focused on the logistic service requirements and distribution channels from a retail perspective. So far, the research has provided the reader with a contribution to the knowledge of the core concepts and accurate logistic service requirements for softwood lumber. Future research ought to include the sawmills' perspective and appropriate sawmill strategies in order to be able to meet the requirements. This is illustrated in the following figure.

Figure 18. Connection between this study and further research
Furthermore, this research specifies characteristics of each concept and touches upon the notion that there is a relationship between them, and hence that they have an effect upon each other. These relationships need to be investigated and therefore situational variables for logistic service requirements ought to be identified.

Traditionally, the sawmills have been considered as channel leaders, but this is about to change. To measure power and power relationships is difficult but nevertheless interesting. Measuring power ought to be possible by looking at prices and the profitability of the different members in the distribution channel.

Consumers and the retail industry are continuously changing, and new trends and categories evolve. Hence profound studies of consumer preferences and retail industry for softwood lumber are necessary. Studies of the retailers' logistic service requirements are by no means at its end. Using action research and studying the retailers' actual behaviour when negotiating and ordering softwood lumber, would deepen the knowledge of the retailers' requirements on logistics services.
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Appendix 1

Also published separately by
School of Industrial Engineering,
Växjö University,

ISSN 1651-1697
ISBN 91-7636-325-2
Logistic service requirements for softwood lumber
Empirical data from survey studies in the retail channel

Åsa K. Gustafsson
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1. Introduction

1.1. Background and purpose
In many markets, the power of the brand has declined and customers have become willing to accept substitutes: even differences in technology between products have been removed. Therefore it has become harder to maintain a competitive edge through the product itself. In this situation, service can provide the distinguishing difference between one company's offer and that of its competitors.1

Service can be defined as follows:

,, a process which takes place between a buyer, a seller and a third party. The process results in value being added to the product or service exchanged. The value added in the exchange process might be short term, as in a single transaction, or long term, as in a contractual relationship. The value added is also shared, in that each of the parties to the transaction or contract are better off on completion of the transaction than it was they were before the transaction took place. Thus in a process view: Customer service is a process for providing significant value-added benefits to the supply chain in a cost-effective way.2

Softwood lumber has always been considered as a "commodity product". Hence brand names and trademarks are not of vast importance and competition is based on price rather than on service. As the view of softwood lumber is transforming, from a commodity product towards a customized product, the issue of service is becoming essential for the sawmills. The sawmills are in an unfamiliar position, where they have to start delivering products and services that the retailers require. Neither standards nor requirements, from the retailers, are established and hence the purpose of this report is to;

1 Christopher M, 1998, Logistics and Supply Chain Management - Strategies for Reducing Costs and Improve Services, Pitman Publishing
identify the general characteristics of the distribution channel and service requirements so as to specify retailers' logistic service requirements

This report is a documentation of empirical data gathered through a survey study. The survey study contains three parts; two sets of interviews and a questionnaire.

The report presents empirical data to:

- The distribution channel for softwood lumber and its logistic requirements
- Retailers' requirements on logistics services, price, and product quality regarding softwood lumber
- Logistic services as a competitive mean - Segmenting the retail market for softwood lumber

Discussions and conclusions are done in the individual texts.

1.2. General pattern of order-cycle process

In order to increase the pre-understanding of the problem area, three case studies were conducted, during the spring of 2002, with the following purpose;

,, to increase the understanding of the order-cycle process and the possibility of reducing inventory costs.

Retailers and their suppliers of softwood lumber work with contracts and orders. The contracts specify product and price (and in some cases volume). The lengths of the contracts vary, depending on price situation.

The retailers place orders, according to the following procedure.

![Order-cycle process diagram]

Figure 1. Order-cycle process
Identification of need
Notice (visually) when running short on products

Ordering - Place order
The retailer calls (mails or faxes) the sawmill and specifies;
  1) Product (specific measurements)
  2) Volume
  3) Quality
  4) Required delivery time

Transport
Either the retailer arranges for the softwood lumber to be picked up at
the sawmill', or the sawmill administers transport to the retailer's.

Arrival report
  1) Makes a control of softwood lumber and quality control of the
     visible
     products (verify with delivery note)
  2) Registers the delivery of softwood lumber into the system
  3) Places softwood lumber on the shelf
1.3. Disposition of the report

The survey study contains three parts. The first part contains explorative interviews used in order to increase the understanding of the retailers' perspective of the distribution channel for softwood lumber, and to identify important service requirements. The second part aims at quantifying and ranking pre-defined logistic service requirements. The part is presenting quantitative data. The third part presents follow-up interviews conducted in order to assess the validity and reliability of the results. The disposition of the report is illustrated in the following figure.

![Diagram illustrating the disposition of the report]

*Figure 2. Disposition of the report*
2. Part 1 - Interviews

This chapter documents the interviews that have been performed in order to increase the understanding of the distribution channel for softwood lumber and to identify important service requirements.

Explorative interviews were conducted until no additional aspects were revealed; in total six interviews with purchasing managers were conducted. The retailers were selected at random, and the interviews started in January 2001 and continued until the spring of 2001.

The interviews were of an explanatory nature, touching on three broad areas of discussion; distribution channels, the order-cycle process, and service requirements.

The interview guide is presented in Appendix 1.

The interviews are summarized in the following sections.
2.1. Interview 1

Basics

<table>
<thead>
<tr>
<th>Volume</th>
<th>8 000 cubic meters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer base</td>
<td>Other retailers, industries, and consumers</td>
</tr>
<tr>
<td>Supply base</td>
<td>Sawmills (10 suppliers)</td>
</tr>
<tr>
<td>Category</td>
<td>Private retailers with no affiliation</td>
</tr>
</tbody>
</table>

Table 1. Basic retail information

The retailer works actively with his ten suppliers and is continuously seeking for the lowest price. The retailer's perception is that suppliers are easily exchanged and hence there is no need to get into any deeper involvement.

The retailer sells his products according to his customers' requirements (i.e. he adjusts the softwood lumber after his customers' orders)

When running short on products, the retailer places orders by telephone or fax. None of the suppliers offers deviation reports.

The retailer requires deliveries within two days, but most suppliers deliver within three to five days. However, the retailer is rather satisfied with the delivery precision, as the products are delivered by the promised delivery time (suppliers' promise when the retailer places the order). About 95 percent of the deliveries are correct and the biggest problem is damages on the softwood lumber (caused by handling).

The retailer receives about 55-60 cubic meters at each delivery and deliveries are made on a fixed delivery day (for each supplier). All purchases are made in whole packages of which about 50 percent contain different assortments (mostly variations of length).

Important service requirements;
- Deliveries according to a promised delivery time
- Short delivery time and the possibility of faster deliveries
- Customization of specific products

Changes for the future; smaller delivery sizes, different assortments within one package, and deviation reports.
2.2. Interview 2

Basics

<table>
<thead>
<tr>
<th>Volume</th>
<th>2 500 cubic meters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer base</td>
<td>Professional contractors and consumers</td>
</tr>
<tr>
<td>Supply base</td>
<td>Sawmills (3 suppliers)</td>
</tr>
<tr>
<td>Category</td>
<td>Centrally managed multiple retailer (However, softwood lumber is not purchased centrally)</td>
</tr>
</tbody>
</table>

*Table 2. Basic retail' information*

The retailer perceives that the sawmills "hold on to the products" and that the deal is based on well-established personal contacts. Hence, the retailer needs to be on good terms with the salesperson at the sawmill in order to get the products needed.

Today, the retailer has three suppliers that are chosen, based on experience. The retailer is about to start working with an additional supplier (offering bar-coded products and short delivery time (two days)).

The retailer carries softwood lumber into the store and adjusts after consumers' demands. The retailer sells most of his softwood lumber in meters but as the products are purchased from the sawmills in cubic meters, the personnel need to transform it. The retailer would prefer it if the sawmill sold some of its products in meters.

The retailer places orders when running short on products. Orders are placed by telephone and deviation reports from the sawmills are not working (even though the retailer requested them).

The delivery time is about one week and the deliveries contain about 25 cubic meters. Each delivery contains six full packages and the assortment is the same within each package. Approximately 75 percent of the deliveries are "on time". All deliveries are correct (the retailer perceives that suppliers prefer to hold on deliveries if they are not complete).

The company has developed a new computer system but none of the softwood lumber suppliers are able to use it. The computer system is built upon handling units of each product. In order for the system to work, it is necessary that the suppliers offer bar-coded products.
Important service requirements;

- Short delivery times
- Increased frequency and smaller delivery sizes
- Fixed delivery days
- Small package sizes

Changes for the future; to buy more components instead of products, obtain deviation reports, get bar-coded products, and to work more intimately with fewer suppliers.

2.3. Interview 3

Basics

<table>
<thead>
<tr>
<th>Volume</th>
<th>4 000 cubic meters softwood lumber</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer base</td>
<td>Other retailers, professional contractors, and consumers</td>
</tr>
<tr>
<td>Supply base</td>
<td>Sawmills (5 suppliers)</td>
</tr>
<tr>
<td>Category</td>
<td>Private retailer in purchasing cooperations</td>
</tr>
</tbody>
</table>

Table 3. Basic retail' information

The retailer has been working with the present suppliers for several years and perceives the business to be a "wheeling and dealing" business, which is something that every member is well aware of. The choice of suppliers is based on personal experience and the retailer emphasizes the importance of personal contacts and of being on good terms with the suppliers. The retailer feels that his company's personnel ought to be sharp enough to counteract the sawmills, but in the end it is the sawmills who more or less determine the conditions for the business deal.

The retailer orders standardized products from the sawmill and adjusts the softwood lumber as the customers specify their demands.

When the retailer is running short on products, orders are placed by e-mail or telephone. Deliveries are always made in full truckloads (about 60 cubic meters). All deliveries are made in full packages each containing the same assortment. The delivery time is about three to four weeks; delayed deliveries do not matter as long as they are not more than one week late. However, the most common problem is that the deliveries are not on time (five days' delay is ordinary business). The retailer perceives that the
suppliers prefer to hold deliveries, if they are not complete, and to wait until the delivery is complete.

**Important service requirements;**
- Keeping promised delivery times
- Having good personal contact with suppliers

**Changes for the future;** deviation reports, smaller delivery sizes, and flexible suppliers that are able to offer complete solutions.

### 2.4. Interview 4

#### Basics

<table>
<thead>
<tr>
<th>Volume</th>
<th>11 000 cubic meters (on 14 sales outlet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer base</td>
<td>Consumers</td>
</tr>
<tr>
<td>Supply base</td>
<td>Sawmill (1 supplier)</td>
</tr>
<tr>
<td>Category</td>
<td>Centrally managed multiple retailer</td>
</tr>
</tbody>
</table>

*Table 4. Basic retail' information*

The retailer is working with just one supplier and therefore the sawmill's offer of assortment and services determines the retailer's choice of supplier. The retailer and sawmill have considered developing solutions, but the retail perceives that the disadvantages outweigh the advantages (for instance, an exchange of supplier).

The retailer adjusts the products in the store, as the customers specify their demands.

Orders are placed by telephone and the supplier provides deviation reports. Products are ordered when shortages appear.

Deliveries are made from two and up to four times a week and each delivery is usually about 65 cubic meters. Delivery time from when the order is placed is 48 hours. In general, the delivery precision is perceived to be high, but differences appear during the high season (when delivery precision is perceived to be about 60 percent).

Almost all deliveries are made in half packages, but both full and quarter packages do exist. The products are customized (including packaging and
bar-coding) and the consumers have to buy the products as they are presented in the store.

The retailer purchases softwood lumber in meters from the sawmills and perceives the system to be working fairly well.

Important service requirements;
- Short delivery times
- Keeping promised delivery times
- Customized products and packages

Changes for the future; wider assortment.

2.5. Interview 5
This organization handles purchases for the other business units within the company (See interview 6 - one outlet) as well as selling products to professional contractors. In total, the retailer purchases 10 000 cubic meter of softwood lumber.

The retailer perceives that the sawmills tried to state conditions, but as they became aware of the fact that softwood lumber could be purchased as any other product (in the organization), they accepted the conditions.

The retailer has long-term experience with its suppliers, and purchases all softwood lumber directly from the sawmills (three suppliers), which are chosen on personal experience. Terms of delivery are according to SVEA 90.

The products are not customized in the store, but if a customer wants a product not available, the retailer adjusts the product at the expense of the customer.

The retailer orders when running short on products. Orders are placed by telephone or fax and the sawmills handle deviation reports satisfactorily.

Delivery time is about ten working days from when the order is placed. Deliveries are always made in full truckloads (60 cubic meters) in both full and half packages (depending on product type). Each package contains only
one assortment. The most common problem is the delivery time, however about 97 percent of the deliveries are perceived to be on time.

Some products (specifically aimed for consumers) are bar-coded and consumer packaged.

**Important service requirements:**
- Short delivery times
- Kept promised delivery times
- Customized products
- Small package sizes

**Changes for the future:** specification of lengths and assortment to vary within a package.

**2.6. Interview 6**
The retailer is a "centrally managed multiple retailer" and sells its products to professional contractors and consumers. The purchases of softwood lumber are handled centrally (see interview 5).

The retailer orders products by telephone. Deliveries are made once a week from the company's distribution center, and all products are consumer-packaged and bar-coded. The products are not customized in the store, but if a customer wants a product not available, the retailer adjusts the product at the expense of the customer.

The retailer experiences increased competition from other retailers and expects a decrease in the number of retailers for softwood lumber within 5 years. However, his store will focus on the expertise of its personnel.
3. Part 2 - Questionnaire

This part documents the questionnaire, which has been used to quantify and rank the logistic service requirements.

![Diagram showing the process flow of the questionnaire]

**Figure 4. Specification of chapter three**

3.1. Methodology and population

Data was collected by a mail survey in 2000 and questionnaires were sent to purchasing managers in Sweden.

Questionnaires were sent to 381 retailers (i.e. members in "Sveriges bygg- och trävaruhandels riksförbund"). "Sveriges bygg- och trävaruhandels riksförbund" covers about 90 percent of the total number of retailers for softwood lumber in Sweden. Retailers not represented in "Sveriges bygg- och trävaruhandels riksförbund" are; DIY multiple retailers, low-price chains and certain retailers that have chosen not to be members.

Two letters reminding the respondents that had not answered the questionnaire followed the first mailing\(^3\), the first time 281 letters were sent out and the second 208 letters were sent out. Each respondent was sent an introductory letter, a questionnaire, and a postage-paid reply envelope. The introductory letter clarified the purpose of the questionnaire, assured

\(^3\) Recommended by Dillman D A, 1978, Mail and Telephone Surveys, John Wiley & Sons
anonymity, promised a summary of the results, and asked them to mark and return the questionnaire if it did not apply to their company.\textsuperscript{4} A total of 98 returned the questionnaire indicating that it did not apply to their company because, for instance, they had gone out of business, they had their own sawmill, or they used only a small amount of softwood lumber. Therefore the population was reduced to 282.

| Total number of questionnaires | 381 |
| Undelivered                     | 1   |
| Did not apply to their company  | 98  |
| Population                      | 282 |

*Table 5. Information about the total population*

The wood industry is regarded as conservative and the educational level is below average; hence it is difficult to obtain a high response rate. However, early and late respondents were compared on several dimensions: structural variables, state, and importance. There are no noticeable differences between the respondents. External validity and reliability have been assured by a series of follow-up interviews (presented in "4. Part 3- Follow-up interviews"). The respondents discussed the different parts of the questionnaire and the results, in accordance with the findings, which signifies that the results are possible to generalize.

### 3.2. Design of the questionnaire

The questionnaire contained three basic parts. The first part aimed at identifying the respondents (company information), the second part asked the respondents to answer questions regarding pre-defined service requirements (time, delivery size and package size), and the third part asked the respondents to answer questions concerning their suppliers. The questionnaire is presented in Appendix 2.

\textsuperscript{4} Recommended by Dillman D A, 1978, Mail and Telephone Surveys, John Wiley & Sons
The data presented is directly connected to three reports, namely:

- The distribution channel for softwood lumber and its logistical requirements
- Retailers' requirements on logistics services, price, and product quality regarding softwood lumber
- Logistic services as a competitive mean - Segmenting the retail market for softwood lumber

Therefore the questionnaire contains questions not presented in this report.

The first part contained the following identification variables; turnover for year 2000, category, supplier of softwood lumber, and customer group. The data is used in "Logistic services as a competitive means - Segmenting the retail market for softwood lumber" for which 113 usable responses were returned.

The second part contained the following areas; delivery time, size of dispatch and packaging, and suppliers. The data is used in "Logistic services as a competitive means - Segmenting the retail market for softwood lumber" and usable responses for this part were also 113.

In the third part, the respondents were asked to answer questions regarding their suppliers, and to determine the importance of pre-defined requirements, including price and product quality. The data is used in "Retailers' requirements on logistics services, price, and product quality regarding softwood lumber" for which 125 usable responses for this part were returned.
3.3. Empirical data

3.3.1. Part 1 - Structural variables

- The distribution between the respondents' turnover is shown in figure (Company information - Q 2).

![Figure 5](image-url)  
*Figure 5. Distribution of respondents' turnover (small < 1 000 000 Euro, medium between 1 000 000 Euro and 1 600 000 and large 1 600 000 < Euro, 1 Euro = 10 SEK)*

The distribution between the respondents' category is shown in figure 6. (Company information -Q 6).

![Figure 6](image-url)  
*Figure 6. Distribution of respondents' category (Ind distr= industrial distributors of building material, No aff= Private retailers with no affiliation, and Co-op= Private retailers in purchasing co-operatives)*
The distribution between the respondents' supply base is shown in figure 7. (Company information -Q 9).

Figure 7. Distribution of respondents' supply base

The distribution between the respondents' customer base is shown in figure 8. (Company information -Q10).

Figure 8. Distribution of respondents' customer base (End con = End consumer and B M = Builders' Merchants)
3.3.2. Part 2 - State of logistic service requirements

Questionnaire questions and diagrams are shown in the following sections.

- Please estimate the average number of working days your company requests for delivery of standard softwood lumber\(^5\) from its softwood suppliers (Time - Q1)

![Figure 9. Required delivery time](image_url)

- Please indicate the average actual delivery time from your softwood lumber suppliers for standardized products (in working days). (Time - Q7)

![Figure 10. Actual delivery time](image_url)

\(^5\) For instance 45 95
Would a shorter delivery time increase your competitiveness? (Time - Q10)

![Bar chart showing opinions on if shorter delivery time would increase the retailers' competitiveness.]

**Figure 11. Opinions on "if shorter delivery time would increase the retailers' competitiveness"**

How big a difference between required and actual delivery times do you accept from your suppliers (before you take action)? (working days for standardized products) (Time - Q11)

<table>
<thead>
<tr>
<th>Number of working days</th>
<th>Number of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>41</td>
</tr>
<tr>
<td>1</td>
<td>35</td>
</tr>
<tr>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
</tr>
</tbody>
</table>

**Table 6. Accepted deviations of delays before retailers take action**
To what extent are you satisfied with your suppliers' fulfillment of your delivery precision requirements? (Time - Q16)

![Bar chart showing satisfaction levels for delivery precision requirements.]

**Figure 12. Perceptions of sawmills' fulfillment of delivery precision requirements**

Average size of deliveries from your suppliers (Delivery size - Q1)

![Bar chart showing average delivery sizes in cubic meters.]

**Figure 13. Average delivery sizes**
Would you prefer having smaller quantities and more frequent deliveries (compared with the present time)? (Delivery size - Q4)

Figure 14. Preferences for smaller delivery sizes and increased frequency

What package sizes do you have at the present time? (Package sizes - Q1)?

<table>
<thead>
<tr>
<th>Package size</th>
<th>Number of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full packages (containing the same assortment)</td>
<td>58</td>
</tr>
<tr>
<td>Half packages (containing the same assortment)</td>
<td>47</td>
</tr>
<tr>
<td>1/4 packages (containing the same assortment)</td>
<td>4</td>
</tr>
<tr>
<td>Packages containing different assortment</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 7. Average distribution of purchases (* buying a majority of the different package combinations)

What package sizes would you like to have from your softwood lumber suppliers in the future? (Package size - Q 3)

<table>
<thead>
<tr>
<th>Package size</th>
<th>Number of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full packages (containing the same assortment)</td>
<td>58</td>
</tr>
<tr>
<td>Half packages (containing the same assortment)</td>
<td>92</td>
</tr>
<tr>
<td>1/4 packages (containing the same assortment)</td>
<td>33</td>
</tr>
<tr>
<td>Packages containing different assortment</td>
<td>25</td>
</tr>
</tbody>
</table>

Table 8. Number of respondents asking for the different package combinations in the future
Please estimate the number of softwood lumber suppliers your company currently has? (Suppliers - Q2)

Figure 15. Number of suppliers for softwood lumber

Is there a strategy in your company to reduce the number of suppliers? (Suppliers - Q7)

Figure 16. Retailers working actively with reducing their supply base
3.3.3. Part 3 - Importance

The respondents were asked to mark the importance of the following logistic service requirements, price, and product quality for their present suppliers. (1 = very little through to 5 = very large) (Suppliers - Q 9)

<table>
<thead>
<tr>
<th>Logistic service requirement</th>
<th>Ranking number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Computerized info transfer</td>
<td>25</td>
</tr>
<tr>
<td>Accurate and timely information</td>
<td>1</td>
</tr>
<tr>
<td>Quick correction of mistakes</td>
<td>1</td>
</tr>
<tr>
<td>Bar-coding</td>
<td>44</td>
</tr>
<tr>
<td>Consumer packages</td>
<td>21</td>
</tr>
<tr>
<td>Possibility of delivering in 1/2 packages</td>
<td>0</td>
</tr>
<tr>
<td>Possibility of delivering in 1/4 packages</td>
<td>27</td>
</tr>
<tr>
<td>Possibility to supply packages containing different assortments</td>
<td>38</td>
</tr>
<tr>
<td>Short lead-time</td>
<td>1</td>
</tr>
<tr>
<td>Orders are fulfilled completely</td>
<td>0</td>
</tr>
<tr>
<td>The accurate product is delivered complete</td>
<td>0</td>
</tr>
<tr>
<td>Order cycle time is reliable</td>
<td>1</td>
</tr>
<tr>
<td>Ability to meet special requests concerning deliveries</td>
<td>3</td>
</tr>
<tr>
<td>Price</td>
<td>2</td>
</tr>
<tr>
<td>Product quality</td>
<td>1</td>
</tr>
</tbody>
</table>

*Table 9. Basic data for ranking logistic service requirements*
4. Part 3 - Follow-up interviews

Follow-up interviews were conducted in order to assess the validity of conclusions and results.

**Figure 17. Specification of chapter four**

The interviews were divided into two parts, the first part aimed at increasing the validity regarding the distribution channel, and the second at the logistic service requirements. The retailers described their aspects of the distribution channels as in the explorative interviews and discussions of results were of the same manner.

The interviews are summarized in the following sections.
4.1. Interview 1

<table>
<thead>
<tr>
<th>Volume</th>
<th>1 500 cubic meters softwood lumber</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer base</td>
<td>Professional contractors and consumers</td>
</tr>
<tr>
<td>Supply base</td>
<td>Sawmills (7)</td>
</tr>
<tr>
<td>Category</td>
<td>Industrial distributor of building material</td>
</tr>
</tbody>
</table>

Table 10. Basic retail' information

This retailer has been working with its main suppliers for over ten years. Today, the main supplier answers for about 60 percent of his total volume. The retailer has just recently started to work with so-called "safety-suppliers" (in order to be prepared for a fast increase in demand). The retailer and one of the main suppliers have developed specific distribution solutions (such as fixed delivery time). The main suppliers (3 sawmills) were chosen based on earlier experience, personal contacts, and their willingness to co-operate and develop solutions.

Another important issue for choosing a specific sawmill has been the sawmill's financial position. The retailer considers improving the handling of complaints and providing deviation reports to be important concerns for sawmills in the future.

The retailer places orders when running short on products. Orders are placed by fax or telephone. The deliveries contain 24 cubic meters in full packages (with different assortments, although the assortment does not vary in one package). The most important logistic service criteria are "reliability of delivery" and "short delivery time". The retailer considers "accurate product is delivered complete" and "orders are fulfilled completely" to be general in the business and hence do not need to be considered.
4.2. Interview 2

<table>
<thead>
<tr>
<th>Volume</th>
<th>500 cubic meters softwood lumber</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer base</td>
<td>Consumers</td>
</tr>
<tr>
<td>Supply base</td>
<td>Wholesaler (1) and sawmills (4)</td>
</tr>
<tr>
<td>Category</td>
<td>Private retailer with no affiliation</td>
</tr>
</tbody>
</table>

*Table 11. Basic retail' information*

The wholesaler administers deliveries of specific softwood lumber, and the rest is purchased directly from the sawmills. 50 percent of the volume is purchased from the three largest suppliers, with whom the retailer has been working for about 25 years. The retailer considers good experience, personal contacts, and a wide assortment of products to be the most important supplier criteria.

The retailer adjusts the products in the store, if the customer makes special demands.

The retailer places orders by fax when running short on products, and shortly thereafter a confirmation is received from the supplier. This confirmation is the only contact the retailer has with the supplier and if problems appear after the confirmation, the retailer receives no further information. The relationship between supplier and retailer is not further developed, since the retailer does not want to be caught with the current supply base.

The delivery time is usually one week, and most suppliers deliver softwood lumber on a fixed delivery day. The supplier suggested delivering on fixed delivery days, and the retailer was satisfied with that solution.

The retailer considers "short delivery time" to be the most important logistic service requirement. The retailer has hardly experienced any problems with his suppliers nor with their deliveries, and hence considers that some requirements should be removed from the list ("accurate product is delivered complete, orders are fulfilled completely" and "quick correction of mistakes", since they are too obvious).
The retailer thinks that small retailers focus considerably on servicing their customers well and place more specific requirements on their suppliers with regards to that.

### 4.3. Interview 3

<table>
<thead>
<tr>
<th>Volume</th>
<th>1 000 cubic meters softwood lumber</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer base</td>
<td>Professional contractors and consumers</td>
</tr>
<tr>
<td>Supply base</td>
<td>Wholesaler (1)</td>
</tr>
<tr>
<td>Category</td>
<td>Private retailer in purchasing co-operation</td>
</tr>
</tbody>
</table>

*Table 12. Basic retail' information*

The retailer feels that the sawmills determine to whom they shall sell their products; they appear to prefer to sell good quality products to foreign retailers, and the products of not such good quality to the Swedish retailers. This makes the retailer feel that "accurate product is delivered complete" and "orders are filled completely" are the most important requirements, and that the third requirement should be "quick correction of mistakes".

Due to the sawmills' reluctance to meet the retailer's requirements (for instance by delivering 1/2 packages), this retailer started working with a wholesaler eight years ago. Today, the retailer purchases all its softwood lumber from the wholesaler.

The retailer places order when running short on products, and orders are placed by telephone. The delivery time is three to four days. The retailer is very satisfied with the wholesaler, since it supplies all the products and services he requires.

The retailer perceives small packages to be the most important logistic service requirement, and the most important requirement in the future to be the provision of confirmations in accordance with the order, and deviation reports.
### 4.4. Interview 4

<table>
<thead>
<tr>
<th>Volume</th>
<th>1 200 cubic meters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer base</td>
<td>Professional contractors and consumers</td>
</tr>
<tr>
<td>Supply base</td>
<td>Sawmills (3)</td>
</tr>
<tr>
<td>Category</td>
<td>Private retailer in purchasing co-operation</td>
</tr>
</tbody>
</table>

*Table 13. Basic retail information*

This retailer purchases 50 percent of his softwood lumber from his main supplier, with whom he has been working for about 15 years. The supplier was selected on his ability to deliver products with the quality asked for by the professional contractors (to a price that they were willing to pay).

The retailer perceives that sawmills use the domestic market as a "fall back market" and hence are not willing to develop any mutual solutions or any relationships. However, the retailer has found one sawmill that is willing to discuss mutual solutions, and co-operation is likely to start; it should be noted that this sawmill is not the main supplier.

The retailer places orders by telephone when running short on products. Deliveries contain 24 cubic meters (in both full and half packages). Delivery time is about one week (if the sawmill is able to deliver all products, otherwise the retailer has to wait until the delivery is complete).

The retailer considers small packages and customized products to be the most important service requirements, and that short lead-time is not of essential importance (since it is only measuring the long-term planning of the retailer).
4.5. Interview 5

<table>
<thead>
<tr>
<th>Volume</th>
<th>5 000 cubic meters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer base</td>
<td>Professional contractors and consumers</td>
</tr>
<tr>
<td>Supply base</td>
<td>Wholesaler and sawmills (1 wholesaler and 4 sawmills)</td>
</tr>
<tr>
<td>Category</td>
<td>Private retail with no affiliation</td>
</tr>
</tbody>
</table>

*Table 14. Basic retail' information*

The retailer has chosen to work with both wholesaler and sawmills in order to have access to all products at a reasonable price, and at the same time keep a small supply base. About 40 percent of the total volume is delivered by one sawmill, with whom the retailer has been working with for about 10 years. The sawmills are chosen based on personal contacts and earlier experiences.

Orders are placed by telephone or fax and the products are ready to be picked up within one week. The retailer picks up 50 cubic meters each time. If the products are not ready (according to the promised collection time), the retailer receives a deviation report from the sawmill.

The retailer perceives fast deliveries, small packages, and customized products to be the most important logistic service requirements.

4.6. Interview 6

<table>
<thead>
<tr>
<th>Volume</th>
<th>2 000 cubic meters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer base</td>
<td>Professional contractors and consumers</td>
</tr>
<tr>
<td>Supply base</td>
<td>Sawmills (6)</td>
</tr>
<tr>
<td>Category</td>
<td>Private retailers in purchasing co-operation</td>
</tr>
</tbody>
</table>

*Table 15. Basic retail' information*

The retailer has two main suppliers, which account for 80 percent of the volume. The retailer has been working with the suppliers for over 20 years, and is very satisfied with the products they deliver and the contacts between the retailer and sawmill. The sawmills are located quite close to the retailer, and the retailer feels that this is a pre-requisite for a good relationship and of the possibility of fast deliveries. One of the main suppliers is looking into the possibility of transferring data over the Internet and of using EDI. The retailer welcomes this development.
The retailer places orders when running short on products; the orders are placed by telephone, and the retailer gets immediate confirmation. However, the retailer would prefer some kind of re-order point system or a VMI solution. Delivery time is about one week, and if the sawmill is unable to deliver the confirmed products, the retailer will be notified. There are two distribution solutions; either the retailer picks up deliveries at the sawmills, or receives deliveries at his premises. The volume differs each time depending on the stock situation and customers' orders.

The retailer perceives "reliability of delivery" and "short delivery time" to be the most important logistic service requirements.

The retailer thinks that the sawmills need to "sell" their products more than they do today, and that there will be more emphasis on short lead-times, complete deliveries and more professional communications in the future.

The retailer perceives that developing communications is a first step towards a partnership. Working in a partnership will probably be necessary in the future, as a scarcity of customers and competition from DIY increase.
Appendix 1 - Interview guide
The interview guide was used to pose areas for discussion.

Areas for discussion
Basic Information
   Volume
   Customer base
   Supply base
   Category

Distribution channel
   Perception of the sawmills, view of the retailer-supplier relationship
   Supplier selection criteria
   Products sold to customers

Order-cycle process
   Order placement
   Order-cycle time
   Delivery precision
   Volume - package sizes
   Specific delivery solutions

Important service requirements

Changes for the future (regarding service requirements)
Appendix 2 - Questionnaire

Company information

1. Estimate the current total number of employees at your company _____

2. Turnover (year 2000) ____________ SEK

3. Turnover (year 2000) ____________ SEK softwood lumber

4. Turnover (year 2000) ____________ cubic meters softwood lumber

5. Do you expect your purchases of softwood lumber to increase over five years?
   - Yes □
   - No □
   - If yes, mainly concerning
     - □ Standard assortment
     - □ Special assortment
   - If no, what is the primary reason? ____________________________

6. Please indicate your primary type of business (Please check only one response)
   - □ Do-it-yourself, belong to a chain
   - □ Do-it-yourself, independent
   - □ Builders merchants, belong to a chain, specify _____________
   - □ Builders merchants, independent
   - □ Other _____________

7. Do you work with general agreements?
   - Yes □
   - No □

8. If yes, do you work with general agreements centrally, or for each sales outlet?
   - □ Centrally
   - □ For each sales outlet
9. How much of your purchases are done through wholesalers, sawmills, or in other manners?

<table>
<thead>
<tr>
<th></th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wholesaler</td>
<td></td>
</tr>
<tr>
<td>Sawmill</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>, specify</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

10. Please indicate the percentage of sales sold to each category of customer in 2000

<table>
<thead>
<tr>
<th></th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>End consumer</td>
<td></td>
</tr>
<tr>
<td>Builders' merchants</td>
<td></td>
</tr>
<tr>
<td>Wholesaler</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>, specify</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
Time
1) Please estimate the average number of working days your company requests for the delivery of standard softwood lumber from your suppliers ________

2) Please estimate the average number of working days your company requests for the delivery of non-standard softwood lumber from your suppliers ________

3) Please rate how your suppliers meet the requested delivery times for standardized products? (1 = never meet, 3 = sometimes meet, 5 = always meet)
   
   1  2  3  4  5

4) Please rate how your suppliers meet the requested delivery times for non-standardized products? (1 = never meet, 3 = sometimes meet, 5 = always meet)

   1  2  3  4  5

5) Please rate how your suppliers meet their promised delivery times for standardized products? (1 = never meet, 3 = sometimes meet, 5 = always meet)

   1  2  3  4  5

6) Please rate how your suppliers meet their promised delivery times for non-standardized products? (1 = never meet, 3 = sometimes meet, 5 = always meet)

   1  2  3  4  5

7) Please indicate the average actual delivery time from your softwood lumber suppliers for standardized products ________ (working days)

8) Please indicate the average actual delivery time from your softwood lumber suppliers for non-standardized products ________ (working days)

6 For instance 45 95
9) How would you rate your possibilities to affect delivery times? (1=none, 3=somewhat, 5= completely)

1  2  3  4  5

10) Would a shorter delivery time increase your competitiveness?
    Yes ☐   No ☐
    If yes, in what way

11) How big a difference between required and actual delivery times do you accept from your softwood lumber suppliers before you take action?______ working days (for standardized products)

12) How big a difference between promised and actual delivery times do you accept from your softwood lumber suppliers before you take action?________ working days (for non-standardized products)

13) Which actions do you take?
    ☐ Impose fines
    ☐ Cancel the order
    ☐ No action
    ☐ Other, specify ________

14) Which action is most common? __________

15) For which reasons are actions taken or not taken?

16) To what extent are you satisfied with your softwood lumber suppliers' fulfillment of your delivery precision requirements? (1 = not at all, 3= to some extent, 5 = completely satisfied)

1  2  3  4  5
17) Do you have a fixed delivery day for each delivery?
   Yes □       No □
   Explain

18) If no, would you like to have a fixed delivery day for each delivery?
   Yes □       No □
   Explain

**Delivery size**

1) Average delivery size (from your suppliers) ____________ cubic meters softwood lumber.

2) Do you have a fixed quantity for each delivery?
   Yes □       No □
   If Yes, which? ____________ cubic meters

3) If No, would you like to have a fixed quantity for each delivery?
   Yes □       No □
   If Yes, which? ____________ cubic meters

4) Would you prefer having smaller quantities and more frequent deliveries (compared with the present time)? Yes □       No □

5) Would you like to have larger quantities and less frequent deliveries (compared with the present time)? Yes □       No □
Package sizes
1) What packaging sizes do you have at the present time?

<table>
<thead>
<tr>
<th>Package Type</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full packages</td>
<td></td>
</tr>
<tr>
<td>Half package</td>
<td></td>
</tr>
<tr>
<td>1/4 package</td>
<td></td>
</tr>
<tr>
<td>Different assortments within one package</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

2) What is the smallest package size your softwood lumber suppliers offer? ___

3) What packaging sizes would you like to have from your softwood lumber suppliers in the future?

- Full packages
- Half package
- 1/4 package
- Different assortment
- Other __________

Product quality
1) How well do your suppliers meet requirements on product quality? 
(1 = never, 3=sometimes, 5=always)

<table>
<thead>
<tr>
<th>Supplier Quality</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Suppliers
1) Where is the softwood lumber purchased, and its share (%)?

<table>
<thead>
<tr>
<th>Supplier Region</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweden</td>
<td></td>
</tr>
<tr>
<td>Other Nordic countries</td>
<td></td>
</tr>
<tr>
<td>Northern Europe (excl. the Nordic countries)</td>
<td></td>
</tr>
<tr>
<td>Russia and the Baltic states</td>
<td></td>
</tr>
<tr>
<td>North America</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100 %</strong></td>
</tr>
</tbody>
</table>
2) Please estimate the number of softwood lumber suppliers your company currently has? _______

If more than one supplier, what are the reasons for multiple suppliers? (Give the two most relevant alternatives)
☐ not offering a complete assortment
☐ decrease dependence on individual suppliers
☐ secure supply
☐ stimulate competition among the suppliers
☐ provide the possibility to press prices
☐ other (please specify) ________________

3) How much of your total annual sales for softwood lumber in 2000 was provided your company's three largest suppliers? ______ %

4) How large a share of your softwood lumber suppliers are offering you a complete assortment?______ %

5) How important is it for you to buy a complete assortment of softwood lumber from one supplier? (1 = not important at all, 3 = somewhat important, 5 = very important)

1 2 3 4 5

6) What is the optimal number of softwood lumber suppliers for your ______ company?

7) Is there a strategy in your company to reduce the number of softwood lumber suppliers?

Yes ☐ No ☐

Why/why not?

________________________________________________________________________________

________________________________________________________________________________
8) Is there a strategy in your company to increase the number of softwood lumber suppliers?

Yes [ ]

No [ ]

Why/why not?

9) How important are the following criteria for your present suppliers?

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Very little</th>
<th>Very large</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computerized info transfer</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Accurate and timely information</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Quick correction of mistakes</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Complete assortment</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Bar-coding</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Consumer packages</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Possibility of delivering in 1/2 packages</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Possibility of delivering in 1/4 packages</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Possibility to supply packages containing different assortments</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Product quality (regular and secure)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Short lead-time (from order)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Order from inventory</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Long period of agreement</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Orders are fulfilled completely</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>The accurate product is delivered complete</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Order cycle time is reliable</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Wide assortment</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Low prices</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Ability to meet special requests concerning assortment</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Ability to meet special requests concerning deliveries</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
10) Please indicate how the following supplier criteria will change over the following five years?

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Decrease</th>
<th>Unchanged</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computerized info transfer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accurate and timely information</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quick correction of mistakes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complete assortment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bar-coding</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumer packages</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Possibility of delivering in 1/2 packages</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Possibility of delivering in 1/4 packages</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Possibility to supply packages containing different assortments</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product quality (regular and secure)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short lead-time (from order)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Order from inventory</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long period of agreement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orders are fulfilled completely</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The accurate product is delivered complete</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Order cycle time is reliable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wide assortment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low prices</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ability to meet special requests concerning assortment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ability to meet special requests concerning deliveries</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
11) How important are the following criteria for a close relationship with your softwood lumber suppliers? (Allocate 100 points between the following alternatives)

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orders filled completely</td>
<td></td>
</tr>
<tr>
<td>Order-cycle time is short</td>
<td></td>
</tr>
<tr>
<td>Order-cycle time is reliable</td>
<td></td>
</tr>
<tr>
<td>Availability of value added services</td>
<td></td>
</tr>
<tr>
<td>Accurate and timely information</td>
<td></td>
</tr>
<tr>
<td>Meets special requests regarding assortment</td>
<td></td>
</tr>
<tr>
<td>Meets special requests regarding deliveries</td>
<td></td>
</tr>
<tr>
<td>Quick correction of mistakes</td>
<td></td>
</tr>
<tr>
<td>Other, specify</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

12) Please indicate how information is currently transmitted and received between your company and your softwood lumber suppliers? (Please tick all that apply)

- [ ] Electronically
- [ ] E-mail
- [ ] Fax
- [ ] Telephone
- [ ] Mail
- [ ] Other (specify)

Is any information transmitted electronically?
- [ ] Yes
- [ ] No

If yes, how many of the total number of transactions? ______ %

---

7 Working together for a long time and sharing, for instance, inventory levels and production plans
8 For instance EDI, Web-based
13) What type of information do you currently receive or wish to receive from your softwood lumber suppliers?

<table>
<thead>
<tr>
<th>Receive today</th>
<th>Wish to</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receive today</td>
<td></td>
</tr>
<tr>
<td>Receive today</td>
<td></td>
</tr>
<tr>
<td>Receive today</td>
<td></td>
</tr>
<tr>
<td>Receive today</td>
<td></td>
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<tr>
<td>Receive today</td>
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<td>Receive today</td>
<td></td>
</tr>
<tr>
<td>Receive today</td>
<td></td>
</tr>
<tr>
<td>Receive today</td>
<td></td>
</tr>
<tr>
<td>Receive today</td>
<td></td>
</tr>
</tbody>
</table>

14) What type of information is most critical for your business in order to become more competitive?  

15) What type of information do you share with your softwood lumber suppliers, and what type of information are you interested in sharing?

<table>
<thead>
<tr>
<th>Actual</th>
<th>Interested in</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please check that you have answered all questions.

Thank you for your valuable co-operation!

---

9 For instance point of sales data
Logistic Service Requirements of European Do-It-Yourself Multiple Retailers - The case of Wooden Flooring

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Lars-Olof Rask **
Peter Nilsson ***
Tomas Svensson ****

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(Revised and resubmitted for Journal of Forest Products Business Research)
Logistic Service Requirements of European Do-It-Yourself Multiple Retailers – The case of Wooden Flooring

Abstract

Fundamental structural changes are taking place in the retail industry for building materials in virtually every European market, creating major changes in the business environment for suppliers. New retail formats (Do-It-Yourself multiple retailers) are entering the industry, gradually replacing older and less competitive retail formats, reshaping the structure of the business, and driving a salient concentration process.

Do-It-Yourself multiple retailers have different views of, and approaches to, both customers and suppliers. Therefore suppliers to the Do-It-Yourself multiple retailers are facing a new format of customer about whom little research has been done, particularly regarding their requirements for logistics services and subsequent underlying logistic drivers.

The research approach is explorative with the aim of identifying basic structures of logistics service requirements. Empirical data on the DIY industry is based on personal interviews and in-store observations. In order to economize on the process of collecting empirical data, the focus for interviews and in-store observations was set on one particular group of products, in this case wooden flooring for the European market. Wooden flooring products were chosen because of the availability of background data and a pre-understanding of the supplying industry.

This paper identifies logistics service requirements of Do-It-Yourself multiple retailers and the underlying drivers of individual requirements in the Do-It-Yourself multiple retailers' organization. Main logistics service requirements of Do-It-Yourself multiple retailers concern customized products (for instance bar-coding and small package sizes), and usually extremely large volumes, often in conjunction with demanding special campaign arrangements. A driving source behind the requirements is the overall distribution policy of the DIY retailers, which in turn is defined by retailers' customer service policies and a general focus on growth strategies.

Key words: Retailer characteristics, logistics drivers, DIY multiple retailers, wooden flooring and logistics service requirements.
Introduction

Since the pre-1980s the retail industry has passed through several stages in its development. “Supplier control” and “Centralization” (Fernie et al. 2000) are just two examples of such important stages. During the past few years, consumer preferences have changed, causing new and additional challenges for retailers. This has contributed to major changes within the retail industry, leading to the development of new retail formats (Stevenson et al, 1999). According to the wheel of retailing, which is one of the fundamental theories of retail development, retailers originate low-cost, low-price, and narrow margin operations, and thereafter trade-up to become traditional retailers. Traditional retailers offer more prestigious offers and improve customer service, which increases both costs and prices. Eventually retailers mature and become so-called mature retailers, with high costs and a sales policy that is based on product quality and service rather than on price appeal. This in turn opens possibilities for new low-cost retailers, and so the wheel revolves. (Brown, 1987)

The European retail industry for building materials contains different formats of retailers. These formats have developed over a period of time, and they continue to develop and transform. However the DIY multiple retailers distinguish themselves by offering, for instance, low-prices, family-friendly shopping, and a wide product range.

Today there are roughly five formats of retailers in the European building materials market. These include (1) private retailers with no affiliation (the independents), (2) private retailers in franchise organizations, (3) private retailers in purchasing co-operatives, (4) industrial distributors of building materials, and (5) DIY multiple retailers. These formats are organized differently (with reference to structure, ownership, supply and marketing management) and have different customer target groups. Most major chains or stores that cater to the private consumer also operate on-line shopping stores; there are also separate virtual-shopping sites on the Internet. Some retailers belong to more than one format, depending on their separate business areas. Since the DIY multiple retailers entered the market, other retail formats have changed many of their ways of doing business. For instance, industrial distributors of building materials started co-operating with joint purchasing and marketing campaigns. Franchise organizations have also started to develop, and the most well known franchise organization today is probably the German OBI, that runs both franchise stores and their own DIY multiple retail stores. DIY multiple retailers are becoming more and more transnational. In some markets, and particularly in Germany, there is an on-going consolidation process, and the largest DIY multiple retailer group in Europe was formed when French Castorama acquired British B&Q in 1998.
The retail transformation started in USA in 1978 with Home Depot as the forerunner to other Do-It-Yourself multiple retailers. Ten years later, in 1988, Home Depot had 96 stores and 13,000 employees in USA; twenty years later they opened their first store in South America (Santiago, Chile), and in 2002 they had over 1500 stores and 30,000,000 employees. The Home Depot concept started to develop in the European market in the beginning of the 1980s, and is today widely spread throughout Europe.

In a customer-supplier relationship the purchasing company’s satisfaction is dependent upon the combination of product quality, service, and price offered and delivered by the supplying company. The importance of service is continuously increasing at the expense of other order qualifiers. Despite its increasing importance, the service concept is difficult to operate and quantify. (Donaldsson, 1994) However, defining and quantifying customers’ service requirements is necessary for effective management in successful companies. (Heskett, 1994)

As the group of DIY multiple retailers grows larger and becomes a more dominant force in the European building materials market, the influence and power of the suppliers are reduced. More intensive service requirements from DIY multiple retailers are putting pressure on their suppliers. At the same time retailers do not want to have total dependence on any individual supplier (Saint Gobain, annual report 2000). Suppliers are facing powerful retailers that put very strict requirements upon them, and at the same time have considerable potential for being a valuable, if not the main, customer. The survival of suppliers as actual suppliers to DIY multiple retailers clearly depends not only on the products, but also on their capabilities to meet the logistic service requirements stated by the DIY multiple retailers. It is therefore important for suppliers to DIY multiple retailers to understand the logistics service requirements, as well as their underlying drivers, in order to be competitive.

**Purpose and Implementation of the study**

The logistical service requirements of DIY multiple retailers have not been described or analyzed in previous research. In order to fill this gap, this article sets out to identify the DIY multiple retailers' logistics service requirements for wooden flooring, as well as the drivers behind the logistics service requirements.
The general structure of the research process is based on an explorative research approach. The area of study, the logistics service requirements of DIY multiple retailers, is an unstructured field of knowledge with insufficient theoretical and empirical research. First there is a need to define the concept of logistical service, and secondly one to collect the empirical data to validate the concepts of logistical services relevant for DIY multiple retailers. Therefore there are elements of inductive research in the research process. However, the structure of the paper does not completely mirror the research process, but is organised in a more reader-friendly way.

The first part of the paper covers the theoretical background and sets out to define the concept of logistics services in general, reports on earlier research on logistic services, and on the operationalization of the concept. Furthermore, it also covers the concepts of logistical planning processes and functions justified by an approach to identify drivers of logistical services requirements in the overall structure and function of the logistical system of DIY multiple retailers.

The second part covers the empirical materials and methods used to collect the data from DIY multiple retailers in a number of countries in Europe. The data collection method was designed as an explorative research approach with the aim of finding the maximum variation of DIY multiple retailers, rather than just statistical representation. In practical terms, those DIY multiple retailers' stores chosen to be studied were based on judgmental criteria rather than random sampling.

The third part of the paper reports on the data collected and the subsequent interpretation of the elements of logistical services relevant to DIY multiple retailers. Business characteristics of the DIY multiple retailers are identified and clustered into three functional groups, with relevance to their origins and drivers.

In the fourth part of the paper the specific logistic service requirements are distinguished, as well as their origins and drivers. Further, the logistical service requirements are discussed and related to the overall competitive strategies of DIY multiple retailers. A tentative model of DIY multiple retailers' logistical service requirements and their drivers is presented.

The paper concludes with a discussion on areas for further research.
Theoretical background

The concept of the supply chain is widely used within academic literature and is commonly defined as a network of actors that produce and deliver products to customers. Mentzer et al (2001) provide the following definition of a supply chain;

*A supply chain is 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.*

Further, Mentzer et al (2001) identify three types of supply chain; direct, extended, and ultimate supply chains. A direct supply chain consists of; a supplier, a company, and a customer involved in upstream and/or downstream flows of products, services, finances and/or information. Extended supply chains include suppliers of intermediate suppliers and customers of intermediate customers, all involved in upstream and/or downstream flows of products, services, finances and/or information. Ultimate supply chains include all actors, from the ultimate supplier to the ultimate consumer, involved in upstream and/or downstream flows of products, services, finances and/or information.

The existence of all actors in a supply chain is based on the willingness of the actors' respective customers to pay for the products produced or the services provided (Christopher, 1998; Coughlan, et al 2001). Consequently, each company’s survival is based on customer focus and customer satisfaction, and is the sole reason for being considered an acceptable supplier in the market place (Mattsson 2000). According to Grönroos (2000), producing companies need to focus on the service aspect of their particular product-service mix, as the service component, if poor or sub-standard, represents the highest risk for loosing customers. Additionally, competitive logistics services contribute to a company’s competitive advantage (Mentzer et al (2001); Sharma et al (1995); Stock and Lambert (1992)).

For any company, logistics has an important role in dealing with its internal as well as external customers (Langely and Holmeob (1992)). Customer service performance is not solely dependent upon its own internal practices, as its performance is also affected by its supplier’s practices (New and Payne (1995)). Improvements are difficult to realize throughout the supply chain, as there are limited possibilities to influence the individual companies. It follows that improvements are best realized in a dyadic relationship either with the closest supplier or the closest customer (Mattsson (2002); Keebler et al (1999)).
Improvement of the supply chain starts with the dyadic relation with customers or suppliers. In order to be able to offer its customer competitive product- and service solutions, a supplier needs to understand its customers' logistics service requirements. The subsequent part of this paper concentrates on previous research of the logistics service concept, as well as covering the process of logistics planning and logistics functions in order to be able to identify the main logistical drivers.

**Logistic service requirements**

Logistics services can be defined as (Translated from Mattsson, (2002));

,, all value-added activities concerning the order-to-delivery process, and providing accurate information and services in accordance with the material flow.

Research on specification of logistics service requirements has been conducted since the 1960s. (Simon, 1965) This has been done in two ways. The first has been through a theoretical approach, which has resulted in lists of logistic service requirements such as; order processing time, order assembly time, delivery time, inventory availability, order-size constraints, consolidation allowed (for shipments), and consistency among the service elements referred to. (Hutchison and Stolle, 1968)

The second way of identifying and defining logistics service requirements has been by using interviews or questionnaires for empirical studies on actual practices. The following empirical studies, presented in Table 1., have been conducted with the aim of identifying logistics services requirements from a retail perspective (only logistics service requirements are illustrated).
<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Industries</th>
<th>Specification of logistics services requirements (in alphabetical order)</th>
</tr>
</thead>
</table>
| Levy¹           | 1978 | Pharmaceutical                | ➢ Absorbing costs of handling and freight on returned  
➢ Computer-to-computer ordering handling  
➢ Consistency in lead-times  
➢ Constant package size  
➢ Expedite order-filling and shipping for reducing lead-times  
➢ Extended dating for deliveries  
➢ Handling of returns  
➢ Packaging information sheet  
➢ Prepaid shipments                                                                 |
| Gilmour         | 1982 | Different                     | ➢ Availability of items  
➢ Delivery time  
➢ Efficient telephone handling of orders and queries  
➢ Order conveniences  
➢ Reliability of delivery                                                                 |
| Sterling & Lambert | 1987 | Office systems and furniture industry | ➢ Ability to expedite rush service  
➢ Ability to meet promised delivery time  
➢ Accuracy in filling orders  
➢ Accuracy of manufacture in forecasting estimated shipping dates  
➢ Advance notice on shipping days  
➢ Completeness of contract orders  
➢ Completeness of quick shipping orders  
➢ Length of promised lead time for quick ship orders  
➢ Order cycle time consistency                                                                 |
| Lambert & Harrington | 1989 | Plastic                       | ➢ Ability to expedite emergency orders in a fast and responsive manner  
➢ Accuracy in filling orders  
➢ Actions on complaints  
➢ Advanced notice of shipping delays  
➢ Consistent lead time (meets expected delivery date)  
➢ Info provided when order is placed - inventory                                                                 |

¹ Levy names it as wholesaler, but the function described is a retail function
<table>
<thead>
<tr>
<th>Gustafsson</th>
<th>2003</th>
<th>Softwood lumber (private retailers with no affiliation, private retailers in purchasing co-operatives, and industrial distributors of building material)</th>
</tr>
</thead>
</table>
|             |      | availability  
|             |      | ✓ Info provided when order is placed - projected delivery date  
|             |      | ✓ Info provided when order is placed - projected shipping date  
|             |      | ✓ Length of promised lead-time  
|             |      | ✓ Ability to meet special requests  
|             |      | ✓ Accurate and timely information  
|             |      | ✓ Accurate product is delivered complete  
|             |      | ✓ Bar-coded products  
|             |      | ✓ Computerized info transfer  
|             |      | ✓ Consumer packages  
|             |      | ✓ Reliable Order cycle time  
|             |      | ✓ Orders are fulfilled completely  
|             |      | ✓ Packages containing different assortments  
|             |      | ✓ Possibility of delivering 1/2 packages  
|             |      | ✓ Possibility of delivering 1/4 packages  
|             |      | ✓ Quick correction of mistakes  
|             |      | ✓ Short lead-time  

Table 1. Previous research on logistic services from a retail perspective

Research has been conducted in different industries. The office system and furniture industry generate high value products in relation to the others. The DIY multiple retailers sell both low and high value products, which calls for a mixture of the previously identified logistics service requirements.

**Origins and drivers of logistic service requirements**

Research on logistics strategic planning was reported during the 1990s (Cooper et al, 1992). It was grounded on the foundations for logistics, and emphasized the logistics function as a key factor for success. (Rushton and Saw, 1993) The working procedure and aspects of logistics strategic planning is shown in Figure 1.
Logistics planning begins with the company's overall strategy and its customers' requirements. It continues with the synchronization of the logistic functions, as well as looking at the quality of each link in the logistics system. A common definition of logistical functions is; procurement, manufacturing and distribution. (Guedes et al, 1993). The concept of manufacturing which is relevant for manufacturing firms is translated in this study to the concept of merchandising when it concerns internal operations of the retailing unit.

As changes in the retail industry continue, there is a need for suppliers to examine and review the logistics service requirements and their underlying drivers in order to be able to compose the most advantageous offers to their customers. In order to effectively develop a logistics strategy that adds value to their deliveries to DIY multiple retailers, the suppliers need to understand the DIY multiple retailers' business goals and what their customers are expecting, as well as the underlying drivers of their logistic service requirements (i.e. logistics functions that drive the logistics service requirements). A tentative conceptual model (presented in Figure 2) has been developed and used in the research process in order to find characteristics and logistics service requirements (including drivers) of the DIY multiple retailers.
The tentative model considers business goals and strategies, customer service requirements, and integrated logistics planning from the Copacino and Rosenfield framework. In order to identify the main sources (i.e. logistical functions) of the logistics service requirements, the Copacino and Rosenfield framework has been supplemented with the main logistical functions provided by Guedes.

Figure 2. Tentative conceptual model of integrated logistics planning, used in order to describe logistic service requirements and their drivers

Stated logistical requirements

*Figure 2. Tentative conceptual model of integrated logistics planning, used in order to describe logistic service requirements and their drivers*
Methods and Materials

An explorative research approach was chosen based on an understanding that the object of study (DIY multiple retailers logistics service requirements and their drivers with application for wooden flooring) was to a large extent unfamiliar and not documented in earlier research. The research methods employed are mainly qualitative and inductive. It is, however, not possible to carry out a “pure” inductive research process; there are always preconceptions and a pre-understanding emanating from earlier experiences.

The deductive part of the research consists of concepts of logistics services borrowed from other industries and it consists of general theory covering the logistics planning process. These concepts are employed in the interpretation and analysis of observations and interviews.

Thus, the research process has both inductive and deductive ingredients and we would like refer to the abductive research approach as presented by Dubois and Gadde (2002). It is true that Dubois and Gadde suggest the concept of abductive research for case based research but we argue that the same purpose of research and the same mixture of methods can be employed to a general object of study, not only to a specific case in its traditional meaning.

Different activities of the research process were at times sequential and at times parallel. Below is a brief report on the activities in the research process.

- Defining the research question and scope of the study
- Selecting tentative concepts for observations and interviews.
- Collection of primary and secondary data
- Work on data collected.
- Conceptualization of service requirements and drivers
- Evaluation of the research process

**Defining the research question and the scope of the study**

The study of DIY multiple retailers is part of a larger study of European distribution channels for interior wood products, specifically wooden flooring. This paper reports only on DIY multiple retailers. The research questions were related to logistics service requirements and their drivers. In order for suppliers to understand DIY multiple retailers, it was necessary to identify DIY multiple retailers’ strategic approach.
Selecting tentative concepts for observations and interviews

Areas of interest for in-store observations were background data such as: country, geographical (in-town / out-of-town) localization and retail format. Areas of interest related to the logistic system were; product range offered, product line in different departments (such as alternative materials, low price alternatives), brands vs. private or no-name brands, pricing, merchandising (including inbound logistics), and sourcing.

Subjects discussed during interviews were: policies and practices on purchasing (including logistical service requirements), sourcing, pricing, branding, marketing/promotion/sales support, merchandising (including inbound logistics), and product line decisions.

Collection of primary and secondary data

The study focused on the two major groups of retailers, i.e. DIY multiple retailers stores and Builders Merchants, but there were also a few examples of other store formats in the field study. Builders Merchants and other smaller groups of retail formats were studied for reference, however they are not covered nor used in this paper.

Selection of retail companies for the study was done on a judgmental basis. Criteria were to cover the span of different stores with regional, national and European coverage, and to cover stores of different business formats and sizes.

Observations were carried out as visits to relevant departments within 59 DIY multiple retail stores. Personal non-structured interviews were carried out with 32 respondents (of which 16 respondents were representatives for DIY multiple retailers). Observations and interviews were carried out between April 2000 and April 2001.
<table>
<thead>
<tr>
<th>Country</th>
<th>Number of stores involved in in-store observations</th>
<th>Number of stores involved in personal interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DIY multiple retailers</td>
<td>Builders Merchants and others</td>
</tr>
<tr>
<td>Austria</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Belgium</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Denmark</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Finland</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>France</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Germany</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>Netherlands</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Norway</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Sweden</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>Switzerland</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>UK</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>59</td>
<td>69</td>
</tr>
</tbody>
</table>

Table 3. Observations and interviews by store, country and retail formats (DIY multiple retailers vs. Builder Merchants and others respectively).

Secondary data have been collected on DIY multiple retailers' business goals and strategies via annual reports. Using annual reports for this purpose allows for pinpointing the actual actions and decisions conducted by management in order to achieve its position in the market place.

**Work on data collected**

Data and information from interviews and observations have been processed with a pattern matching approach and with the aim to identify common and differentiating characteristics regarding logistics service requirements and their drivers.

**Conceptualization of service requirements and drivers**

Formation of concepts and building of theory belong to the final parts of the research process but incremental conceptualization happens along the full process.
Characteristics of the DIY multiple retailer

DIY multiple retailers around the different European countries started to appear at different periods, and have also developed at different speeds. DIY multiple retailers in Germany have by now reached a consolidation phase. In recent years this has also been the process in UK. However, consolidation is still going on, and British Kingfisher plc., the largest DIY multiple retailer holding company in Europe, acquired in 2001 an important stake in Hornbach, a leading German DIY multiple retailer.

DIY multiple retailers are aiming for continuous growth, and are consequently applying a distinct growth strategy by consolidating and by entering new markets. The expansion ideas are clearly stated by the retailers as seen in their annual reports. For instance, Kingfisher (annual report Autumn 2001) states that their focus is;

“... growth strategy “ and “...will seek to enter mature markets through acquisitions and mergers, while in developing markets pursue mainly organic growth through rolling out existent successful formats.”

and Saint Gobain (Annual report 2000)

“... actively pursue a structure-building acquisition strategy focused on its high-growth business”.

An indicator that DIY multiple retailers stress growth more than profitability is that they use turnover per m² as key performance indicator (see for instance GIB-group, annual report 2000) and they base their existence on economies of scale (see for instance Kingfisher Annual report, Autumn 2001).

Based on interviews with purchasing managers in 16 DIY stores, complemented by in-store observations in 59 DIY stores, specific characteristics of DIY multiple retailers with relevance for logistics service requirements are outlined in the sections below. Characteristics are clustered in three groups, namely: Business Core Characteristics, Business Structure Characteristics and Business Systems Characteristics. The characteristics are, of course, to a large extent mirroring the unique business strategy of the DIY multiple retailer.
Business Core Characteristics

Consumer market segment
The main customer base for DIY multiple retailers are the front-line consumers, the typical do-it-yourselfer. There are also professional contractors in the customer base, but these are by far outnumbered by the private consumers. Characteristics of consumers are that they buy smaller quantities per individual than do the professional contractors, and knowledge and skills are different. Stores frequently offer education (often performed by suppliers) and special exposures of products, including manuals and information leaflets. Training in installation and the use of products are often offered to consumers and performed by suppliers.

Large assortment and one-stop-shopping
DIY multiple retailers' product lines contain up to 60,000 items, depending on the size of the store. DIY multiple retailers carry a wide assortment of products including, for instance, garden products, electrical fittings, tools and lumber products. However, supplies differ between assortments (depending on product category). For instance there is only a limited assortment of furniture and textile fabrics, while other assortments are both deep and wide as, for instance, wooden flooring, lumber products and household fittings.

Low consumer service levels
DIY multiple retailers' store sales staff often have limited special knowledge of specific product groups and hence they leave the need of know-how to the customer (i.e. consumer). Many stores have low staffing, the staff themselves receives low wages, and consequently staff turnover is high. Many DIY multiple retailers work with their suppliers according to the motto; “we supply the roof - you fill in the floor”. Some stores offer additional services, e.g. hire of hand tools/machinery, trailer rental, and cutting-to-size of lumber products or plywood. Installers offer their services by the check-out or exit, and on the DIY retailers' homepages.

Business Structure Characteristics

Extremely large volumes
DIY multiple retailers are trading in extremely large volumes of products, both in the numbers of items and in the numbers of product lines. All stores carry product lines from suppliers that are approved by the head office, but no single store necessarily carries the full range of products that are listed.
Strict and direct sourcing strategies
Suppliers are invited to present their products and conditions at special purchasing sessions, and purchasing managers list successful suppliers. Supply is normally abundant, so price is all-decisive. Low-priced products, imported from Asia or Eastern Europe, are often purchased directly from the producer, and some DIY-chains maintain sourcing offices in these regions. The buyer typically selects 2-3 companies as main suppliers, and some buyers favour a closer alliance with the supplier in order to reduce transaction costs and increase reliability.

Centralized purchasing and local orders
Purchasing is either centralized on the group purchasing department and/or handled by purchasing units in the specific country where DIY multiple retailers run stores. The basic purchasing agreements specify choice of products, packaging, branding, estimated volumes (not binding), prices, various discounts (which can amount to 8-12 %), delivery time (typically 7 –14 days), penalties, and other conditions. Conditions for campaigns are set down in separate agreements (see above), as are also conditions for orders of special products if the buyer requires such a product assortment. Placement of orders, and of refilling the store, is generally done at store level.

Extended accessibility
DIY multiple retailers have long operating hours, often from 09.00 to 20.00, as well as being open on Saturdays and Sundays. They cater for professional contractors by additional early opening hours. There is a tendency that suppliers are required to offer the same operating hours as the DIY multiple retailers. Stores are easily accessed both concerning time but also in space, due to their location at "out-of-town" shopping centers.

Non-inventories
There are normally no inventories and hence products that are for sale in stores represent the inventory. Some chains keep regional inventories, however.

High delivery precision
Sub-orders are typically placed 7-14 days before delivery, and delivery precision requirement is 90 %. If delivery precision requirement is not met, the supplier typically has to pay 35-50 % of the product value as a penalty. However, suppliers can on occasions declare that they can not comply with the agreements (according to separate rules).
Promotional campaigns
To increase the number of consumer visits to stores, DIY multiple retailers typically run about 3-5 campaigns per year and product group. These campaigns contain products that are especially listed for these events, and timing is communicated to the supplier concerned either in connection with the negotiations or about two months ahead. The number of campaigns is stated in special campaign agreements, with conditions that differ from the main agreements, particularly regarding price. Orders for campaign goods are sent to suppliers about two weeks ahead of the start of the campaign, and additional (fill-up) orders must be delivered immediately.

Mass communication
In order to communicate their offers to the consumer, DIY multiple retailers use the same means and methods as do everyday commodity retailers. In particular, direct mail advertising is distributed at regular and frequent intervals to all households in the region, and TV-media is widely used for exposure.

Low price alternative
There is always a low-price alternative product, either as a campaign offer or in the standard program. Low prices increase customer frequency to the store. The up-market DIY multiple retail-chains maintain a relatively wide selection of products, including low-price alternatives, and the down-market chains have discount offers as part of their regular business policy. However, with the exception of certain outspoken discount chains, the DIY multiple retailers do not generally keep lower prices than their main competitors in the traditional building materials' and DIY products' retail trade.
Results and Discussion

DIY multiple retailers are attractive customers, but also extremely demanding on their suppliers, as they place strict requirements on their suppliers. Competition among suppliers increases as consolidation in the European retail industry for building materials and DIY-products continues. The development in the European retail industry for building materials follows the general idea of the Wheel of Retailing (Brown, 1987). The mature retailers, offering high quality products and services, have been challenged by the DIY multiple retailers offering low-price products.

DIY multiple retailers typically follow "cost leadership" strategies, with low costs as a competitive advantage (see Generic strategies by M Porter, 1985). They go for a broad competitive scope, which is shown e.g. in their mass communication strategy, and they focus on low-cost policies as their competitive advantage. This is revealed by the use of turnover per m² as key figure and, as identified in interviews, a high share and frequency of campaigns. Additionally, DIY multiple retailers always offer low price alternatives and are hence always looking for the lowest cost supplier. According to Person and Virum's (1996) description of logistics' foundations, this type of logistics strategy is to be considered as "cost-oriented logistics". (Logistics is not used as a uniqueness driver, but as a cost driver). Logistics is then to be seen as "as cheap as possible is good for us". Cost-oriented logistics emphasizes large volumes and utilization of capacity, and this is in accordance with the overall direction of DIY multiple retailers' strategy.

The business concept of DIY multiple retailers is to offer inexpensive products to end-consumers, which is enabled by exploiting full economies of scale. There are always offers of low-price alternatives, and in order to be able to do this, other services are barely non-existent. In order to be able to keep prices low, it is necessary to have both low purchase prices and low operational costs. This implies that keeping the lowest possible cost for every function is vital, which explains the low staff salaries and low staffing. Purchasing is done centrally and/or country wise, as regional preferences differ. The purchasing departments are powerful, and they handle all suppliers in the same way. Suppliers have to compete on price and product alone, given the pre-defined levels of logistics service (defined by the DIY multiple retailers).

This leaves requirements from DIY retailers for exposing products to the suppliers, as well as offering video presentations, information leaflets and other consumer education activities. The DIY retailer provides the space. The step to allocate supplier staff to the stores is a possible next move.
One measure to keep prices low for DIY multiple retailers is to let suppliers handle replenishment in stores. This could also be done, for instance, by developing standardized interfaces and offering simple "Vendor Managed Inventories" solutions, which should not be proprietary to one specific retailer. The solution have to be standardized, since DIY multiple retailers do not want to be totally dependent upon any supplier; the supplier must be able to use the "VMI-concept" with other retailers.

The empirical research indicates a number of characteristics of DIY multiple retailers. However not all of them can be considered as logistics service requirements. Table 4 identifies logistics characteristics and logistic service requirements for each of the general characteristics respectively.

<table>
<thead>
<tr>
<th>General characteristic</th>
<th>Logistic characteristics</th>
<th>Description</th>
<th>Logistics service requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business core Characteristics</td>
<td>Assortment</td>
<td>DIY multiple retailers offer a wide and deep product assortment (depending on product category).</td>
<td>♦ Several product categories</td>
</tr>
<tr>
<td>Business core Characteristics</td>
<td>Consumer service levels</td>
<td>Products need to be delivered in consumer packages, which imply smaller entities but a larger number of units. Consumer packages imply that each product is identifiable and is easy to handle.</td>
<td>♦ Small package sizes ♦ Large number of units ♦ Bar-coded products ♦ Consumer packaged</td>
</tr>
<tr>
<td>Business structure Characteristics</td>
<td>Extremely large volumes</td>
<td>DIY multiple retailers have coordinated their assortment. All stores carry an assortment from accredited suppliers.</td>
<td>♦ Large volumes ♦ Knowledge of demand for each store</td>
</tr>
<tr>
<td>Business structure Characteristics</td>
<td>Accessibility</td>
<td>Products shall be available in stores when customers are there to buy them. Lead-time from placement of sub-order to delivery is required to be 7-14 days (depending on product type). Suppliers are requested to have the same opening hours as the DIY stores they deliver products to.</td>
<td>♦ Fixed delivery time ♦ Opening hours</td>
</tr>
</tbody>
</table>
Campaigns are standard activities for DIY multiple retailers. They have a special campaign assortment, and they state the requirements they consider necessary for this activity.

- Large additional volumes
- Deliveries of fill-up orders
- Special campaign programs

<table>
<thead>
<tr>
<th>Business system Characteristics</th>
<th>Campaigns</th>
<th>Description and logistic service requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Campaigns</td>
<td>Large additional volumes, Deliveries of fill-up orders, Special campaign programs</td>
</tr>
</tbody>
</table>

Table 4. Characteristics, description and logistic service requirements

Each of the general characteristics contains logistic characteristics, which in turn drive different logistics service requirements. The DIY multiple retailers' business goals and strategies have been identified as focusing on growth by exploiting economies of scale and by offering one-stop-shopping with a wide product assortment. The DIY multiple retailers' customer service requirements have been identified as self-service, with a minimum of in-store assistance, and consumer packages at low prices. Logistics service requirements need to be understood in relation to their drivers in the logistics function. Therefore identification of the logistics function of relevance for each logistics service requirement has been conducted. A complete overview of the DIY multiple retailers, according to the conceptual model, is presented in Figure 4.
DIY multiple retailers require strict logistic service levels from their suppliers. Most of these requirements have their origin in the requirements of the consumer (distribution policy) and the DIY policies in operating the stores (merchandising policy). Thus they have repercussions on required logistics services from suppliers, and suppliers to DIY multiple retailers have to comply with logistical solutions according to these requirements. However most of the requirements seem to be based on suppliers possessing flexible production and distribution processes. This is difficult for individual suppliers to meet, due to the complexity of the products. In order to handle this, suppliers have either to carry large stocks or co-operate with other suppliers in the same situation.
Conclusion and suggestions for further research

DIY multiple retailers are characterized by their business concept, their goals and their strategies. In essence they are transnational, pursuing growth strategies in order to exploit economies of scale. Economies of scale are utilized both in marketing and communication as well as in procurement and other logistical related areas. An ongoing consolidation process intensifies this.

DIY multiple retailers are identified by the following characteristics: consumer focus, wide assortment and one-stop-shopping, low consumer service levels, systematic periodic campaigns, mass communication, low-price alternatives, extremely large volumes, centralized purchasing and local ordering, and high accessibility and corresponding deliveries.

A supplier to the DIY multiple retailer should have the ability to deliver or offer - large volumes, small package sizes, large number of units, several product categories, opening hours in line with the DIY multiple retail stores they deliver to, special campaign programs, bar-coded products, consumer-packaged products, fixed delivery times, large additional volumes, deliveries of fill-up orders, and the knowledge and ability to meet the unique demands from each store.

Suppliers of wooden flooring to European DIY multiple retailers are facing challenges of operational and strategic activities. Demands and requirements from power retailers have to be met by individual suppliers or by individual suppliers in co-operation with other suppliers. The findings imply that structural changes in the retail industry might have consequences for upstream participants. This is in accordance with other research focusing on the shift in power in the distribution channel in favour of the retailers; at the same time it points to a fruitful area for future research.

The following research agenda ought to be divided into two paths, the supplier path and the retailer path, based on the two perspectives. The suppliers have other customers and need to have the possibility of delivering to different segments of customers with different logistics service requirements.

Different ideas for future research regarding the retail path are specified below.

- In the present paper, we make an attempt to characterize and determine logistics service requirements of the DIY multiple retailers. The findings presented in the paper ought to be tested and verified further. Therefore, the next phase of this specific research is to make an in-depth survey of the DIY multiple retailers and their purchasing behaviour, including
relationships with suppliers and power. There is also a need to thoroughly investigate the spoken as well as unspoken norms for doing business in this industry.

- DIY multiple retailers are considered so-called "category killers", and hence the characteristics and logistics service requirements ought to be comparable to similar retailers in other industries. Consequently, further studies ought to be conducted in order to verify and compare different retail industries as well as their supply bases.

- The DIY multiple retailers have also changed the basic principles for suppliers of wooden flooring; their entrance has also changed the conditions for the existing retailers. Consequently, further studies need to be conducted in order to describe changed market conditions and structural trends within the retail industry.
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Abstract

In many sectors, retailers have grown substantially and have forced their suppliers to improve their production and delivery of products. As the retailers have been getting more powerful, the suppliers have been forced to adapt to retailer requirements. This trend is visible in the distribution channel for softwood lumber as well. Traditionally, softwood lumber has been considered as a commodity product, where brand names and trademarks are of subordinate values. Competition has been based mostly on price. However, the focus has been extended and today service is becoming an increasing part of the business transaction. In order for sawmills to develop and offer the combination of product, price, and service elements that the retailers require, it is necessary that they know and can interpret the retailers' requirements correctly.

This paper determines important retail service requirements and their relation to price and product quality.

Keywords: service comparison, and softwood lumber

1. Introduction

Over the past few decades, suppliers have experienced changes in their business environment and it has become harder for individual companies to build and maintain a competitive advantage on the core product (Christopher 1998). However, there is a possibility to differentiate the business transaction by including, for instance, service (Donaldsson 1994). In the 1970s, a study (based on purchasing managers' opinions considering supplier characteristics) showed that retailers ranked service¹ as the second most important element, after product quality but ahead of price (Perrault and Russ 1976). However, service becomes more important the

¹ named distribution service
greater the competitive environment becomes and in order for a company to build a sustainable competitive advantage, service is hence becoming increasingly important.

Suppliers experience a change in the relationship with the retailers. This change has its basis in the retailers' opinion that: "external suppliers now exert a major influence on a company's success or failure" and hence they need to be managed and learnt from. A reduced supply base leaves more time to develop close relationships with the remaining suppliers (the so called "preferred suppliers") and this ought to result, for instance, in service improvements and reduced costs in the distribution channel.(Goffin et al. 1997)

This situation is evident in the sawmill industry. It implies that competition between individual sawmills becomes intensified and that the focus is drawn not only to price, but also to the service elements that the retailers put emphasis upon. Today, the most important characteristics of softwood lumber are of product quality nature. However, availability of products is ranked third in the study made by Eastin et al (2001), at the same time as price (as an isolated criterion) is ranked as fifth most important. There is however a relationship between price and product quality, although the same study indicates that the quality of softwood lumber is decreasing and that the price is increasing.\footnote{Verified in interview by Björn Rådström, VD Byggvaruhandlarna, 2002-06-05} In order for sawmills to become and stay one of the preferred suppliers, it is necessary that they are willing to fulfil the requirements stated by the retailers regarding service, price, and product quality. However, this could also be considered as an opportunity for individual sawmills. If the right mix of product and service elements is found, and they use this in order to develop valuable offers and design the distribution channel accordingly, it will lead to increased profit margins. In order for the sawmills to develop accurate service levels and quality in their products, with consideration taken to the price that the retailers are willing to pay, they need to increase their knowledge about retailers as well as their understanding of the retailers’ requirements. Identifying the relevant requirements and putting them in relation to price and product quality is the most critical step in order for the sawmills to develop sustainable competitive advantage and accurate offers to the retailers.

The purpose of this study is to determine and relate important retail service requirements to price and product quality.
This work is one part of a wider study that aims at identifying structure and service requirements stated by the retailers in the distribution channel for softwood lumber and it is focused on retailers’ requirements and their relation to price and product quality.

This paper concerns distinct features in a population and an appropriate methodology to use ought to be a survey study (Befring 1994). It is based on a questionnaire sent to 381 Swedish retailers (i.e. total population of Swedish retailers for softwood lumber). The basic material is described in "Logistikservicekrav för sågade trävaror - Logistic service requirements for softwood lumber" (Gustafsson 2002).

2. The distribution channel for softwood lumber

Sawmills have, to the present time, focused on the supply of raw material and its production process. There are many individual sawmills that have comparable production processes and consequently they have the capacity of producing similar products. As a result, price is often the basis of competition between the individual sawmills. Softwood lumber is easily copied and can be produced by any company that has the raw material and the required equipment. The competition within the industry is intense at the same time as the sawmills are experiencing competition from other materials and the profitability, for many sawmills, is low. (Petersson and Svensson 2000)

Softwood lumber can take nearly any form. An average retailer carries about 3-400 different forms of softwood lumber and today about 80% of the retailers' purchases of softwood lumber is done directly from the sawmills. It is very difficult for an individual sawmill to offer a complete assortment and hence the retailers work with different sawmills. However, about 35% of the retailers are actively working towards reducing their supply base. (Gustafsson 2002)

Softwood lumber is often sold and delivered as a commodity product and the distribution channel is characterized by; divergent flow with secondary products, living material, and the required connection with the supply base (Adolfson et al. 2000). The sawmills are positioned close to the raw material source and their chances of affecting the incoming materials’ properties are, in many cases, very limited. The characteristics of the products also vary with time, for instance some material has a tendency to twist and turn. In the sawmill industry, the customers' service requirements are particularly difficult to meet. This is not only due to the sawmills'
position in the distribution channel but also because they do not have the possibility to acquire the exact products needed for their production, which they are supposed to supply their customers with products according to their requirements.

The basic retail requirements are "delivery time" and "size of packages and dispatch". They require delivery within four working days, but the deliveries are made within five working days. Delivery size (median) is about 40 cubic meters. However, 47% of the retailers would like to receive smaller quantities and hence more deliveries. A vast majority of the products are delivered in full or half packages. However, some deliveries are done in quarter packages and even packages containing different assortments. The retailers are also stating the importance of high product quality and they assume that sawmills place emphasis on product quality. (Gustafsson 2002)

3. Theoretical framework

3.1. Logistics and service

The most critical events that influence a company proceed externally, and customers experience a result of using and interacting with the company's products, services, and actions (Lanning 1998). Combinations of these elements determine to what degree they are satisfied with the company and its offers (Sharma et al. 1995). Service is becoming an important part in the development of long-term relationships between the different participants in a distribution channel (Donaldson. 1995).

Service could then be considered as (La Londe et al. 1988); "a process for providing significant value-added benefits to the supply chain in a cost effective way".

According to Mattson (1998) service can be divided into the following three services: delivery, information, and logistics. It is not possible to determine which delivery service element is most important because it is determined by the situation. Delivery service is considered to be such services as delivery time, delivery precision, and delivery flexibility. Information service is the customers' possibility to obtain information during the business deal concerning, for instance, order statuses and delivery notification. Logistics service is referred to be the other
customer services that are complementary to the physical product. This service element constitutes among other things bar-coded products, special packages, and handling of customer's inventories (Vendor Managed Inventories). Logistics services have increased in importance more than the other customer service elements over the recent years.

3.2. Modeling service for softwood lumber

Mattson divides service into three parts all related to logistics. However, as all elements stem from logistics and logistics related activities, the classification of the service elements, as done by Mattson, is in one way confusing. In order not to cause any misunderstandings, the following interpretation of Mattson's concept of "service" is suggested.

![Figure 1. Logistics service elements and feasible criteria in the distribution channel for softwood lumber](image)

The element (named logistics services by Mattson) is hereafter called "Value added logistics services" and the embracing term is logistics service.³

³ There are other models of service, for instance the classical elements put forward by La Londe and Zinzer (1976). However they are less suitable for this study because of the elements existing in this industry. (Extremely long business relationships and pre-transaction and post-transaction elements do not exist and some transaction elements barely exist).
By using this model in order to structure the concept of service it is possible to identify services within the process, service related to the process and services that are additional to the process. Delivery service is provided by the process, information service is facilitating and related to the process at the same time as it lays the foundation for value added logistics services.

4. Empirical study and Discussion

4.1. Gathering of data

Data was collected by a mail survey and questionnaires were sent to purchasing managers in Sweden. Before the questionnaires were sent out, a draft questionnaire was constructed and tested on both retailers and other researchers. (Recommended by Dahmström, 2000) They were asked to identify unclear questions, make comments on the existing questions, and add missing issues. No vital comments were made and the final questionnaire was sent to the Swedish retailers on October 1, 2001. Questionnaires were sent to 381 retailers (i.e. total population of Swedish retailers for softwood products). When working with a questionnaire, using total population is favorable because then no sampling errors, frame errors or selection errors exist, and hence it provides more accurate information than when using only a sample. Two letters reminding the respondents that had not answered the questionnaire followed the first mailing (recommended by Dillman, 1978), the first mailing contained 281 letters were sent out and the second 208 letters.

The questionnaire included questions directed to the respondents to state the importance of specified requirements. The requirements have been specified in earlier studies (see Gustafsson, 2002).

Each respondent was sent an introductory letter, a questionnaire, and a pre-paid reply envelope. The introductory letter clarified the purpose of the questionnaire, assured anonymity, promised a summary of the results and asked the respondents to mark, and return the questionnaire if it did not apply to their company. (Recommended by Dillman 1978) A total of 98 returned the questionnaire referring that it did not apply to their company for such reasons as that it had gone out of business, it had its own sawmill, or that it sold only a small amount of softwood products. Thus the population was reduced to 282.
Table 1 Information about the population.

<table>
<thead>
<tr>
<th>Total number of questionnaires</th>
<th>381</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undelivered</td>
<td>1</td>
</tr>
<tr>
<td>Did not apply to their company</td>
<td>98</td>
</tr>
<tr>
<td>Population</td>
<td>282</td>
</tr>
<tr>
<td>Responses unable to use</td>
<td>4</td>
</tr>
<tr>
<td>Number of responses (able to use)</td>
<td>125</td>
</tr>
<tr>
<td>Response rate</td>
<td>44 %</td>
</tr>
</tbody>
</table>

A preliminary analysis of the respondents vs. non-respondents does not indicate a non-response bias and further analysis will be done in "Logistikservicekrav för sågade trävaror- Logistics service requirements for softwood lumber" (Gustafsson 2002)

4.2. Empirical data

The respondents were asked to mark the importance of the different service criteria, price and product quality using a 1-5 Likert scale, where 1 was "not important" and 5 was "very important" according to their opinion. Using Likert scales for this purpose gives an indication of the attitudes towards the criteria and the standard deviations indicate the uniformity considering the attitude (among the respondents). In the column "adjusted average" the measurements were standardized for each respondent by dividing the number of points allocated to a given criteria by the total points allocated to all criteria by the respondents.

The criteria have been distributed between the different service elements by being derived from their origin and thereafter placed to the most feasible source. The empirical data is presented in the following table.
<table>
<thead>
<tr>
<th>Product Quality</th>
<th>Adjusted mean</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Max(^a)</th>
<th>Min(^b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The accurate product is delivered complete</td>
<td>0.0598</td>
<td>4.72</td>
<td>0.63</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orders are fulfilled completely</td>
<td>0.0582</td>
<td>4.60</td>
<td>0.62</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Order cycle time is reliable</td>
<td>0.0572</td>
<td>4.55</td>
<td>0.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quick correction of mistakes</td>
<td>0.0568</td>
<td>4.49</td>
<td>0.72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short lead-time</td>
<td>0.0547</td>
<td>4.35</td>
<td>0.77</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ability to meet special requests concerning deliveries</td>
<td>0.0462</td>
<td>3.68</td>
<td>0.86</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Delivery service</strong></td>
<td><strong>0.0555</strong></td>
<td><strong>4.40</strong></td>
<td><strong>0.804</strong></td>
<td><strong>4.72</strong></td>
<td><strong>3.68</strong></td>
</tr>
<tr>
<td><strong>Prices (low)</strong></td>
<td><strong>0.0500</strong></td>
<td><strong>3.95</strong></td>
<td><strong>0.968</strong></td>
<td><strong>3.95</strong></td>
<td><strong>3.95</strong></td>
</tr>
<tr>
<td>Accurate and timely information</td>
<td>0.0554</td>
<td>4.41</td>
<td>0.79</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computerised info transfer</td>
<td>0.0320</td>
<td>2.56</td>
<td>1.13</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Information service</strong></td>
<td><strong>0.0437</strong></td>
<td><strong>3.48</strong></td>
<td><strong>1.336</strong></td>
<td><strong>4.41</strong></td>
<td><strong>2.56</strong></td>
</tr>
<tr>
<td>Possibility of delivering in 1/2 packages</td>
<td>0.0530</td>
<td>4.17</td>
<td>0.91</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Possibility to supply packages containing different assortments</td>
<td>0.0326</td>
<td>2.59</td>
<td>1.35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Possibility of delivering in 1/4 packages</td>
<td>0.0348</td>
<td>2.77</td>
<td>1.27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumer packages</td>
<td>0.0346</td>
<td>2.77</td>
<td>1.19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bar-coding</td>
<td>0.0284</td>
<td>2.28</td>
<td>1.23</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Value added logistics service</strong></td>
<td><strong>0.0367</strong></td>
<td><strong>2.92</strong></td>
<td><strong>1.361</strong></td>
<td><strong>4.17</strong></td>
<td><strong>2.28</strong></td>
</tr>
</tbody>
</table>

\(^a\) Max value of the elements in the specific criteria  
\(^b\) Min value of the elements in the specific criteria
4.3. Analysis of average and standard deviation

The standard deviation increases as the average decreases. This indicates that the respondents are off different opinions and hence disagree about the importance of the lower ranked criterion. However, this could be because the respondents have a larger possibility to distribute their points from 1 to 5 when the average is about 3.0.

![Figure 2. Relation between average and standard deviation](image)

5. Discussion on logistics services

The criteria and logistics service elements respectively are described in the following sections.

5.1.1. Delivery service

The criteria considered as belonging to "Delivery service" are highly ranked. The respondents are concordant but there are differences that are not to be neglected. The standard deviation for these six service criteria is small compared to the lower ranked criteria. However, the criterion "ability to meet special requests concerning deliveries" is considered not as important as the other criteria (lower ranked) and ought to be regarded as a representative for the flexibility in the distribution channel.
5.1.2. Information service

There is a distinct difference between the two criteria considered as "Information service". "Accurate and timely information" is uniformly considered as an important criterion at the same time as "computerized information transfer" is not considered as important, however the respondents are of different opinions. "Computerized information transfer" ought to require that the retailers actively take part in the development of information technology in order to find it beneficial. The wide difference of the average values is amplified by the standard deviation.

5.1.3. Value added logistics services

The difference between the criteria in the element "Value added logistics services" is rather large considering the ranking but also considering the attitudes among the respondents. "Possibility to deliver in 1/2 packages" ought to be established in the business and is hence highly ranked. The other criteria are developed in other industries and have probably just started to be visible in the distribution channel for softwood lumber (indicated by differences among the respondents).

5.2. Discussion on price and product quality

Product quality is an extremely important criterion and the standard deviation could be considered as relatively small, indicating a certain consensus among the respondents.

Considering the elements alone, price is ranked as eleventh most important. However, the standard deviation is relatively high, which indicates that the respondents have ranked price as having different degrees of importance.

6. Conclusion

Softwood lumber has been considered as a commodity product by both sawmills and retailers. Ranking can be based on adjusted average, average, max or min. However, the ranking between service categories and product quality is stable while price varies depending on ranking method. The following discussion will be based on adjusted average. This work has indicated the following ranking order between logistics service, price, and product quality.
1. Product quality
2. Price
3. Logistics service
The result indicates that "Product quality" is the most important criterion, the second criterion being price (i.e. that the sawmill sells its softwood lumber at a low price). However, in this case the retailers do not seem as unified as they seem to be regarding "Product quality". The fact that a total of seven service criteria are ranked higher than price, indicates that these criteria are more important to the retailer's ability to make a profit than are price negotiations. The ranking order indicated in the study is in accordance with the ranking order identified in the study performed by Eastin et al (2001). The entire logistics service concept is ranked as third but if it is divided into its elements, the following ranking order is indicated:

1. Product quality
2. Delivery service
3. Price
4. Information service
5. Value added logistics service

Product quality is still ranked as number one, the second element being "delivery service". The retailers seem to agree that "delivery service" ought to be an important element (standard deviation is 0,80). However, most of the delivery service criteria ought to be considered as so-called "qualifiers" at the same time as they are fundamental criteria for a business transaction to take place.

The relationship between service, price, and product quality has, at the first sight, changed (service has become of less importance) since the 1970s. However, if "logistics service" is separated into its elements, the change is not so obvious since delivery service appears to be more important than price. Delivery service is the original function within logistics and in this traditional industry, where the other elements have not yet appeared on a regular basis, it is still the most important service element. The extended concept of service has decreased in importance and the conclusion of this paper is in accordance with the study done in the 1970s by Perrault and Russ. Accurate services ought to be created within the process while the other services (related and additional to the process) are of subordinate importance.

Retailers today place less emphasis on "information service" and "value added logistics service" than on the other elements. Nor do they seem to regard issues that are considered as fundamental in other industries, for instance effective information exchange, as very important. However, some
retailers seem to put emphasis on "information service" and "value added logistics service", since the standard deviations for these elements are higher than for the others. This indicates that some retailers are changing their attitudes and are starting to consider softwood lumber as a non-commodity product. This change is opening a door for sawmills that wish to renew their competitive strategies. This importance is amplified by the fact that the newly entered retail category, the Do-It-Yourself (DIY) multiple retailer, has these service requirements as standard for their suppliers. Thus sawmills should identify retail segments and employ different logistic strategies to each segment when designing the distribution channels for softwood lumber.

A vast majority of softwood lumber is purchased directly from the sawmills, and in order for an individual sawmill to become a preferred supplier, the major focus ought to be on developing the production and distribution processes. However, there are some retailers who have started to consider other elements (highly ranked in other industries) as well as the traditional criteria, and hence the sawmills need to be aware of and prepared for this development. These requirements are new for the sawmills and they are in their infancy. In order for the sawmills to build a sustainable competitive advantage, it is necessary that they prepare for these new elements that as could be expected even in the distribution channel for softwood lumber. At the same time as they find the accurate mix of the five ranked elements for their specified customer group. (Compare Marketing mix philosophy)
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Logistic Services As Competitive Means – Segmenting the Retail Market for Softwood Lumber

Åsa Gustafsson


Softwood lumber has been considered traditionally as commodity. Subsequently brand names and trademarks were of subordinate value and competition was based on price. Recently, retailers have grown substantially and are forcing their suppliers to improve the production and delivery of products. As retailers are getting more diverse and powerful, suppliers are forced to adapt to the retailers’ service requirements. The new situation also brings opportunities for the sawmills to develop their competitive advantage. The retail industry is continuously changing, and in order for sawmills to develop and offer what retailers are asking for, it is necessary that they understand and interpret retailers’ requirements correctly. One way for sawmills to be successful is to develop accurate service elements and to use the service elements as a segmentation base in order to structure their customer base. This study shows that retailers place considerable emphasis on delivery and value-added logistical services. It generates three hypotheses concerning the following potential retail segments; turnover, category, and customer base.

Keywords service requirements, retail segments, softwood lumber

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Received 25 June 2002 Accepted 7 May 2003

1 Introduction

Over the past few decades manufacturing and distributing companies have been experiencing changes in their business environment and it has become harder for individual companies to build and maintain a competitive advantage through the physical product (Levitt 1980, Christopher 1998). One possibility to handle this situation is to differentiate the products and hence distinguish them from competitors’ products by including some form service in the offer (Mattsson 1998). As consumer demands are being more diversified and production processes are becoming more flexible, the complexity of the customer base increases and hence the combination of products and services grows into an immense number of alternatives. In order for a company to build a sustainable com-
petitive advantage, it is necessary to understand what creates value for its customers and how to segment their customer base.

In many industries, existing retailers are growing larger while the number of retailers is decreasing and new retail categories are evolving (Dunne and Kahn 1997). This trend has created a shift in power (Fernie 1994) from the manufacturers towards the retailers. Manufacturers have become more or less forced to focus on and consider the distribution channel from a retailer’s perspective. Increased dominance of major retailers has enabled retailers to put pressure on their suppliers in order to cut prices and/or to improve service provided (Blatherwick 1996). A reduction in the number of retailers and the descent of the middle-sized retailing chains will continue to increase the retailers’ power in distribution channel (Dunne and Kahn 1997).

1.1 The Distribution Channel for Softwood Lumber to End Consumer

Until now, Swedish sawmills have focused on the supply of raw material (Petersson and Svensson 2000) and on centralisation of production processes. This has resulted in a concentration of production units. Many individual sawmills have comparable production processes and consequently the capacity of producing similar products. As a result, price has been the traditional basis of competition between individual sawmills. Softwood lumber is easily copied and could be produced by any company with access to raw material and required equipment. Competition within the industry, as well as from other materials, is high at the same time as profitability in many sawmills is low (Petersson and Svensson 2000). There is an ongoing change in the retail industry for softwood lumber, where new actors are entering the market. Today, the retail industry consists of different categories of retailers (see table 1) based on organization.

Softwood lumber is usually purchased in full packages each containing 4 m$^3$ and an average retailer has about seven suppliers of softwood lumber. However, there is an ongoing trend to reduce the supply base. Agreements are made between the actors and the period of the agree-

<table>
<thead>
<tr>
<th>Table 1. Retail categories, identified by management.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category</td>
</tr>
<tr>
<td>Centrally managed multiple retailers</td>
</tr>
<tr>
<td>Private retailers in purchasing co-operatives</td>
</tr>
<tr>
<td>Private retailers with no affiliation</td>
</tr>
</tbody>
</table>

1.2 Discussion of the Problem

The sawmill industry is experiencing not only an ongoing rivalry between individual sawmills but also between sawmills and retailers. In order for the individual sawmill to survive and develop in this competitive environment, where they have been used to competing only on price, there is an evident possibility to differentiate their products by for instance including additional services (i.e. offering both products and services). In the sawmills’ position the knowledge of retailers is essential, because sawmills cannot create service offers unless they know and understand what products and levels of service are important for the retailers (cf. McEachern 1998).

The best way to structure the customer base and to gain a sustainable competitive advantage in a market place where the customer base is diversified, is by segmenting and offering accurate service levels (Sharma and Lambert 1994) to each of the different segments (similar concept “Logistically Distinct Business (LDB)”, see concept by Fuller et al. 1993) since different segments have different service requirements (Gilmour 1982). This could be done for instance by offering well-developed logistical solutions. Logistic services are not easily copied and hence they could be successfully used in order to develop a sustainable competitive advantage (Sharma et al. 1995). However, there is not one general set service elements or segmentation variables, and hence sawmills need to find the appropriate service elements (Murphy and Daley 1994) and segmentation variables on their own.
1.3 Previous Research

Research conducted in the specific area of softwood lumber is primarily focused on ranking of predetermined service requirement in relation to for instance product quality issues. However, they are handling all customer categories indiscriminately or are based on industrial users only. Hence no research has been conducted on specifying service elements nor on segmentation of retailers for softwood lumber.

A study (Hansen and Bush 1996, see also Hansen et al. 1996) based on a questionnaire sent to industrial users, wood treaters and Home centers (could be considered as DIY multiple retailers = retailers which sell products to private consumers and the private consumer undertakes the required work in order to install the products), suggests the following ranking: lumber characteristics (such as straightness and absence of end split), supplier/sales characteristics (for instance consistency in schedule deliveries and accuracy in billing system), lumber performance (for instance ease of nailing and stiffness), supplier services (such as protective wrapping and credit terms) and supplier facilities (for instance physical facilities and equipment).

Weinfurter and Hansen (1999) defined the gap in perception of importance between sawmills and their customers. Supplier/salesperson (such as supplier understanding needs and friendliness) and lumber characteristics (for instance straightness and accuracy and consistency in grading) were rated most important according to the customers. Items of dimension lumber performance (for instance durability and fastener retention) were rated slightly lower and dimension supplier services (for instance credit terms) were rated lowest. All dimensions received fairly high ratings and the spread of ratings was largest in supplier services.

Järvinen et al. (2002) stated the following ranking between factors when German companies trading wood products choose suppliers; high product quality, reliability of supplier, price level and consistency in price, customer oriented services (willingness to provide customised products and fast deliveries). At the same time, they came to the conclusion that construction material retailers and DIY multiple retailers put more emphasis on payment arrangement and reliability than wood product wholesalers do.

A comparison between importance ratings of selected material attributes influencing U.S. homebuilders’ purchase decision in 1994 and 1998 gave the ranking order described in Table 2 (Eastin et al. 2001).

Eastin et al. (1998) state that industrial users value reliability of supply, price, and price stability over quality.

Ankarling (1995) in his master thesis considers service requirements stated by strictly industrial users. The study contributes with delivery service requirements stated by industrial users. The study claims that the Scandinavian industrial users generally perceive product availability, order cycle time, physical distribution and information as the most important delivery service elements. However, in sophistication the customers regard information about order changes, delivery precision, notification, the accurate product is delivered complete, and that deliveries are made on time mostly. The study also contains the following marketing variables; Product, Price, Delivery service.

1.4 Purpose

The purpose of this work is to specify retailers’ basic logistic service requirements, quantify the requirements and to distinguish potential retail segments regarding these requirements.

The work specifies retailers’ service requirements and gives an indication of potential segments. The indication is summarised in three hypotheses, which ought to be tested further.

<table>
<thead>
<tr>
<th>Table 2. Ranking order of importance ratings.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
</tr>
<tr>
<td>Strength, Straightness</td>
</tr>
<tr>
<td>Availability, Overall price level</td>
</tr>
<tr>
<td>Price stability, Lack of defects</td>
</tr>
<tr>
<td>Lack of defects</td>
</tr>
<tr>
<td>Overall price level</td>
</tr>
</tbody>
</table>
1.5 Theoretical Framework

1.5.1 Service

Customers experience a company by interacting with its products, services, and actions (Lanning 1998) and hence the combinations of these elements determine to what degree they are satisfied with the company and its offers (Sharma et al. 1995). As service increases in importance in the business transaction, the understanding of its components is becoming more essential (Mattsson 1999). Service could be defined as (La Londe et al. 1988):

“A process for providing significant value-added benefits to the supply chain in a cost effective way”.

According to Mattsson (1998) customer service can be divided into the following three parts: delivery service, information service and logistic service. Which service element that is most important is determined by the situation. Delivery service is considered to be such services as delivery time and delivery precision. Information service is the customers’ possibility to obtain information during the business transaction concerning for instance order status, and delivery notification. Logistic service is referred to be the other services that are complementary to the physical product. This service element constitutes amongst other things bar-coding, special packages, and Vendor Managed Inventories. Logistic services have increased in importance, more than the other customer service elements, during the last years (Mattsson 1998).

1.5.2 Segmentation

The segmentation concept emerged in the 1950s (Wedel and Kamakura 1999) and has become a popular area for marketing research. Segmentation is used for structuring the customer base and resource allocation and aims at effectiveness and customer satisfaction (Murphy and Daley 1994). During the years, segmentation research has given considerably more attention to segmentation of consumer markets in relation to industrial market segmentation (Bonomo and Shapiro 1983). According to Sharma and Lambert (1994), there are two bases for segmentation: the first is the identifiable-/accessible group and the second is the needs/benefits group. Customer service is considered as a “needs/benefits base” and is hence based on the underlying needs and benefits of the buying organization. This segmentation base implies that the companies make individual offers to each individual segment (Sharma and Lambert 1994).

In order to find the appropriate service elements and to identify relevant segments Sharma and Lambert (1994) suggest a working model presented in Fig. 1.

1.6 Operationalization and Measurement

1.6.1 Operationalization and Working Method

Mattsson (1998) addresses only logistic aspects of service and divides it into three parts. However, as all elements stem from logistics and logistic related activities, the classification of the service elements, as done by Mattsson, is in one way confusing. In order not to cause any misunderstandings, I suggest the interpretation presented in Fig. 2 of Mattsson’s concept of “service”.

The element (named logistics services by Mattsson (1998)) is hereafter called “Value-added logistical services” and the embracing term is “Logistic service”. There are other models of service, for instance the classical elements (pre-transaction, transaction, and post-transaction) put forward by La Londe and Zinzer (1976). However, according to Nilsson (1987), they are less applicable in the
In order to identify service elements and distinguish potential retail segments, a working method described in Fig. 3 has been developed.

Earlier studies indicate the following segmentation variables: turnover (Rao and Wang 1995, Sharma and Lambert 1990); category (Gilmour 1982); customer base (Sharma and Lambert 1990); product mix (Sharma and Lambert 1990); product type and uncertainty (Cardozo 1980); product type (Zinzer 1997); strategy (Verhallen et al. 1998); structure of purchasing decision (Choffray and Lilien 1978).

Research conducted by Nachum (1994) concludes that there is no need to use a large set of variables in order to perform an industrial segmentation study. Using few segmentation variables ought to facilitate the data handling, reduce complexity, and reduce the cost of data collection. Therefore the segmentation variables, shown in Table 3, were chosen.

### Table 3. Information of potential retail segments.

<table>
<thead>
<tr>
<th>Segmentation variables</th>
<th>Potential retail segments</th>
<th>Abb. variable</th>
<th>Number of respondents (Tot 113)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply base</td>
<td>Sawmill</td>
<td>Sawmill</td>
<td>96</td>
</tr>
<tr>
<td></td>
<td>Wholesaler</td>
<td>Wholes.</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>Other</td>
<td>4</td>
</tr>
<tr>
<td>Turnover(^1)</td>
<td>Less than 1 mill. Euro</td>
<td>Small</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>1.0–1.6 mill. Euro</td>
<td>Medium</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>over 1.6 mill. Euro</td>
<td>Large</td>
<td>80</td>
</tr>
<tr>
<td>Category</td>
<td>Industrial distributors of building material</td>
<td>Ind distr</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Privat retailers with no affiliation</td>
<td>No aff</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td>Privat retailers in purchasing co-operatives</td>
<td>Co-op</td>
<td>43</td>
</tr>
<tr>
<td>Customer base</td>
<td>End consumers</td>
<td>End con</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>Builder’s merchants</td>
<td>B M</td>
<td>82</td>
</tr>
</tbody>
</table>

\(^1\) The intervals are recommended by Björn Rådström, CEO for “Union for Softwood Lumber Dealers and Timber Merchants” 2002-05-06.

In order to distinguish potential retail segments, the questionnaire requested the respondents to state their major supplier, turnover for year 2000, category, and customer base. To make it possible to quantify service elements, the respondents were asked to specify their required and actual delivery time, if they were satisfied with their existing suppliers, if their suppliers fulfilled their requirements concerning delivery precision, and if a shorter delivery time would increase their competitiveness. The respondents were also asked to state their average delivery size, if they would prefer smaller quantities and as a result higher frequency (and the opposite), average package sizes, what package sizes they would prefer in the future, and if there were any requirements missing.

### Fig. 2. Logistic service and service elements.

### Fig. 3. Working method for this study.

1.6.2 Questions

In order to distinguish potential retail segments, the questionnaire requested the respondents to state their major supplier, turnover for year 2000, category, and customer base. To make it possible to quantify service elements, the respondents were asked to specify their required and actual delivery time, if they were satisfied with their existing suppliers, if their suppliers fulfilled their requirements concerning delivery precision, and if a shorter delivery time would increase their competitiveness. The respondents were also asked to state their average delivery size, if they would prefer smaller quantities and as a result higher frequency (and the opposite), average package sizes, what package sizes they would prefer in the future, and if there were any requirements missing.
2 Data and Analysis

2.1 Design of the Study

This study contains two parts. The first part is to specify retailers’ service requirements and this is done through an explorative study, which is based on a series of interviews. The second part is to quantify logistic service requirements and to distinguish potential retail segment regarding the service requirements. The latter and verification of the interviews are done through sending a questionnaire to Swedish purchase managers for softwood lumber.

2.1.1 Interviews

In order to find basic service elements of particular interest to the retailers, a series of interviews were performed. Respondents (purchasers and purchasing managers of seven Swedish retailers) answered specific questions, but were also asked to speak freely about their service requirements on and relationships with their suppliers. The respondents were asked to state basic logistic service requirements and their satisfaction with their suppliers.

2.1.2 Questionnaire

The interviews ended up in specific areas of interest and a questionnaire was constructed (based on those areas). The aim of the questionnaire was to quantify the logistic service elements, verify interviews, and to identify structural segmentation variables.

Data was collected by a mail survey and questionnaires were sent to purchasing managers in Sweden (members of “Union for Softwood Lumber Dealers and Timber Merchants” – union for retailers selling with softwood lumber). Before the questionnaires were sent out, a draft questionnaire was constructed and tested on both retailers and other researchers (recommended by Dahmström 2000). They were asked to identify unclear questions, make comments on the existing questions, and add missing issues. No vital comments were made and the final questionnaire was sent to the Swedish retailers on the first of October 2001. Questionnaires were sent to 381 retailers (i.e. total population of Swedish retailers for softwood products).

When working with a questionnaire, using total population is favorable because then no sampling errors, frame errors or selection errors exist, and hence it provides more accurate information than when using a sample. Two letters reminding the respondents that had not answered the questionnaire followed the first mailing (recommended by Dillman 1978), the first mailing contained 281 letters that were sent out and the second 208 letters. Each respondent was sent an introductory letter, a questionnaire, and a postage-paid reply envelope. The introductory letter clarified the purpose of the questionnaire, assured the anonymity, promised a summary of the results and asked them to mark, and return the questionnaire if it did not apply to their company (recommended by Dillman 1978). A total of 98 returned the questionnaire referring that it did not apply to their company because of for instance gone out of business, had their own sawmill, or used a small amount of softwood products. Therefore the population was reduced to 282.

An analysis of the respondents vs. non-respondents does not indicate a non-response bias. Comparisons between the earliest and latest answers have been done and no major differences appeared.

2.2 Data Analysis and Limitations

Basic data have been analysed through frequency analysis and it is thereafter used as basis for segmentation. $\chi^2$-analysis has been conducted in order to find differences between potential retail segments.
The questionnaire contained four pre-defined segmentation variables. According to theory, there are no universal segmentation bases and the choice of segmentation variables should be kept to a limited number. There might be a risk that the selected variables were not the most accurate for this industry and that other would have resulted in clear segments.

The requirements stated in the interviews might not have given the complete picture of requirements. In order to add missing requirements, the questionnaire contained a question asking the respondents about missing requirements. However, no additional requirements were added.

3 Results

3.1 Completion of the Working Model

In order to fulfill the purpose the following working method has been used. The working method and operational measures are presented in Fig. 4.

3.2 Identification of Service Elements

Basic service requirements identified in the interviews are time and size of packages and dispatch (verified in the questionnaire). These requirements could be considered as delivery and value-added logistical services respectively and hence information service is excluded:

- Time. Retailers state that the actual and required delivery time are important requirements. Actual and required delivery time differ between the retailers. Required delivery time is referred to the time that the retailers ask for when placing a sub-order. The difference in delivery time is (both actual and required) from 2 days to 4 weeks while the satisfaction with the delivery time is perceived to be very high (over 95%).
- Size of packages and dispatch. Retailers are placing suborders when they are running short of products. Products are normally delivered in full packages (1 package is a typical delivery unit and it contains 4 m³. One package usually contains only one type of product). Retailers order products in order to fill a truckload. However, some retailers state that they only accept half packages and that they require the assortment to vary within one package.

3.3 Quantification of Service Elements

3.3.1 Delivery Time and Satisfaction

The actual and required delivery times are shown in Fig. 5 and the number of days are referred to as working days measured from the time the order is placed until the products are delivered or are available at the sawmill (depending on the agreement. The agreements state the conditions for delivery for instance FOB and other delivery conditions such as for instance frequency of suborders, time between suborder and delivery, and amount of products to be delivered at each suborder).
Of the total deliveries, 67% are performed within one working week and 91% are delivered within two working weeks (i.e. ten working days). Of the total respondents, 73% require having their deliveries within one working week and 95% require having their deliveries within two working weeks. The respondents experience a difference between actual and required delivery time. The retailers require deliveries within less than one week; however there is a difference between actual (5 working days) and required delivery time (4 working days) of about one day. Of the total respondents, 63% state that a shorter delivery time would increase their competitiveness by for instance their being able to offer their customers a shorter delivery time (for non stock deliveries). The gap (deviation) between actual and required delivery time (in working days) is shown in Fig. 6.

A majority of the retailers get their deliveries ahead of or on their required delivery day. However, the retailers appear to be satisfied with the delivery precision offered by the sawmills (average = 3.7 on 1–5 scale where 1 is not at all and 5 is completely). They accept deviations of about 1 working day on average (median) between required and actual delivery time, before they take action.

### 3.3.2 Size of Packages and Dispatch

Delivery size (median) is about 40 cubic meters (but it does vary between 4 and 1500 cubic meters). Of the total respondents, 30% receive deliveries equal or less than 20 cubic meters and 45% receive deliveries equal to or less than 32 cubic meters. However, 47% of respondents would like to have smaller quantities and hence more deliveries. Today, retailers are purchasing different sizes of package. Table 5 shows the retailers average distribution of purchases (share of purchases).

Retailers require their softwood lumber to be delivered in different package sizes. Table 6 shows the percentage of retailers that would like to purchase the different package size at the present time as well as in the future (as a share of total purchases).

### 3.4 Potential segments

#### 3.4.1 Delivery service

The potential segmentation variable that demonstrated differences between the respondents was “turnover” (see turnover in Table 3). Fig. 7 shows the actual delivery time (required delivery time hardly shows any differences) for potential segmentation variable “turnover”.

“Small” (79%) and “medium” (86%) receive larger amount of their deliveries within one working week than “large” (64%) does. Fig. 7 indicates that “large” might have a longer delivery time than the “small” and “medium” sized retailers. In order to determine whether “turnover” (small, medium, or large) is an appropriate segmentation variable a $\chi^2$-test was used (see also Table 7).
The $\chi^2$-test indicates no significant difference between the potential retail segments on 95% level and hence turnover is too cursory and further studies need to be done. Significance difference could not be proven even though the expected value was less than 5 in two cells. Another $\chi^2$-test has been conducted with the following time interval; 1–3 and 4 and over, and still no significant difference was indicated.

In order to distinguish potential segments it is necessary to use a simplified method. Continuous work study the most rigorous requirements in detail (the strictest requirements placed by retailers are in this case: Actual delivery time = 1 working day, and no acceptance of deviations). Table 8 illustrates the most rigorous requirements, stated by retailers, while Table 9 illustrates the population of potential segmentation variable (percentage of the segmentation variable that have placed the requirement) (for instance: 66% of the retailers that require Actual delivery time = 1 working day bought their softwood lumber directly from the sawmills). The share of the potential retail segments ought to be put in relation to the figures in Table 9.

Tables 8 and 9 show that an exceptional part of the most rigorous requirements are placed by retailers regarded as “Small” and “Private retailers in purchasing co-operatives (compared to their share of the total population). This indicates that potential retail segments are turnover and category.
3.4.2 Value-Added Logistical Services

The potential retail segment that shows considerable differences between respondents is customer base. However, in order to distinguish potential segmentation variables, the same method as above was used (see explanation above).

Tables 10 and 11 indicate that the retailers that are considered as “Private retailers with no affiliation” or have “End customers” as their customer base place the most rigorous requirements (considering value-added logistical services).

| Table 10. Structural characteristics of retailers with rigorous value-added logistical services requirements. |
|---|---|---|---|
| Supply base | Segmentation variables | Customer base |
| Actual delivery size | Sawmill | Large | No aff | End con |
| < 20 cubic meter | 78% | 67% | 61% | 56% |
| Actual deliveries in half packages > 90% | Sawmill | Large | No aff | End con |
| | 78% | 72% | 61% | 56% |

| Table 11. Potential segments share of total population. |
|---|---|---|---|
| Supply base | Segmentation variables | Customer base |
| Share of total population | Sawmill | Large | No aff | End con |
| | 85% | 71% | 48% | 27% |

4 Discussion and Conclusion

There are differences between potential retail segments regarding the two basic service requirements. Fig. 8 shows potential retail segments and service elements respectively.

*Turnover* is a potential segmentation variable for delivery service requirements (Rao and Wang 1995, Sharma and Lambert 1990). Small retailers seem to have more strict requirements (regarding delivery service) than other retailers do. One reason could be that small retailers do not have the possibility to keep inventories in the same way as other retailers do or that they place a high value on loss of sales. Another possibility is that small retailers might pursue a differentiating strategy (see the concept of Generic Strategies by e.g. Porter 1985) and hence place more strict requirements for deliveries on their suppliers. There is also a possibility that “large” retailers accept longer delivery times because they have well-developed routines and hence order products before they are actually needed.

*Category* is representative for ownership and structure (Gilmour 1982). Retailers that are considered as “Private retailers in purchasing co-operatives” seem to have more strict delivery service requirements, at the same time as “Private retailers with no affiliation” seem to place stricter conditions on value-added logistical services than do other retailers. “Private retailers in purchasing co-operatives” might consider softwood lumber as any other product and are hence making purchases of softwood lumber in the same way as they purchase other products. “Private retailers
with no affiliation” ought to stress that they have a small staff in order to handle administrative tasks and that they place these requirements on their suppliers in order to be able to keep this low staffing. Another possibility is that “Private retailers with no affiliation” pursue a differentiating strategy (see the concept of Generic Strategies by e.g. Porter 1985) and hence place more strict requirements for deliveries on their suppliers.

**Customer base** is a potential segmentation variable for value-added logistical services (Sharma and Lambert 1990). Retailers with a majority of end customers need to have fewer and more customised products in their stores. If the retailers do not adopt the products themselves, they need to purchase them from another actor in the distribution channel, preferable their supplier.

The retailers’ dominance in the distribution channel is increasing and will probably continue to increase in the future. This tendency seems to be true even for the distribution channel for softwood lumber. In order for the sawmills to handle this developing situation, it is evident that they need to adopt a different view of softwood lumber and the retailers. However, this should not only be seen as problematic for the sawmills. Adding accurate service levels, using service elements for segmentation in order structuring their customer base, and developing different logistical strategies for each segment ought to give the sawmills a profound foundation for building competitive advantage. The retail industry for softwood lumber is not static. The segmentation bases identified are most likely to change, some might even disappear and new appear. Hence sawmills that are about to start working with building their competitive advantage, need to structure their customers base as well as to consider the development in the retail industry with a focus on the development of potential segments.

### 4.1 Conclusion and Further Research

This work has generated the following hypotheses, which ought to be tested further in order for the sawmills to identify the accurate segments and actively start working with segmentation. (The hypotheses could be tested through for instance cluster analysis).

Hypothesis 1: “Small retailers in purchasing co-operatives” place stricter requirements on delivery service elements than do other retailers.

Hypothesis 2: “Private retailers with no affiliation” place stricter requirements on value-added logistical services than other retailers do.

Hypothesis 3: Retailers with “end consumers” as their customer base place stricter requirements on value-added logistical services than do other retailers.

Retailers seem to be sensitive in their requirements and hence there is a possibility to segment the retail market and to use logistic services in order to achieve competitive advantage.

### References


Total of 37 references
Appendix B
IMPORTANCE OF LOGISTICS SERVICE IN THE HOUSE-BUILDING INDUSTRY

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This paper is submitted to Journal of Forest Products and Business Research.
The interview guide and questionnaire are presented in the last part of the Appendix.
IMPORTANCE OF LOGISTICS SERVICES IN THE HOUSE-BUILDING INDUSTRY

Abstract

The general trend towards more sophisticated customers, with an emphasis on the combination of physical product quality and logistics services in relation to price, has now reached the sawmill industry. Thus individual sawmills can no longer build and maintain competitive advantage exclusively on their core products (i.e. softwood lumber).

One of the sawmills’ customers is the house-building industry. In order to become a preferred supplier to the house-building industry, sawmills ought to increase the value of their offers by being more attentive to the services that their customers require. It follows that sawmills need to know and understand the prioritization between the individual logistics service requirements of their customers and their relationship to physical product quality and price.

This paper is divided into two parts. The first part identifies the customers' logistics service requirements through explorative interviews. The second part quantifies logistics service requirements and ranks the logistics service requirements amongst themselves, as well as against price and physical product quality measures. The second part of this paper is based on a survey study. The conclusion is that physical product quality is the one most highly ranked. Logistics service requirements concerning the actual delivery are ranked higher than price, which implies that the planning of incoming material, and not being short on products, is of importance for house-building industry. Consequently, logistic service requirements, specifically those considered as delivery services, ought to be considered as order qualifiers.

Keywords: house building, service requirements, service comparisons, softwood lumber
1. Introduction

A line of different companies constitutes a supply chain\(^1\), and the existence of each company in the supply chain is based on the willingness of its customers to pay for the suppliers' overall offers (Christopher, 1998; Coughlan et al., 2001). Consequently each company's survival in a supply chain is based on its ability to meet its customers' requirements. According to Browning (2002), activities such as production processes, distribution and support accumulate value. Value is thereby determined by quality aspects in relation to price (Harmon and Laird, 1997; Olhager, 2000). Price is a quantified issue, whereas physical product quality and services are objective depending on individual customers. The quality aspect, according to, for instance, Hansen and Bush (1999), is a function of physical product quality and service attributes.

Softwood lumber is in many cases referred to as a commodity product (Roos et al., 2002), which implies that the main order qualifier is a pre-determined and stable physical product quality (Aitken et al., 2003; Pine, 1993). As a consequence of this, suppliers ought to differentiate themselves on service rather than on physical product quality characteristics (Perkins, 1993). Previous studies regarding softwood lumber in the Swedish environment identified accurate products being delivered completely, orders being filled completely, and quick correction of mistakes to be general order qualifying criteria (Gustafsson, 2003). Further, the more competitive the environment becomes, the more service offers increase in importance; they thereby constitute the so-called order winning criteria.

Traditionally, sawmills have tried to increase their market share by accomplishing and developing production advantages (Vlosky et al., 1998), and increasing the quality of their physical products in order to increase their competitiveness. As improvements in the quality of the physical products have been conducted, focus has also been drawn towards the other components of the total offer.
(i.e. the service provided and the price). Additionally, sawmills have found they must offer the required services at reasonable prices. Then too, customers appear to value quality dimensions differently (Garvin, 1987). A study conducted by Eastin et al (1998) concluded that manufacturers that used softwood lumber as an incoming material valued reliability of supply, price and price stability over quality, which implies that the order qualifiers for softwood lumber are about to change. For producing companies, the services offered and provided represent the highest risk for loosing customers (Grönroos, 2000). Consequently, knowing and understanding the customers’ expressed and unexpressed requirements for service will become necessary in order for the individual sawmills to be able to avoid the traditional commodity of just softwood lumber, and supply their customers with value-adding order winning criteria.

Service is continuously increasing in importance. Despite this, service has been particularly difficult to execute and quantify (Donaldsson, 1994). Defining and quantifying customers’ service requirements is necessary for effective management in successful companies (Heskett, 1994). Additionally, it is the customers’ identification and ranking of quality elements that is important for the company's success, rather than estimations done by the company.

House builders manufacture houses (i.e. they prefabricate houses to various extents) more or less completely at the factory, and then transport the modules in order to finalize the assembly of the houses at pre-ordained delivery sites. House builders purchase a majority of their softwood lumber directly from the sawmills (Gustafsson, 2004). Members of the house-building industry purchase their volumes of softwood lumber on a regular basis.

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1 Mentzer et al (2001) provides the following definition of a supply chain; *A supply chain is 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.*
1.1. Previous research

Research on logistics service has been conducted since the 1960's (See Simon, 1965). Principally there are two ways to operationalize the logistics service concept; theoretically or empirically. Theoretical logistics service requirements are often presented with regards to Hutchinson and Stolle (1968); for instance order processing time, order assembly time, delivery time, inventory availability, order size constraints, consolidation allowed (for shipments), and consistency among the elements referred to. The second way of realizing the concept is by using interviews or questionnaires. Table 1. provides an overview of empirical studies on logistics service requirements from other industries than the wood industries (identified logistics service requirements presented in ranking order, if provided in the original source). The table only communicates requirements regarded as logistics service requirements.
Table 1. Previous studies including empirically identified logistic service requirements from an industrial user perspective.

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Industry</th>
<th>Logistic Service requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cunningham and Roberts</td>
<td>1974</td>
<td>Valve and Pump</td>
<td>Ability to meet quoted delivery times</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(purchase of steel)</td>
<td></td>
</tr>
<tr>
<td>Lambert and Sharma</td>
<td>1990</td>
<td>Chemical</td>
<td>Accuracy in filling orders</td>
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<td></td>
<td></td>
<td></td>
<td>Ability to expedite emergency orders in a fast responsive manner</td>
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<td></td>
<td></td>
<td></td>
<td>Accuracy by supplier in forecasting and committing to shipment dates for custom-made products</td>
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<td></td>
<td></td>
<td></td>
<td>Completeness rate (Percentage of order eventually shipped)</td>
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<td></td>
<td></td>
<td></td>
<td>Rapid adjustment of rate and shipping errors</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Frequency of deliveries</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Order processing personnel located in market area</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Computer-to-computer order entry</td>
</tr>
<tr>
<td>Gilmour et al</td>
<td>1994</td>
<td>Various</td>
<td>Delivery time</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Providing info about delivery</td>
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<td></td>
<td></td>
<td></td>
<td>Order accuracy</td>
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<td></td>
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<td>Availability</td>
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<td>Packaging</td>
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<tr>
<td></td>
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<td></td>
<td>Delivery reliability</td>
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<td></td>
<td>Ability to fill complete orders</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Reasonable delivery estimates</td>
</tr>
<tr>
<td>Donaldsson</td>
<td>1994</td>
<td>Various</td>
<td>Order – Delivery time</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Delivery reliability</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Available information</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Transaction accuracy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Flexibility</td>
</tr>
</tbody>
</table>

Studies of identifying important service requirements in the hardwood industry have been conducted by for instance Bush et al (1991), Idassi et al (1994), Forbes et al (1994) and Smith (2002).

Previous studies focusing on softwood lumber have mainly been conducted with the aim of studying product quality as referred to by Garvin (1984; 1984), where product quality has eight dimensions; performance, feature, product reliability, conformance, durability, serviceability,
aesthetics, and perceived quality. Furthermore, Hansen and Bush (1999) have developed an empirical model of customer perceived total quality regarding softwood. Other previous studies regarding requirements on suppliers of softwood lumber are based on the ranking of service requirements in relation to price and physical product quality issues. Järvinen et al (2002) studied different German customer groups (retailers, wholesalers, and the construction industry) indiscriminately. The ranking was based on means and provided the following ranking order; high product quality, reliability of supplier, price level, consistency in price, and customer oriented services (a willingness to provide customized products and fast deliveries). Toivonen et al (2005) assess the product on a quality-based competitive position of wood product suppliers focusing on intangible product dimensions. Weinfurter and Hansen (1999) studied the quality perception gap between suppliers and customers. The study suggested the subsequent ranking order (based on means); supplier/salesperson (such as suppliers understanding needs, and friendliness), lumber characteristics (for instance straightness, accuracy and consistency in grading), lumber performance (for instance durability and fastening (retention), and supplier services (for instance credit terms). Eastin et al (1998) identified 14 softwood lumber attributes and ranked reliability of supply and price and price stability ahead of quality. Hansen and Bush (1996) combined the work of Garvin (1984) and Parasurman (1988), (see also Hansen et al, 1996), and provided the following ranking order; lumber characteristics (such as straightness and absence of end split), supplier/sales characteristics (for instance, consistency in scheduled deliveries and accuracy in billing systems), lumber performance (for instance, the ease of nailing, and stiffness), supplier services (such as protective wrapping and credit terms), and supplier facilities (for instance, physical facilities and equipment).

General logistics service requirements differ between the separate industries, which implies that situational factors determine valuable logistics service requirements for the industrial users. Since previous studies aiming to put into operation the logistics service concept have not been focused
solely on softwood lumber and the house-building industry, the sawmills need to have these specified.

However, following the general belief that softwood lumber is to be considered a commodity product, and the result of Eastin et al (1998), there is a need to identify, quantify and rank the individual requirements, and compare them to the physical product quality and price from a customer perspective. When these relationships become clarified, it will be possible to evaluate the order qualifiers and order winners for softwood lumber.

1.2. Problem definition and Purpose

The house-building industry is growing steadily, providing potentially increased demands for softwood lumber from the sawmills. Softwood lumbers constitutes the main building material for the house-building industry, and as the purchases of softwood lumber increase, the house builders become more powerful and can put pressure on the sawmills to attain specific services. So being able to deliver the services and offers as specified by the house-building industry is an important business opportunity for the sawmills to exploit, particularly as competitive logistics services contribute to a company's competitive advantage (Mentzer et al, 2001; Sharma et al, 1995; Stock and Lambert, 1992). However, at present the sawmills lack a sufficient knowledge of the logistics service requirements and their relationship to prices and physical product quality. As a consequence, this research aims at identifying logistics service requirements and relating these requirements to price and physical product quality regarding softwood lumber in the house-building industry.

Since physical product quality is to be considered as an order qualifier, and several research projects have focused on the workings of the physical product quality concept, this research focuses on logistics services.
1.3. Theoretical framework

Logistics services are the processes for providing value-added benefits to the distribution channel in a cost-effective way (La Londe et al., 1988), and consequently these processes measure the effectiveness of the logistics system by creating time and place utility. Service could be divided into pre-transaction, transaction, and post-transaction elements. (La Londe and Zinzer, 1976). However, according to studies conducted by Nilsson (1987), pre-transaction and post-transaction elements are less applicable in the Swedish industry environment.

Logistics services can be as defined by (Mattsson, 2002, page 139);

..., *all value-added activities concerning the order-to-delivery process, and providing accurate information and services in accordance with the material flow.*

Following this definition of logistics services, logistics services consist of services related to the physical flow, services related to the information regarding the physical flow, and the value-added services related to the physical flow. The importance of each service element is determined by the situation. *Delivery service* refers to the physical flow and it is characterized by for instance delivery time, frequency and volume. *Information service* is the customers' possibility to obtain any information concerning and during the business transaction. *Logistics service* denotes all other services that are complementary to the physical flow of products. This service element constitutes among other things of bar-coding, special packages, and Vendor Managed Inventories. During recent years logistics services have increased in importance more than the other customer service elements (Mattsson 1999). The general concept of logistics services was expanded by Gustafsson (2003), who proposed the phrasing of the individual service elements to be; delivery, information and value-added logistics services.
2. Materials and methods – Design of the study

This study contains two parts. The first part is to specify the individual logistics service requirements; the research has been conducted through an explorative study based on a series of interviews (the interviews are presented in Gustafsson, 2004). The second part is to evaluate each requirement, as well as pricing and physical product quality, and has been executed by a survey. In order to assess reliability and external validity, follow-up interviews have been conducted.

2.1. Interviews

Using personal interviews allows for options that are not possible with other methods, as the interviewer is able to explain questions, pose in-dept questions and ensure that the interviewee provides complete answers (Churchill, 1991). Therefore, in order to identify the logistics service requirements, a series of explorative interviews with purchasing managers was performed. The respondents gave answers not only to questions regarding the order-cycle process and distribution channel, but were also asked to speak freely about their service requirements on, and relationships with, their suppliers. The respondents were also specifically asked to state their basic logistics service requirements (both present and future). The interview guide contained the following main issues; general company information, distribution channels, order-cycle processes, important service requirements, and changes for the future (regarding service requirements).

Using interviews to ascertain the workings of logistics services might imply uncertainty with the selection of interviewees. However, companies were selected with regard to their production processes (degree of pre-fabrication) and size. Only purchase managers responsible for softwood lumber were interviewed. As a complement, all interviews started with some general questions regarding the purchase of softwood lumber, in order to make the interviewee feel comfortable as well as making sure that the interviewee was actually the one responsible for the purchase of
softwood lumber. Interviews were conducted until no additional aspects were revealed (in accordance with Grounded Theory presented by Glaser and Strauss, 1967). Each interview lasted for about one to two hours, and in total four interviews were conducted.

In order to verify the identified logistics service requirements, three additional interviews took place where the interviewees were asked to identify service requirements, and thereafter verify the list of identified logistics service requirements, as well as to add any further logistics service requirements if needed. No additional logistics service requirements were added during the additional interviews.

2.2. Survey

Based on the results of the interviews, a questionnaire was constructed. The aim of the questionnaire was to rank and specify (where possible) the importance of the logistics service elements (identified in interviews), pricing, and physical product quality.

Data was collected by a mail survey and questionnaires were sent to purchasing managers in Sweden. Before the questionnaires were sent out, a draft questionnaire was constructed and tested on both industry representatives and other researchers (Recommended by Dahmström, 2000). The recipients were asked to identify unclear questions, make comments on the existing questions, and to add any issues they considered to be missing. After reviewing the comments and making the necessary changes, the final questionnaire was sent out to purchasing managers in August 2004.

Since no general list of all Swedish house-building companies exists, the PAR database, a leading address database in Sweden, was used as a preliminary sampling frame (www.par.se). When working with a questionnaire, using total population is favorable because sampling errors, frame errors or selection errors ought then to be missing. Hence this method provides more accurate information compared to when using a sample. Each respondent was sent an introductory letter, a questionnaire, a postage-paid reply envelope, as well as an information leaflet on results from
previous studies conducted within the author’s current research program. The introductory letter clarified the purpose of the questionnaire, assured anonymity, and promised a summary of the results; it also asked respondents to mark and return the questionnaire if it did not apply to their company. (Recommended by Dillman 1978).

Questionnaires were sent out to 415 purchasing managers; the respondents who had not answered were reminded by mail. After completing the first set of reminder letters, 24 questionnaires were received (20 usable and 4 unusable), 26 were returned undelivered, while 237 respondents had still not replied. 128 respondents replied that the questionnaire did not apply to their company; amongst reasons mentioned for not applying were; gone out of business, had their own sawmill, or used only very small amounts of softwood products. Several respondents also returned the questionnaire referring to their purchase of logs and thereafter administering their sawmilling internally.

The high non-response rate, and the number of respondents stating that the questionnaire did not apply to their company, was not acceptable and called for action. In order to get a firm link with reality, telephone calls were made to all respondents who had not replied. In total 237 telephone calls were made, of which 10 did not answer despite several calls. The telephone calls gave an understanding of the individual members of the register. It appeared that most members did not in fact build wooden houses as such; instead they did complementary work such as constructing staircases and executing various kinds of renovation. They were only members of the register in order, for instance, to receive information of the business, indications of trends, and to find potential customers. Furthermore, in order to get a reality-based knowledge of the total population, industrial expertise within the area was contacted. The industrial experts verified the lists of respondents, and thus a total population of 81 active builders of wooden houses in Sweden could be drawn up. Information regarding the population is presented in table 2.
Table 2. Information about the population

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of questionnaires</td>
<td>415</td>
</tr>
<tr>
<td>Undelivered</td>
<td>26</td>
</tr>
<tr>
<td>Did not apply to their company</td>
<td>308</td>
</tr>
<tr>
<td>Population</td>
<td>81</td>
</tr>
<tr>
<td>Usable replies</td>
<td>45</td>
</tr>
<tr>
<td>Response rate</td>
<td>56%</td>
</tr>
</tbody>
</table>

The structure of the industry is characterized by attributes such as; size of production (ranging from 50 houses per year to about 1,500), customization (such as allowing customers to decide on personal variations in construction, such as two bay alternatives), and export share (ranging from none to about 90 percent). Based on the 45 usable responses, the response rate was calculated to 56 percent. A general concern in survey studies is non-response bias, which results from a failure to obtain information from entities that differs significantly from the other respondents and that this could possibly influence the result of the study. Based on the assumption that late respondents react more like non-respondents (Fowler, 1984), a comparison of early vs late respondents was conducted. In order to test non-response bias, early and late respondents were tested on the separate survey questions (according to Armstrong and Overton, 1977). However, no significant differences between early and late respondents were observed.

In order to be able to relate the logistics service elements to pricing and physical product quality, the respondents were asked to mark the importance of the different logistics service requirements, pricing and physical product quality using a 1-5 scale (1 referring to not important and 5 referring to very important). Using scales for this purpose gives an indication of the importance of each individual requirement. The respondents were also asked to specify their quantified requirements as well as their degree of satisfaction with their suppliers.

Using questionnaires always implies some concerns. The specific concern for this study considers the population. The preliminary population was first identified at over 400. However, after processing, it was heavily reduced to 81. The reduction of the 334 respondents was then done in
two steps, firstly based on the replies (by the respondents themselves) and secondly on the telephone calls (in which respondents identified themselves as either belonging to the population or not). The final population has thereafter been verified with two independent experts in the field (one within the industry and one representing a heavily dominating supplier to the industry), and is therefore considered to be in accordance with reality.

2.3. Follow-up interviews

A series of follow-up interviews were conducted in order to assess reliability and external validity. House-builders were selected based on prefabrication and size, and the interviews were conducted in the same manner as the previous ones, with additions to the results from previous parts of the study. The interviewees had access to the results beforehand in order to be well prepared. The interviewees discussed the areas in a similar manner as in the previous interviews, and agreed on the questionnaire’s results. This implies that researchers following the same procedure ought to get the same results and that it is possible to generalize the findings.
3. Results

In order to fulfil the purpose of the paper, the working procedure presented in Figure 1 has been used. Figure 1. also includes the results.

Figure 1. Working procedure and results of the study
3.1. Identification of logistics service requirements

Logistic service requirements identified in interviews are presented in the following table. (The interview protocols are presented in Gustafsson, 2004)

Table 3. Logistic services identified in interviews

<table>
<thead>
<tr>
<th>Respondent</th>
<th>Logistics service requirements</th>
<th>Future logistics service requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interview 1</td>
<td>Short lead-time</td>
<td>Bar-coded products</td>
</tr>
<tr>
<td></td>
<td>Specified delivery date when ordering</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Order cycle-time is reliable</td>
<td></td>
</tr>
<tr>
<td>Interview 2</td>
<td>Short lead-time</td>
<td>Keeping supplier stock at production site</td>
</tr>
<tr>
<td></td>
<td>Order cycle-time is reliable</td>
<td>Order cycle time is reliable</td>
</tr>
<tr>
<td>Interview 3</td>
<td>Short lead-time</td>
<td>Possibility of ordering and receiving all softwood lumber needed for one house at the same time</td>
</tr>
<tr>
<td></td>
<td>Specified delivery date when ordering</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Possibility to meet special requests concerning deliveries</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Order cycle-time is reliable</td>
<td></td>
</tr>
<tr>
<td>Interview 4</td>
<td>Short lead-time</td>
<td>Short lead-time</td>
</tr>
<tr>
<td></td>
<td>Specified delivery date when ordering</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Order cycle-time is reliable</td>
<td></td>
</tr>
</tbody>
</table>

Previous studies regarding softwood lumber in the Swedish environment identified the following general order qualifying criteria (accurate products are delivered completely, that orders are fulfilled completely, and that there is a quick correction of mistakes) and these criteria are therefore included in the study. Logistics service requirements considered in this study are therefore; that the correct products are delivered in full, that products are bar-coded, that supplier stock is kept at the production site, that order cycle-time is reliable, that orders are fulfilled in full, that delivery dates (possibility to meet special requests concerning deliveries) are fixed, that it is possible to order in entities (i.e. providing the possibility to order and receive all softwood lumber needed for one house at the same time), that there is a quick correction of mistakes, that there are short lead-times, and that a specified delivery date is supplied when ordering. Each logistic service requirement has been distributed to its respective element.

Delivery service stems from the basics of logistics, and is mostly related to the operational distribution of products. Requirements that ought to be regarded as delivery services are; that the
correct products are delivered on full, that delivery dates are supplied when ordering (i.e. possibility
to meet special requests concerning deliveries), that orders are fulfilled in full, that there is a quick
correction of mistakes, that order cycle-times are reliable, and that lead-times short. Regarding lead-
times, two dimensions ought to be considered; real and required lead-time. The required lead-time
is referred to as the time that the house-builders ask for when placing the order, whereas the real
lead-time refers to the real lead-time of softwood lumber. Figure 2 shows differences in required
and real lead-time. The majority of the house-builders require deliveries within two working weeks,
while 40 percent of the house-builders receive their deliveries with a delivery time of three weeks.
Despite this difference, house-builders appear to be satisfied with the delivery precision, as the
mean average is 4 on a 1-5 Likert scale. Information services ought to be considered as issues that
facilitate the operational processes by offering, for instance, information in advance of a delivery. In
this case, only one requirement ought to be regarded as information logistics services, namely
specified delivery dates when ordering. Value-added logistics services refer to issues that are
additional to the processes and are thereby create value for the individual customer. In this case,
bar-coded products, keeping supplier stock at the production site, and making ordering in entities a
possibility, have been identified as requirements that ought to be considered as value-added to the
operational process.
Figure 2. Actual and required lead-time (working days)
3.2. Ranking of variables

Mean, proportion, standard deviation (based on the mean), and standard error have been calculated for the different logistics service requirements, price and physical product quality. Proportion is calculated by dividing the number of points allocated to a given criterium by the total points allocated to all criteria by the respondents. Standard error refers to the expected distribution of an estimated regression coefficient and thereby denotes the expected range of the coefficient across the data. Table 4 identifies the measured variables.

Table 4. Ranking order of physical product quality, price, and the individual logistic service requirements (standard deviation based on mean).

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Mean</th>
<th>Proportion (total 1.0000)</th>
<th>Standard deviation</th>
<th>Standard error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical product quality</td>
<td>4.778</td>
<td>0.1071</td>
<td>0.517</td>
<td>0.0770</td>
</tr>
<tr>
<td>Accurate products are delivered completely</td>
<td>4.755</td>
<td>0.1063</td>
<td>0.435</td>
<td>0.0648</td>
</tr>
<tr>
<td>Order cycle-time is reliable</td>
<td>4.644</td>
<td>0.1036</td>
<td>0.5289</td>
<td>0.0788</td>
</tr>
<tr>
<td>Orders are fulfilled completely</td>
<td>4.5778</td>
<td>0.1022</td>
<td>0.4995</td>
<td>0.0745</td>
</tr>
<tr>
<td>Quick correction of mistakes</td>
<td>4.5556</td>
<td>0.1012</td>
<td>0.7849</td>
<td>0.1170</td>
</tr>
<tr>
<td>Price (low)</td>
<td>4.2222</td>
<td>0.0946</td>
<td>0.7351</td>
<td>0.1095</td>
</tr>
<tr>
<td>Short lead-time</td>
<td>4.000</td>
<td>0.0894</td>
<td>0.8257</td>
<td>0.1230</td>
</tr>
<tr>
<td>Possibility to meet special requests concerning deliveries</td>
<td>4.000</td>
<td>0.0885</td>
<td>1.0444</td>
<td>0.1557</td>
</tr>
<tr>
<td>Specified delivery date when ordering</td>
<td>3.911</td>
<td>0.0857</td>
<td>1.221</td>
<td>0.1820</td>
</tr>
<tr>
<td>Possibility to order in entities</td>
<td>2.333</td>
<td>0.0504</td>
<td>0.5173</td>
<td>0.0771</td>
</tr>
<tr>
<td>Keeping supplier stock at production site</td>
<td>1.800</td>
<td>0.0398</td>
<td>1.140</td>
<td>0.1699</td>
</tr>
<tr>
<td>Bar-coded products</td>
<td>1.47</td>
<td>0.0313</td>
<td>1.0125</td>
<td>0.1509</td>
</tr>
</tbody>
</table>

As a consequence of the choice of scale, the standard deviation cannot be expected to be constant over the requirements. It is obvious from the table that the standard deviation and the standard error
are larger towards the centre of the scale than at the end points. However, the low standard errors for the studied elements indicate that more certain conclusions can be made.

The different logistics service requirements have been distributed between the various logistics service elements by being derived from their origin and thereafter placed to the most feasible source (See table 5).

Table 5. Ranking order (based on mean) of physical product quality, price, and logistic service elements.

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Mean</th>
<th>Max value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical product quality</strong></td>
<td>4.778</td>
<td></td>
</tr>
<tr>
<td>Accurate products are delivered completely</td>
<td>4.7550</td>
<td></td>
</tr>
<tr>
<td>Order cycle-time is reliable</td>
<td>4.6440</td>
<td></td>
</tr>
<tr>
<td>Orders are fulfilled completely</td>
<td>4.5778</td>
<td></td>
</tr>
<tr>
<td>Quick correction of mistakes</td>
<td>4.5556</td>
<td></td>
</tr>
<tr>
<td>Short lead-time</td>
<td>4.0000</td>
<td></td>
</tr>
<tr>
<td>Possibility to meet special requests concerning deliveries</td>
<td>4.0000</td>
<td></td>
</tr>
<tr>
<td><strong>Delivery service</strong></td>
<td>4.4221</td>
<td>4.7550</td>
</tr>
<tr>
<td><strong>Price (low)</strong></td>
<td>4.2220</td>
<td></td>
</tr>
<tr>
<td>Specified delivery date when ordering</td>
<td>3.9110</td>
<td></td>
</tr>
<tr>
<td><strong>Information service</strong></td>
<td>3.9110</td>
<td>3.9110</td>
</tr>
<tr>
<td>Possibility to order in entities</td>
<td>2.3330</td>
<td></td>
</tr>
<tr>
<td>Keeping supplier stock at production site</td>
<td>1.8000</td>
<td></td>
</tr>
<tr>
<td>Bar-coded products</td>
<td>1.4700</td>
<td></td>
</tr>
<tr>
<td><strong>Value added logistic service</strong></td>
<td>1.8000</td>
<td>2.3330</td>
</tr>
</tbody>
</table>
4. Discussion and conclusions

This work has identified several logistics service requirements stated by the house-building industry. The logistics service requirements have been related to physical product quality and pricing in order for the sawmills to match their offers to the requirements of the house-building industry.

In other industrial distribution channels, specification of individual requirements is mainly clear. However, in the house-building industry some of these requirements, such as bar-coded products and keeping suppliers' stock at production site, are not highly valued. Keeping supplier stock on production site implies that the supplier keeps stock on the customer's production site on behalf of the customer. Further, some of the requirements are connected, and therefore stating one requirement calls for another. For instance, if the respondents do not use a computerized system, then the need for bar-coded products ceases to exist. The same applies for keeping supplier stock at the production site, and the possibility of ordering in entities. With regards to keeping supplier stock at production site, if the relationship between the supplier and the respondent is not fairly well developed, and routines standardized, there is no need to keep supplier stock at production site. The possibility of ordering in entities stems from the house-builders' requirements to translate a constructional drawing into a need for material and thereafter being able to order according to the exact demand. The requirement implies that the respondents have the possibility of controlling inventory according to demands, and thereby reduce tied-up capital. The low ranking of these requirements indicates that the relationship between the members in the distribution channel is not well developed, and that advanced logistical solutions are not applied. However, these requirements might be in their infancy, and are to be expected to increase in importance in the future. However, the appearance of these specific requirements shows the potential development of the distribution channel for softwood lumber. The distribution channel for softwood lumber is about to become more developed, and customers are going to require more specific services. Therefore it becomes
necessary for successful sawmills to be prepared for these types of requirements in order to be considered as one of the possible preferred suppliers in the future. Today, some of the respondents value these types of requirements (as illustrated by the high standard deviation), while other respondents appear not to take them into consideration.

This research follows the result of Järvinen et al (2002), where the respondents considered physical product quality as the most important element when selecting a supplier, followed by the reliability of supplier (comparable to order cycle-times being reliable in this study) and pricing issues. Järvinen et al (2002) studied supplier characteristics of the building material markets in Germany, and the results indicate a similarity in purchasing behavior, as well as a homogeneity from an international perspective.

This study shows that physical product quality is the most important requirement to be fulfilled by the sawmills, and that some logistics services are not primarily taken into consideration when choosing a supplier. Studying the individual elements, the delivery service (in particular that accurate products are delivered in full, that order cycle-times are reliable, that orders are fulfilled completely, and that there is a quick correction of mistakes should they occur), is considered more important than price. As a result of being ranked higher than price, these individual logistics service requirements should be considered as order qualifiers rather than logistics service requirements to bargain on. However, the results from this study do not follow the study conducted by Eastin et al (1998), and therefore additional studies ought to be conducted.

All members involved in the distribution channel consider softwood lumber to be a commodity product, following that price negotiations are the main instrument for selecting suppliers. Therefore issues such as physical product quality are considered as so-called order qualifiers. The notion of softwood lumber as a commodity product is amplified by the house-building industry’s prioritizing
of the requirements studied. The ranking order indicated in this study needs to be tested and verified in further research.
Literature cited


25


Olhager, J. 2000. Production economics. Studentlitteratur, Sweden


Sharma et al, 1995; Stock and Lambert, 1992


www.par.se
Interview guide regarding logistics service requirements.

The interview guide was used to pose areas for discussion.

**Areas for discussion**

- **Basic Information**
  - Volume
  - Customer base
  - Supply base

- **Distribution channel**
  - Perception of the sawmills, view of the house builder-supplier relationship
  - Supplier selection criteria
  - Products sold to customers

- **Order-cycle process**
  - Order placement
  - Order-cycle time
  - Delivery precision
  - Volume
  - Specific delivery solutions

- **Service requirements**

- **Changes for the future (regarding suppliers and service requirements)**
Company information

1. Estimate the current total number of employees at your company _____

2. Turnover (year 2003) ____________ SEK (in total)
3. Turnover (year 2003) ____________ SEK softwood lumber
4. Turnover (year 2003) ____________ cubic meters softwood lumber

5. Do you expect your purchases of softwood lumber to change over the next five years? (1 = decrease dramatically, 3 = unchanged, 5 = increase significantly)
   1  2  3  4  5

If an increase, what is the primary reason? __________________________

6. Please indicate your primary type of business (number of houses)
   - Standardized houses _______ % number of houses __________
   - Customized houses¹ _______ % number of houses __________
   - Components and elements _______ % For instance __________
   - Other _______ % For instance __________

If you do customized houses, where does the customization start?
   - With contacts with an architect
   - Construction
   - Volume/exterior
   - Surface layer/interior

7. How big is your export market share? (based on number of houses)
   0 %   50 %   100 %

¹ (for specification see following question)
8. With how many of your softwood suppliers do you work with general agreements?

<table>
<thead>
<tr>
<th></th>
<th>0 %</th>
<th>50 %</th>
<th>100 %</th>
</tr>
</thead>
</table>

If you work with general agreements, how long is the average period of an agreement?

9. What percentages of your purchases are done through sawmills, wholesalers, retailers, or in other manners? (in cubic meters)

<table>
<thead>
<tr>
<th></th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sawmill</td>
<td></td>
</tr>
<tr>
<td>Wholesaler</td>
<td></td>
</tr>
<tr>
<td>Retailer</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>%, specify</td>
</tr>
</tbody>
</table>

| Total    | 100 % |
Time
1) Please indicate the average demanded delivery time from your softwood lumber suppliers for standardized products ________ (working days)

2) Please rate how your suppliers meet the demanded delivery times?
   (1 = never meet, 3 = sometimes meet, 5 = always meet)
   1 2 3 4 5

3) Please indicate the average actual delivery time for standardized products from your softwood lumber suppliers ________ (working days)

4) How big a difference between promised and actual delivery times do you accept from your softwood lumber suppliers before you take action? ________ working days

5) Which actions do you take? (See question 4)
   - ☐ Impose fines
   - ☐ Cancel the order
   - ☐ No action
   - ☐ Other, specify ________

6) For which reasons are actions taken or not taken? (See question 4 and 5)

7) How would you rate your possibilities to affect delivery times? (1 = none, 3 = somewhat, 5 = completely)
   1 2 3 4 5

8) To what extent are you satisfied with your softwood lumber suppliers’ fulfillments of your delivery precision requirements? (1 = not at all, 3 = to some extent, 5 = completely satisfied)
   1 2 3 4 5

9) Do you have a fixed delivery day for each delivery from a majority of your suppliers?
   Yes ☐ No ☐
10) If No, would you like to have a fixed delivery day for each delivery?  
Yes ☐    No ☐

What advantages would you be able to achieve by having fixed delivery days?
____________________________________________________________________________________
____________________________________________________________________________________

Delivery size
1) Average delivery size (from your suppliers) ____________ cubic meters softwood lumber.

2) Do you have a fixed quantity for each delivery?  
   Yes ☐    No ☐
   If Yes, how many cubic meters? ____________

3) If No, would you like to have a fixed quantity for each delivery?  
   Yes ☐    No ☐
   If Yes, how many cubic meters? ____________

4) Would you prefer having smaller quantities and more frequent deliveries (compared with the present time)?  
   Yes ☐    No ☐

5) Would you like to have larger quantities and less frequent deliveries (compared with the present time)?  
   Yes ☐    No ☐
Package sizes
1) What is the smallest package size your softwood lumber suppliers offer? ___

2) What packaging sizes would you like to have from your softwood lumber suppliers in the future?

- Full packages
- Half package
- 1/4 package
- Different assortment
- Other __________

3) What is the inventory turnover rate per year? __________

4) When is an order initiated?
- Daily inventory control
- It is automatically generated
- At stock-taking
  - Once a week
  - Every other week
  - One a month
  - Other, __________
- Other, __________

Suppliers
1) Where is the softwood lumber purchased, and its share (%)?

<table>
<thead>
<tr>
<th>Country</th>
<th>Share (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweden</td>
<td></td>
</tr>
<tr>
<td>Other Nordic countries</td>
<td></td>
</tr>
<tr>
<td>Northern Europe (excl. the Nordic countries)</td>
<td></td>
</tr>
<tr>
<td>Russia and the Baltic states</td>
<td></td>
</tr>
<tr>
<td>North America</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100 %</strong></td>
</tr>
</tbody>
</table>

If you purchase softwood lumber from Other Nordic countries, Northern Europe (excl. the Nordic countries), Russia and the Baltic states, North America or others, what type of softwood lumber is then purchased?

---

2 For instance all softwood lumber for a specific house

3 Yearly turnover divided with average inventory levels
2) Please estimate the number of softwood lumber suppliers your company currently has? ______

If more than one supplier, what are the reasons for multiple suppliers? (Give the two most relevant alternatives)
- One alone does not offer a complete assortment
- Several suppliers decrease dependence on individual suppliers
- Several suppliers secure supplies
- Several suppliers stimulate competition amongst themselves
- Several suppliers provide the possibility to press prices
- Other (please specify) ______________

3) How much of your total annual sales for softwood lumber in 2003 was provided by your company's three largest suppliers? ______ %

4) How large a share of your softwood lumber suppliers are offering you a complete assortment? ______ %

5) How important is it for you to buy a complete assortment of softwood lumber from one supplier? (1 = not important at all, 3 = somewhat important, 5 = very important)

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
</table>

6) What is the optimal number of softwood lumber suppliers for your company? __________

7) Is there a strategy in your company to reduce the number of softwood lumber suppliers?
- Yes ☐
- No ☐

What advantages would you achieve by reducing the number of suppliers?
_________________________________________________________________________
8) Is there a strategy in your company to increase the number of softwood lumber suppliers?
   Yes ☐   No ☐

What advantages would you achieve by increasing the number of suppliers?

9) How important are the following criteria for your present suppliers? (Please mark below)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Very little</th>
<th>Very large</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short lead-time (from order)</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Order cycle time is reliable</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Accurate and timely information</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Specified delivery date when ordering</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Possibility to meet special requests concerning deliveries⁴</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Possibility of delivering in 1/4 packages</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Possibility of delivering in 1/2 packages</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Possibility of delivering in larger packages than today</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Possibility to supply packages containing different assortments⁵</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Deliveries to different locations</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Bar-coded products</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Consumer packages</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Keeping supplier stock at production site</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Computerized info transfer</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Quick correction of mistakes</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Physical product quality</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Long period of agreement</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Orders are fulfilled completely</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>The accurate products are delivered completely</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Low prices</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>

⁴ Possibility of fast deliveries and fixed delivering days
⁵ All softwood lumber for a specific house
10) Which of the following criteria are absolutely necessary for a supplier to meet (mark 5 at the most)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>X</th>
<th>Criteria</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short lead-time (from order)</td>
<td></td>
<td>Bar-coded products</td>
<td></td>
</tr>
<tr>
<td>Order cycle time is reliable</td>
<td></td>
<td>Consumer packages</td>
<td></td>
</tr>
<tr>
<td>Accurate and timely information</td>
<td></td>
<td>Keeping supplier stock at production site</td>
<td></td>
</tr>
<tr>
<td>Specified delivery date when ordering</td>
<td></td>
<td>Computerized info transfer</td>
<td></td>
</tr>
<tr>
<td>Possibility to meet special requests concerning deliveries</td>
<td></td>
<td>Quick correction of mistakes</td>
<td></td>
</tr>
<tr>
<td>Possibility of delivering in 1/4 packages</td>
<td></td>
<td>Product quality</td>
<td></td>
</tr>
<tr>
<td>Possibility of delivering in 1/2 packages</td>
<td></td>
<td>Long period of agreement</td>
<td></td>
</tr>
<tr>
<td>Possibility of delivering in larger packages than today</td>
<td></td>
<td>Orders are fulfilled completely</td>
<td></td>
</tr>
<tr>
<td>Possibility to supply packages containing different assortments</td>
<td></td>
<td>The accurate product is delivered complete</td>
<td></td>
</tr>
<tr>
<td>Deliveries to different locations</td>
<td></td>
<td>Low prices</td>
<td></td>
</tr>
</tbody>
</table>

---

6 Possibility of fast deliveries and fixed delivering days
7 All softwood lumber for a specific house
11) Please indicate how you believe the following supplier criteria will change over the following five years?

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Decrease</th>
<th>Unchanged</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short lead-time (from order)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Order cycle time is reliable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accurate and timely information</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specified delivery date when ordering</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Possibility to meet special requests concerning deliveries(^8)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Possibility of delivering in 1/4 packages</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Possibility of delivering in 1/2 packages</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Possibility to supply packages containing different assortments</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Possibility of delivering in larger packages than today</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Possibility to supply packages containing different assortments(^9)</td>
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<tr>
<td>Deliveries to different locations</td>
<td></td>
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<tr>
<td>Bar-coded products</td>
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<tr>
<td>Consumer packages</td>
<td></td>
<td></td>
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<tr>
<td>Keeping supplier stock at production site</td>
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<tr>
<td>Computerized info transfer</td>
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<tr>
<td>Quick correction of mistakes</td>
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<tr>
<td>Product quality</td>
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<tr>
<td>Long period of agreement</td>
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<td></td>
<td></td>
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<tr>
<td>Orders are fulfilled completely</td>
<td></td>
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<tr>
<td>The accurate products are delivered completely</td>
<td></td>
<td></td>
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<tr>
<td>Low prices</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

\(^8\) Possibility of fast deliveries and fixed delivering days

\(^9\) All softwood lumber for a specific house
12) Please indicate how information is currently transmitted and received between your company and your softwood lumber suppliers? (Please tick all that apply)

- Electronically\(^{10}\)
- E-mail
- Fax
- Telephone
- Mail
- Other (specify ___________

Is any information transmitted electronically\(^{9}\)?

- Yes
- No

If yes, what percentage of the total number of transactions is done in this manner? _______ %

13) What type of information do you currently receive or wish to receive from your softwood lumber suppliers?

<table>
<thead>
<tr>
<th>Receive today</th>
<th>Wish to receive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inventory levels</td>
<td></td>
</tr>
<tr>
<td>Production plans</td>
<td></td>
</tr>
<tr>
<td>Order confirmations</td>
<td></td>
</tr>
<tr>
<td>Delivery information</td>
<td></td>
</tr>
<tr>
<td>Prices</td>
<td></td>
</tr>
<tr>
<td>Deviation reports</td>
<td></td>
</tr>
</tbody>
</table>

14) What type of information is most critical for your business in order to become more competitive? __________________________

15) What type of information do you share with your softwood lumber suppliers, and what type of information are you interested in sharing?

<table>
<thead>
<tr>
<th>Actual</th>
<th>Interested in</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inventory level</td>
<td></td>
</tr>
<tr>
<td>Sales information(^{11})</td>
<td></td>
</tr>
<tr>
<td>Prognosis</td>
<td></td>
</tr>
<tr>
<td>Other ___________</td>
<td></td>
</tr>
</tbody>
</table>

\(^{10}\) For instance EDI, Web-based, Not e-mail

\(^{11}\) For instance point of sales data, Not e-mail
Please check that you have answered all questions.

Thank you for your valuable and valued co-operation!

If you have any questions, do not hesitate to contact me;
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TD, Hus M
351 95 Växjö

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The specific areas and checkpoints for the sawmills interviews.

1. Strengthening internal and external integration
   - **Existing** internal (formal, informal or organizational) and external integration (information integration, coordination and resource sharing, and organizational relationship linkages) with customers and suppliers
   - What do you **require** in order to be able to consider external integration?
   - General **business characteristics** effecting the possibility of external integration?
   - What would be the **benefits** of applying or extending internal and external integration?

2. Eliminating or adapting to expected pattern of demand
   - How are you adapting to the existing pattern of demand?
   - What would you **require** in order to be able to adapt to the expected pattern of demand?
     If you knew some of your customers’ demand, how¹ would you adapt your business?
     How long in advance would you need to know of customer demand in order to be able to adopt your business?
   - What type of demand pattern do you consider as suitable regarding softwood lumber? (statistical unpredictable, low demand and statistical predictable)
   - General **business characteristics** effecting the possibility to adapt to expected pattern of demand
   - What would be the **benefits** of eliminating or adopting to to expected pattern of demand?

3. Reducing or adapting to uncertainties²
   - How are you adapting to uncertainties in your present situation?
   - Which types of uncertainties effect your organization?
   - What is **required** from each function (procurement, production and distribution) in order to be able to adapt to uncertainties?
   - **Which** uncertainties would be most beneficial for your business to be able to cope with?
     Why?
     Effects on the rest of the organization?
   - General **business characteristics** effecting uncertainties in the different parts (procurement, production and distribution) of the physical flow and external uncertainties?
   - What would be the **benefits** of reducing or adopting to uncertainties?

---
¹ For instance planning, produce to stock, cooperation, fixing of prices
² For instance; lead-times, quality and unpredictability in the environment
4. Differentiating
   o Do you differentiate any of your customers or suppliers?
   o What is required in order for you to be able to differentiate customers, suppliers, products, processes and systems?
   o General business characteristics effecting the possibility of differentiation of customers, suppliers, products, processes and systems?
   o What would be the benefits of applying differentiation?

5. Postponing
   o Structure of inventory, where are the value-adding activities taking place?
   o Existing postponement structure ,,.
   o What would you require in order to consider changing you structure according to postponement?
   o General business characteristics effecting the possibility postponement (geographically of value-adding) or activities (for instance packaging or bar coding)?
   o What would be the benefits of applying postponement?

6. Simplifying structures, systems, and processes
   o Supply chain structure
   o Are you continuously working with simplification of structures, systems, and processes?
     Cooperation with customers and suppliers
     What would facilitate cooperation with customers and suppliers
     Standardizing of products (?)
   o General business characteristics effecting your work with simplification of structures, systems and processes?
   o What would be the benefits of applying simplification of structures, systems, and processes?

7. Improving the information processing and decision support systems
   o Do you continuously work with improving information processing and decision support systems?
   o Information exchange with customer and suppliers
   o What is required in order to be able to improve information processing and decision support systems?
   o General business characteristics effecting you possibilities to improve information processing and decision support systems
   o What would be the benefits of improving information processing and decision support systems?
8. Redistributing or increasing frequencies
   o Are you continuously working with redistributing or increase frequencies?
   o What is required of each function (procurement, production and distribution) in order to be able to redistribute or increase frequencies?
     In which functions should it be beneficial to increase frequencies?
     Between which functions should it be possible to redistribute frequencies?
   o General business characteristics effecting the possibility to redistribute or increase frequencies
   o What would be the benefits of redistributing or increasing frequencies?

9. Reducing or redistributing lead-times
   o Are you continuously working with reducing or redistributing lead-times?
   o What is required of each function (procurement, production and distribution) in order to be able to reduce or redistribute lead-times?
     Possibility to redistribute lead-times
     Which lead-times should be suitable to reduce and why?
     What else would be affected by utilization of this logistics principle?
     Administrative/strategic lead-times
   o General business characteristics effecting the possibility to reduce or redistribute lead-times
   o What would be the benefits of reducing or redistributing lead-times?

10. Do you develop your logistics processes or flows in any other way in order to increase process performance or develop your process?
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Serie III (ISSN 1404-4307)

Växjö University Press
351 95 Växjö
SWEDEN

www.vxu.se