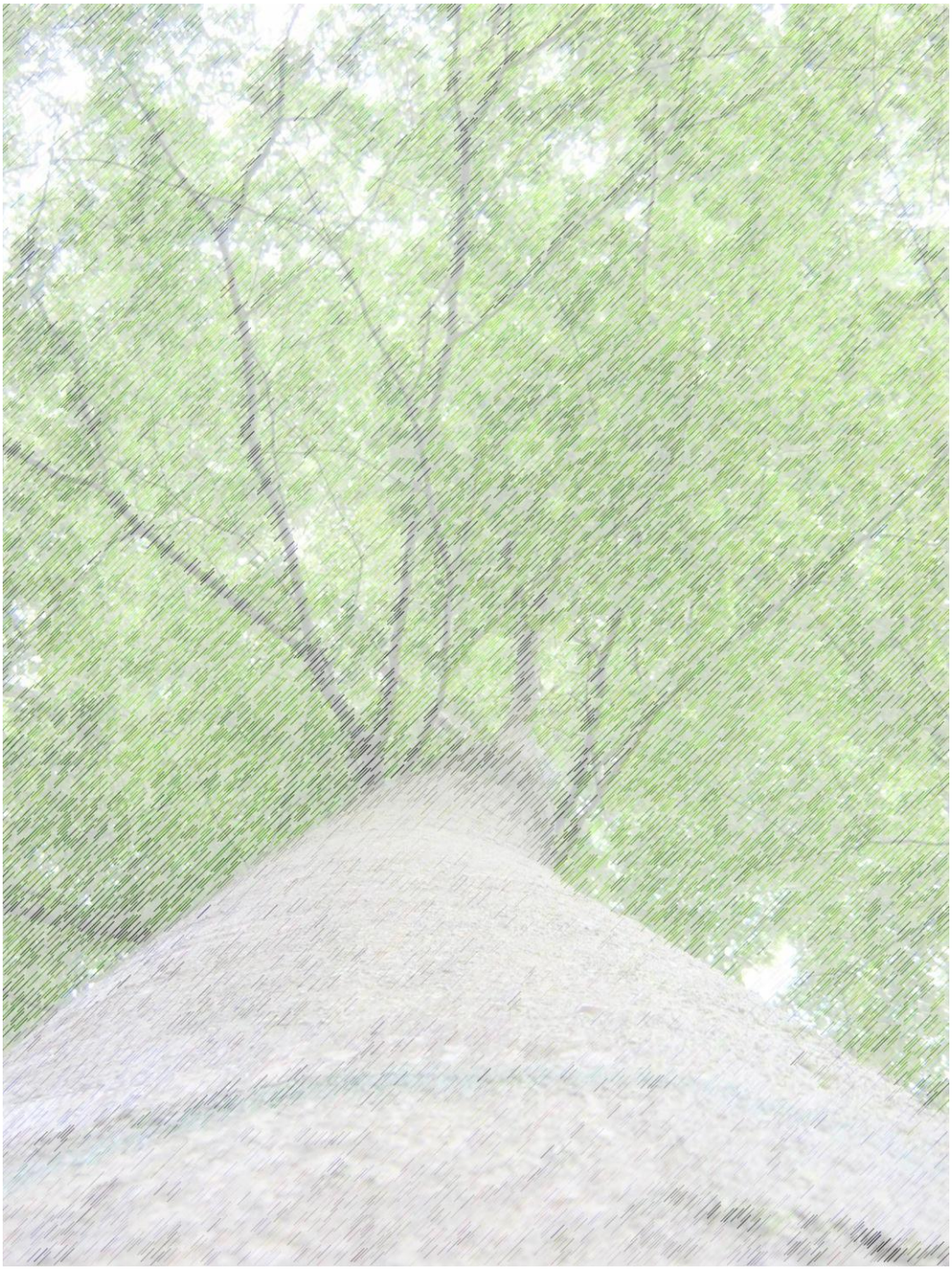
Finding drivers of innovation in the Dutch timber industry



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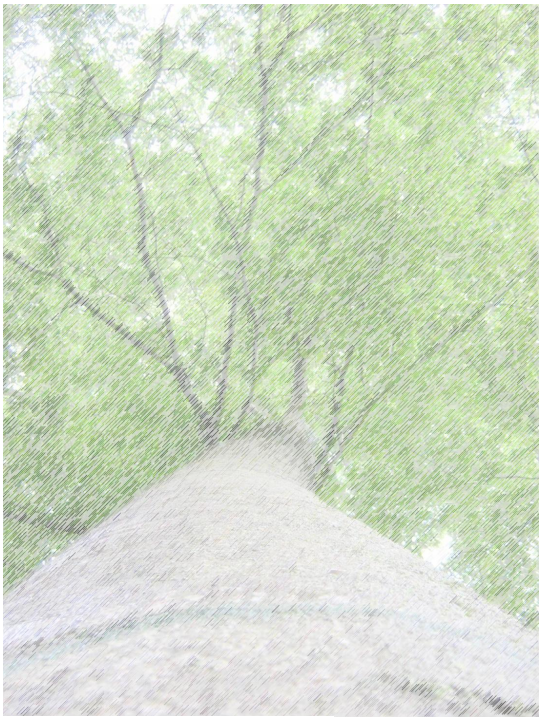

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Abstract

In a recent study, the Dutch manufacturing industry was classified in categories based on the innovative performance of companies. The conclusion of the study was that a classification can be made in three categories: high tech, low tech and the timber industry. Compared to companies in other industries the Dutch timber industry performed less innovative activities. Therefore the present research tries to establish the level of innovation in the Dutch timber industry by identifying the drivers of innovation in the Dutch timber industry. Innovation is an important method to increase firm performance.

In order to identify potential drivers of innovation in the timber industry a preliminary study was conducted consisting of a literature study with the following topics: 'innovation drivers', 'innovation in the timber industry' and 'barriers towards innovation'. Based on the results of the preliminary study a questionnaire was developed that was used in 16 interviews with managers of different companies in the Dutch timber industry.

Based on this research, it can be concluded that it is possible to classify innovation in the timber industry in a so called input – throughput – output model. Inputs are the external conditions and refer to the connections of the company with external parties. Throughput refers to the characteristics that a company has chosen to develop, so the internal conditions. Output refers to the innovative output of companies, so for example the number of product innovations.

It was possible to classify the Dutch timber industry in a model in which the internal factors and external factors are identified and the innovative output of companies is measured. In this way the Dutch timber industry is comparable with other manufacturing industries in the Netherlands. Furthermore, in the present study the drivers of innovation in the Dutch timber industry were identified. Based on these drivers recommendations could be made on how innovativeness can be stimulated and improved in the Dutch timber industry.

Companies in the Dutch timber industry should have a focus on both internal resources and on the market. A higher level of formal structures and an innovation strategy will increase the innovative output of companies in the Dutch timber industry. Other innovation drivers also have a positive effect on the innovative level of companies in the Dutch timber industry.

Management summary

In a recent study the Dutch manufacturing industry was classified in categories based on the innovative performance of the companies in different segments. The conclusion of this study was that a classification can be made in three categories: high tech, low tech and the timber industry. Companies in the Dutch timber industry were described as less innovative than companies in other manufacturing industries. Therefore the present study tries to establish whether the companies in the Dutch timber industry are less innovative than companies in other industries.

The level of innovation is established by identifying the drivers of innovation in the Dutch timber industry. A literature study is used to identify potential drivers of innovation. The results of the literature study are used to construct a questionnaire. The questionnaire was used in 16 interviews with managers of companies in the Dutch timber industry. Overall can be concluded that no evidence was found that companies in the Dutch timber industry are less innovative than companies in other manufacturing industries.

The results of the study show that it is possible to classify innovation in the timber industry in a so called input – throughput – output model. Input are the external variables and connections, for example subsidy use. Throughput are the characteristics of a company, for example the level of education of employees. Output refers to the innovative output of companies, for example the number of product innovations. Based on the results of the present study can be concluded that companies in the Dutch timber industry behave similar to companies in other industries. Although companies in the Dutch timber industry can be compared to companies in other industries, some suggestions for improving the innovativeness of the Dutch timber industry can be made.

Based on the drivers for innovation suggestions can be made on how companies can improve their innovativeness. Respondents was asked how their company strategy could be best described, choosing between 3 different descriptions. Overall can be concluded that companies should try to pursue their strategy as much as possible. The strategy should be reflected throughout the company and not be limited to specific parts of the organization.

Besides a general strategy companies have a certain orientation, either a market orientation or an orientation on internal resources. When a company has a focus on internal resources this means that innovations are developed based on the capabilities and resources of the organization. A focus on the market suggests that companies primarily focus on the market, innovations are developed

because the market has certain demands. This study shows that a combination of both orientations has a positive effect on the innovativeness of companies in the Dutch timber industry.

Currently, companies in the timber industry have primarily a focus on the market. Some suggestions on how to improve this orientation can be made. For example, one should try to identify opportunities for competitive advantage. This will improve the innovative behavior of companies. Furthermore companies should try to react to actions of competitors in order to reduce the competitive advantage of competitors. Discussing strategies and sharing information about competitors can also help to find out ways to reduce the competitive advantage of competitors.

At this moment companies in the Dutch timber industry do not focus enough on developing internal resources. Developing the internal resources of a company will have a positive effect on the innovative output of companies. In general companies should improve the level of 'formalization' and some suggestions how to do this can be proposed. First of all, companies should have a vision or mission referring to innovation. This will show the commitment of the management towards innovation, personnel will be more motivated to perform innovations. Secondly the management of a company should try to create 'cross functional' teams. Employees with different backgrounds will have different perspectives and different knowledge. Combining this knowledge with each other will result in more innovative ideas. Thirdly the management should try to improve the commitment and morale of employees. Motivated employees will be more committed to innovations and will understand the necessity for innovations.

Innovations are mostly developed in teams. The results of the research show that the 'team organization' is not sufficient. Improving the 'team organization' will positively influence the innovative output of companies in the Dutch timber industry. First of all companies need to ensure that the team leader has sufficient qualities and skills. Secondly the management of the company should be committed to innovation and the teams that develop innovations. The management can show their commitment for example through the mission or vision of the company. Thirdly the teams should be composed of different employees with different disciplines and backgrounds.

Connected to the resources and personnel of a company is the educational level of employees. Participants in the study indicated that a combination of practical and theoretical knowledge is important. In the future this will probably become even more important because the knowledge about timber and timber products is slowly disappearing from the market. A good method to increase the knowledge within the organization are innovation networks. Other studies show the

benefits of cooperation in innovation networks, especially for small and medium sized enterprises. Most companies do not participate in innovation networks yet. Companies in the Dutch industry should consider entering in an innovation network. Cooperation in innovation networks does not imply that a company has to cooperate with direct competitors. Innovation networks can also be created together with for example suppliers of raw materials.

Besides studying drivers of innovation some attention was given to the financial aspect of innovations. The results of the study show that the decision whether or not to invest in a certain innovation can be described as an opportunistic decision. At this moment unnecessary costs and risks are made by companies because of a lack of structured investment decisions. The investment decision should be part of the strategic decision making process and companies need to develop procedures that determine whether or not to invest in innovations.

To reduce the financial risk, companies use subsidies to (partially) invest in innovations. A frequently mentioned objection of using subsidies is that it is difficult to be eligible for a subsidy. Furthermore some respondents did not have any idea what the possibilities for subsidies were. Therefore subsidy use should be promoted and if necessary companies should be helped to become eligible for subsidies. Also companies themselves can take measures to become eligible for a subsidy, for example by making investment decisions part of the strategic decision making process.

Besides drivers of innovation respondents were also asked about the barriers of innovation. Remarkable was that most respondents mentioned only 1 or 2 barriers. It is important that companies realize what the actual barriers are towards innovations, and how these barriers can be addressed. A frequently mentioned barrier is the market, most respondents seemed to address a lack of acceptance of new products. Companies and branch organizations should cooperate together to reduce this barrier. Education and training about timber and timber products will help to overcome the barrier.

Preface & Acknowledgements

This report is the result of a study that already started in March 2011. The idea for the study started with the idea to combine 2 different topics; namely innovation and the Dutch timber industry. Together with Verduurzaamd Hout Nederland the research topic was further defined. Supervision of the research was conducted by the department Management Studies of Wageningen University.

The research is the final phase of the study Management studies. For me it has been an intensive process in which I feel that I have improved my scientific skills. I would like to thank everybody who has supported me during this process. Especially I would like to thank dr. Vincent Blok, because of his enthusiasm and critical remarks I managed to complete my research. Furthermore I would like to thank professor Omta for his critical reviews and comments.

Besides the supervisors of Wageningen University I would also like to thank Verduurzaamd Hout Nederland especially Kees Boon. He gave me insights in the Dutch timber industry and gave useful comments on the research.

Finally I would like to thank all respondents and people that have participated in this research. Without the input of these people I would not been able to write this report. It amazed me how friendly and open all respondents were, it helped me to motivate myself again.

Jeroen Veldhorst, February 2012

Table of contents

1.1 Introduction

Innovation is a concept that is used already for centuries. For many companies and people it is an important source of economic growth. Innovation has also been topic of scientific research for many years, and a vast amount of literature can be found. Not only for scientific or business purposes is innovation important. Everybody is able to mention innovations that possibly have changed life. An example is the introduction of the light bulb and a more recent and less radical innovation is the Senseo coffee machine (Smith, 2010).

Governments also agree upon the importance of innovation for people and companies with for example subsidy programs to stimulate innovations. In 2006 a research was performed in order to classify the Dutch manufacturing industry. Classifications can be helpful for the government and for example for branch organizations. With classifications, it can be established which industries perform better than others or which industries should be granted subsidies. In this study a remarkable result was found. The manufacturing industry could be classified into 3 different categories: a high tech industry, a low tech industry and the timber industry. Apparently the timber industry in the Netherlands was less innovative than other low tech industries (Raymond et al, 2006).

In 2009 the organization for wood treatment companies in the Netherlands, 'Verduurzaamd Hout Nederland', launched the initiative 'Innohout'. 'Innohout' was an initiative in which companies in the timber industry cooperate on innovations. The reactions of companies were very positive, but the results of the initiative were somewhat disappointing. Together with the results of the study of Raymond et al. (2006) this was the reason to start a research dedicated to innovation in the timber industry. This report presents the results of a study performed in the past year with as main topic innovation in the Dutch timber industry.

The report is structured as follows: In the first chapter the industry background is presented in order for everybody to get an idea of the Dutch timber industry. Chapter 2 presents the problem analysis, followed by the methodology in chapter 3. In chapter 4 the literature review is presented, and in chapter 5 the results and analysis are presented. Finally the conclusions are given in chapter 7, followed by the discussion in chapter 8.

1.2 Industry background

The timber industry is a small industry in the Netherlands, 276.900 companies are active in the Dutch industry of which only 863 companies are active in the timber industry. Financial companies are not included in the total number of companies. The timber industry can be defined as 'primary woodworking and production of articles of wood, cork, reed and wicker work'. Companies active in the manufacturing of furniture are not included in this figure. The furniture producers are member of the Centrale Bond Meubelfabrikanten (CBM), and it is estimated that around 40 – 50 companies are active in the production of furniture in the Netherlands. As shown, the timber industry is very limited in size, and its influence on the total economy is also small. In 2009 the total industry in the Netherlands had a net turnover of about € 1.042.289,3 million, the timber industry had a net turnover of about € 2.470,5 million. (CBS statline, retrieved 2-11-2011).

Timber is a versatile and important product that is used in many different applications. Everybody can give examples of timber used in for example buildings or the public domain. There are more examples where timber is used, for example gates, piles, shipbuilding, flooring, furniture and window frames. Timber is also used as for example packaging material. As secondary raw material timber is also used in the pulp and paper industry, but these types of companies are not included in the definition of timber industry (Kuiper & Jans, 2001).

For the supply of timber companies in the Netherlands they are mostly dependent on the import of (sawn) timber from abroad. There is only a very limited amount of home grown timber available. Of all sawn timber that is available in the Netherlands is less than 10% originating from Dutch forests (Probos, 2010). More than 90% of all sawn timber is imported from abroad; around 75% of all imported sawn timber is originating from within Europe. Sweden and Finland are the most important suppliers of timber, however, these countries only supply softwood timber. Other important countries or areas from which timber is important are North America (20% of the total imports, softwood & hardwood) and tropical countries (5% of the total imports, hardwood). (Kuiper & Jans, 2001).

The timber industry is composed of a variety of companies with different activities. Different branch organizations represent small parts of the industry. 'Verduurzaamd Hout Nederland' (VHN) has around 20 members, of which about 15 companies are active in the treatment of timber. The 'Nederlandse Bond van Timmerfabrikanten' (NBvT) represents all carpentry factories in the

Netherlands and has about 250 members. Timber merchants are represented by the 'Vereniging Van Nederlandse Hout- ondernemingen' (VVNH) and have in total around 300 members. Besides the above mentioned organizations there are a number of branch organizations that represent a small part of the timber industry.

2. Problem analysis

2.1 Research problem

In the past decades the timber market in the Netherlands has changed and it will continue to change in the future. Customer demands differ from demands from 30 years ago, companies adapt to these changes with new products and innovations. A good example in the timber industry in the Netherlands is the wood treatment industry. In the 90's their products became criticized because of the chemicals that were used for the treatment of timber. Innovations and research finally led to new products that were perceived as more environmentally friendly. Not all innovations became a success: a good example of an innovation that initially failed is PLATO. The company started in 1999 with the thermal treatment of relatively non-durable timber species but faced two times bankruptcy (Baeten, 2006).

Compared to other manufacturing industries in the Netherlands the Dutch timber industry is lacking behind with innovation (Raymond et al., 2006). Raymond et al. (2006) performed a study in order to classify the Dutch manufacturing industry. One of the outcomes of the research was that three manufacturing groups can be identified: a high tech group, a low tech group and the wood industry (Raymond et al, 2006). The high tech group consisted out of companies in chemicals, electrical, M&E, plastic and vehicle, the low tech group consist out of companies in food, metals, non-metallic products, textiles, and products not elsewhere classified (Raymond et al., 2006). Statistical analysis clearly showed that the wood industry compared to the high tech and low tech industry was lacking behind with innovation. A possible explanation could be that companies in the timber industry mainly innovate on a process basis while the low tech and high tech industry innovate both on products and processes (Raymond et al. 2006). In 2009 Verduurzaamd Hout Nederland (VHN) launched the initiative 'Innohout' in order to stimulate innovation in the Dutch timber industry. Objective of Innohout was to increase and stimulate innovation among companies in the timber industry. During the period in which companies could subscribe it was noticed that most companies reacted enthusiastic towards the initiative but only a limited number of companies really participated in Innohout.

The problem definition of the present research can be formulated as 'VHN wants to know how they can help and assist companies in their innovation processes'. Focus of this research will be on the success and failure factors during the innovation process. Special attention is given to the concept of willingness since the study of Raymond et al. (2006) and the experiences of Innohout seem to address a lack of willingness to innovate. Although willingness seems to have a large influence on the

innovation success of companies this research takes a broader view towards innovation. Other success and failure factors identified in the literature are also tested. In other countries studies on innovation in the timber industry have already been performed and the results are used in this study. The type of innovations is also identified since this can have an impact on the success of innovations and could explain the lower innovative level of the timber industry.

2.2 Research objective

In the previous paragraph the objective of the research was already described, in short it can be described as follows:

"The objective of this study is to establish the level of innovativeness of the Dutch timber industry compared to other manufacturing industries and identifying the drivers for innovation"

The level of innovation in the Dutch timber industry seems to be lower than in other manufacturing industries in the Netherlands. This study tries to establish whether the Dutch timber is less innovative and aims to identify the drivers for innovation in the timber industry.

2.3 Research issue

Based on the research objective a main research question is designed, to answer the main research question 6 specific research questions are formulated.

Main research question:

"Should the level of innovativeness be improved in the Dutch timber industry, and if so how should the level be stimulated in the Dutch timber industry?"

Specific research questions:

1. How can innovation in the Dutch timber industry be classified?
2. What are drivers for innovation in the Dutch timber industry?
3. What is the level of innovation in the Dutch industry compared to other industries?
4. Can a lack of willingness explain a lower innovation level in the Dutch timber industry?
5. How can the drivers for innovation be better used to stimulate innovation?

3. Methodology

This chapter is structured according to the Research Framework that is also depicted in figure 1. First the focus will be on the preliminary research, in this case a thorough literature study. Secondly the focus is on the empirical research part of this study. Finally is explained how the data gathered in the empirical research will be analyzed.

3.1 Preliminary research

The preliminary research of this study is a literature review which is performed by analyzing relevant literature. Relevant literature consists of books, research articles and websites. Literature is found by using 'Web of science' and through branching from references in relevant literature, furthermore literature is found through recommendations. The results of the literature study are used to compose a question list that can be used during the semi-structured interviews with timber companies. In chapter 5 the results of the literature study are shown. Based on the preliminary research a conceptual framework is constructed. In figure 1: 'conceptual framework' the conceptual framework of this study is shown. All the elements that are presented in the framework can also be found in the literature study. The question list is also designed based on the conceptual framework.

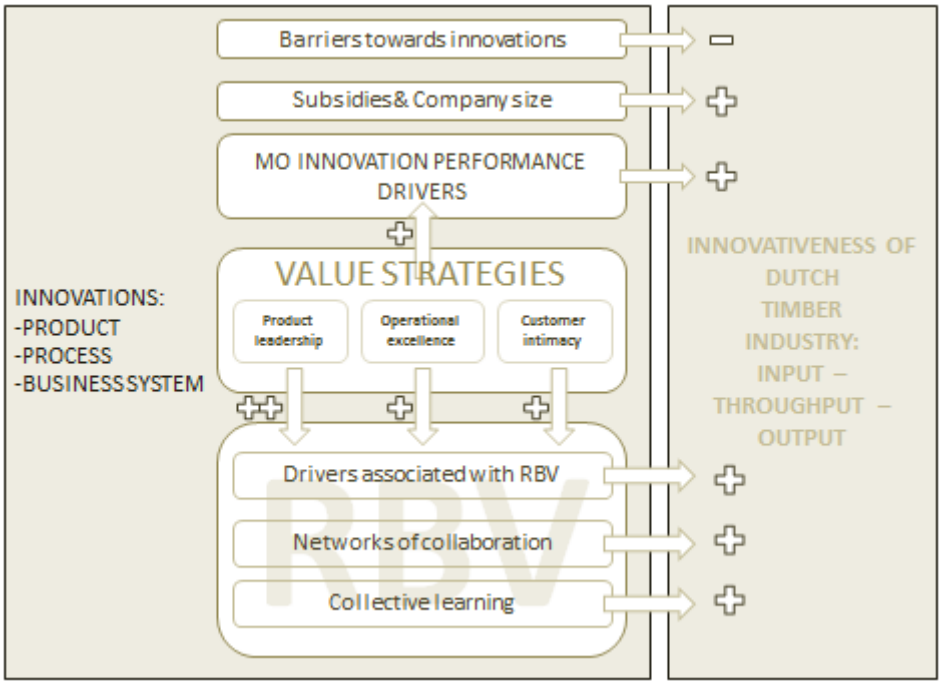

Figure 1: Conceptual framework

Figure 1 'Conceptual framework' shows presumed relation between the different concepts identified in the literature study. Innovation can be divided into product, process and business system innovations. A number of different drivers have a positive influence on the innovativeness of the

Dutch timber industry. The model also shows that a product leadership strategy will have an extra positive influence (++) on the drivers that are associated with a Resource Based View. Again, these drivers will also have a positive influence on the innovativeness of the Dutch timber industry. The value strategies also have a positive influence on the Market Orientation innovation performance drivers. These drivers can be associated with a MO and increase the innovation performance of a company. The + and – indicate if a concept has a positive or negative effect on the innovativeness of the Dutch timber industry.

3.2 Empirical research

3.2.1 Population and sampling

As already shown in the previous chapters the timber industry in the Netherlands is very limited in size. The industry is composed out of companies active in producing or processing timber and companies that are active as trader or wholesaler. In this research the companies active in producing or processing timber are studied and interviewed. It is likely that the companies active only as trading company or wholesaler do not have innovative activities. This presumption is confirmed by a timber merchant. In Appendix 2 the complete list of the interviewed companies can be found. In this appendix also some additional information about the companies can be found.

After consultation with VHN it was decided to contact 5 members of VHN and 3 nonmembers. Finally 3 members of VHN decided to cooperate and 1 nonmember decided to cooperate. The members of VHN are all active in the wood treatment, this means that they chemically or thermally treat timber with to increase the durability and/or properties of timber.

Furthermore 2 companies with various activities were contacted because of the process innovations and product innovations introduced by their companies. Both companies are active as contractor for others, but also have an own product range. 1 company focuses on the construction industry with for example masonry profiles, the other company has an own label for timber floorings.

Through contacts of the researcher 2 respondents agreed to cooperate. Both companies are active in the production of furniture for consumers and companies. Innovation was also a topic of interest of both respondents. In the Netherlands there are only a limited number of furniture manufacturers, an estimate based on the website of the Centrale Bond Meubelfabrikanten (CBM) contains 40 companies. Probably not all of these companies will produce furniture with timber, but also other materials.

In consultation with the VHN it was decided to contact the NBvT for contact information of their members. An oral agreement with the NBvT was made to receive contact details of a number of their (innovative) members. But after a few weeks, and sending a reminder no contact information was received. Therefore it was decided to contact first the members of the VHN. These companies were asked to mention companies in the timber industry that were good examples of innovative companies. Through this method contact information was retrieved of about 30 companies which were all contacted. Of the contacted companies 8 agreed to cooperate in the research. 2 companies were willing to participate, but because of time restrictions of these companies an appointment was not made.

The companies mentioned by others are mainly window frame manufacturers. During the interviews was noticed that it is difficult to make a clear distinction between the activities of companies. For example there was a company active in the treatment of wood, but the company also produced window frames.

3.2.2 Questionnaire development

After concluding the preliminary research a questionnaire is constructed that will be used during the interviews with companies in the timber industry. All topics in the questionnaire link back to the conceptual model and literature study. The questionnaire is constructed and structured in such a way that the total time for the interviews does not exceed a time of 60 – 90 minutes. After finalizing the first version of the questionnaire it was tested during a first interview. Question 3 was changed since it appeared that respondents found it difficult to divide 100 points among 3 different descriptions. In the final version of the questionnaire respondents was asked to grade the three value strategies from 1: most important to 3: least important.

Furthermore, only small (textual) changes were made. In appendix 1 an example of the questionnaire that is used during the interview can be found. All questions in the question list relate to a certain part of the literature study, this is also indicated by the paragraph number depicted at every question. As already mentioned the questions also relate to the conceptual model. After every question is explained what the exact goal of the question is. Table 1: “Questions related to concepts” shows how the different questions presented in appendix 1 relate to the different concepts presented in the conceptual framework and the literature study.

Table 1: Questions related to concepts		
Question number	**Paragraph number**	**Concept**
1	4.1.1 / 4.1.2	Innovation – types of innovation
2	4.1.3	Input – throughput – output
3	4.1.4	General company strategies
4	4.2.1	Drivers RBV – Innovation strategy
5	4.2.1	Drivers RBV – Formal structures
6	4.2.2	MO – Customer orientation
7	4.2.2	MO – Competitor orientation
8	4.2.2	MO – Interfunctional coordination
9	4.2.1.1	Networks of collaboration – Project team organization
10	4.2.1.2	Collective learning
11	4.2.1.1	Networks of collaboration – Cooperation
12	4.2.1.1	Networks of collaboration – Cooperation
13	4.2.1.1	Networks of collaboration – Cooperation
14	4.2.1.1	Networks of collaboration – Cooperation
15	4.2.1.1	Networks of collaboration – Dependency
16	4.2.1.1	Networks of collaboration – Compatibility
17	4.2.3.1	Subsidies – Finance
18	4.2.3.1	Subsidies
19	4.2.3.1	Subsidies
20	4.3	Barriers towards innovation
--	4.2.3.2	Company size

3.2.3 Procedure

All companies are contacted through telephone and if necessary by email. At the start of the telephone call is asked if the telephone call can be forwarded to the person responsible for innovations. To potential respondents is explained what the purpose and goal of the research is and if they are willing to cooperate in the research. If companies request additional information about the research is send be email in order to convince people to cooperate. When companies agree to cooperate an appointment is made for a face-to-face interview. In most cases the director or owner of the company will be interviewed.

3.2.4 Validity and reliability

The validity of an empirical study can be assessed in two ways: face validity and content validity. Content validity is ensured since the interview questions are all based on the literature study, whilst face validity is ensured by pre-testing the questionnaire. Pre-testing the questionnaire ensures that questions are interpreted and explained in the same way. Because all interviews are conducted by the same person it is ensured that all data are gathered in the same way. This ensures a reliable research. To ensure the reliability of the results at every company the production manager, technical director, director or owner will be interviewed. In total about 35 different companies are approached to participate in an interview. Finally 16 companies agreed upon an interview of 60 to 90 minutes.

Appendix 2 shows the characteristics of the interviewed companies. For example the company size, address etc. are mentioned. Also a short list of companies that were not willing to participate in a study is included.

3.2.5 Assumptions

For this research some assumptions were made:

- The sample represents the studied population

The first part of the interviewed companies was chosen in consultation with VHN. The second part of the studied population was chosen based on recommendations of industry partners and already interviewed companies. Trading companies are about 1/3 of the timber industry in the Netherlands and are not studied, because it is expected that these companies do not innovate. This presumption was confirmed by a timber merchant.

- Respondents give truthfully answer to the questions posed

All the companies that participate in this study do not have a commercial interest in this study, and therefore the researchers expect that they will answer questions truthfully. Companies that participate in the study do not know in advance which companies participate in the study. During the interview, if requested, names of other companies are mentioned. No substantive information is given to these companies.

- The survey is valid and has an adequate coverage of the topics

The topics that are discussed in the questionnaire are discussed extensively in the literature study. All paragraphs in the literature study correspond to a question in the question list. In this way is secured that all topics are discussed during the interviews.

3.3 Data analysis

After finishing all interviews the data gathered during the interviews is analyzed. Of all interviews are transcript is written. A CD-ROM with all interviews can be found as appendix 5. Questions 4,5,6,7,8,9, 15, 16 and 19 consist out of Likert-scales ranging from 1- (not at all) to 4 (neutral) to 7 (to an extreme extend). The questions were Likert scales were used are analyzed wit SPSS in order to retrieve average values and standard deviations. During the interview a number of open questions were posed (1, 2, 3, 10, 11, 12, 13, 14, 17, 18 and 20). Furthermore every respondent was asked to motivate scores given on the Likert scales. These data will be used in a descriptive way during the analysis of the interviews. The results from the interviews and analyses will be linked back to concepts found in the literature. Also links between various items are hypothesized or proposed.

3.4 Limitations

In this study is assumed that the population is representative for the entire population, companies active in the forestry are excluded. Therefore one should be careful with generalizing all results. The main reason for this is that it is suspected that innovations in the forestry are not comparable with timber companies. For example, in the forestry innovations can be concerned with new types of forest maintenance. Furthermore the results are not applicable for timber merchants and wholesale companies in the Netherlands. It is assumed in this study that these companies do not have really innovative activities.

4. Literature review

In this chapter the results of the literature review are presented. The chapter is structured into 3 different sections. In the first section the general innovation literature is reviewed. In section the Resource Based View (RBV) and Market Orientation (MO), two firm perspectives and its innovation drivers are presented. In section 3 innovation barriers are presented.

4.1 General innovation literature

In the following paragraphs will be explained how innovation in the Dutch timber industry can be classified. First of all the definitions of innovation and innovativeness will be explained. Secondly it is explained which types of innovations are common in the literature. The third and final part of this chapter is concerned with methods to classify innovation.

4.1.1 Definition of innovation and innovativeness

In the literature a variety of definitions can be found for the concept innovation. A simple but not complete definition of innovation is that an innovation is 'something new' (Smith, 2010). Already a better definition is that 'an innovation is something novel and different' (Smith, 2010). Rogers (1995) gives the following definition for innovation: "An innovation is an idea, practice or object that is perceived as new by an individual or other unit of adoption" (Rogers, 1995 in Smith, 2010). A more practical definition of an innovation is given by Freeman & Soete (1997): "The first commercial application or production of a new process or product" (Freeman & Soete, 1997 in Smith, 2010). The definition of Freeman & Soete has a shortcoming: it fails to address service innovations (Smith, 2010). Therefore in the present research the definition "Innovation is the successful exploitation of ideas" is used (DTI, 2004 in Smith, 2010).

Innovation and innovativeness are two concepts that are very closely related to each other. There are also many definitions for innovativeness. A common definition for innovativeness is 'A firm that adopts innovations' (Utterback (1974); Daft (1982); Attewell (1992) in Knowles et al. 2007). Another way to define innovativeness is 'the propensity of firms to create and (or) adopt new products, manufacturing processes, and business systems' (Knowles et al. 2007). In other words innovativeness is the behavior of a firm to create and adopt new products, processes and business systems. Innovativeness is the actual 'innovation behavior' of a firm.

Concluding, there are various definitions of innovation and innovativeness. In this research we will use the following definitions: An innovation is the successful exploitation of ideas. Innovativeness is defined as the tendency of companies to create and adopt new products, processes and business systems.

4.1.2 Types of innovations

Innovations can be characterized in various ways; a well-known typology is developed by Henderson & Clark (1990). Here a distinction between system and component knowledge is made to differentiate 4 categories of innovations: incremental innovations, modular innovations, architectural innovations and radical innovations. 'Figure 2: types of innovation' gives a schematic overview over the four different types of innovations.

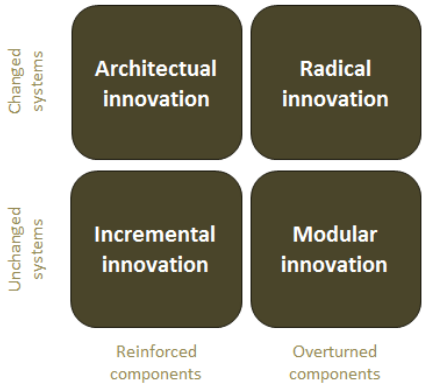

Figure 2: Types of innovation (adapted from Henderson & Clarck, 1990; in Smith, 2010)

Important is to recognize that products, services and processes are actually systems. Again, systems are made up of components that fit together in a certain method. Components are parts or mechanisms that perform a specific function in a system. This means that when systems are changed the components are combined or related to each other in another way (Henderson & Clarck, 1990; in Smith, 2010).

A radical innovation can be described as a non-linear innovation where the expected development stops, and a different step is taken than what would be logical. A good example of a radical innovation is the flat-screen television, being radically different than CRT televisions. Instead of using a CRT-screen, flat screen televisions use LCD screens. Incremental innovations can be defined as small or medium changes to existing products, processes and services. They typically involve improvements or new components but within the boundaries of an existing design. Modular innovations use the design and configuration of existing products, but use new components with different design features. They do not use a completely new design, but it uses new or significant different components, an example of a modular innovation is the clockwork radio. It uses the same components as a radio, but the power source is different than 'normal' radios. The final type or description developed by Henderson & Clark (1990) is called architectural innovation. The components and design remain the same, but how they are configured is new. A classic example of

an architectural innovation is the Sony Walkman, all components were used for years, but the way configured together was completely new (Smith, 2010).

For products the typology of Henderson & Clarck (1990) is very usable. However it is difficult to use as a classification scheme for all types of innovations. In the past years an important innovation in the timber industry has been the introduction of certification schemes like Forest Stewardship Council (FSC). FSC is a certification scheme that guarantees that the timber is produced and harvested in a social, economic and environmental sustainable method. To classify these types of innovations into the scheme of Henderson & Clarck (1990) is difficult since there is a general focus on products.

To describe the different types of innovations in the timber industry one needs a different description than the characterization proposed by Henderson & Clarck (1990). The description should be able to characterize all types of innovations that can occur in the timber industry. A well-known definition that is often used is the characterization of innovations into three categories: product, service and process innovations (Smith, 2010). This characterization scheme simply divides innovations into a category based on the nature of the innovation. In contrast to the description of Henderson & Clarck (1990) it does not take the impact of an innovation into account. Product innovations are probably the most well-known innovations, numerous examples can be mentioned. Service innovations are less known, probably because service innovations are often less spectacular and appealing than product innovations. Examples of service innovations are Facebook and EBay, but also new delivery systems or no frills airlines like South West airlines. Process innovations are typically innovations in manufacturing processes and also include innovations in administrative and office systems since they can include improved methods of working. A very well-known process innovation is the moving production assembly line of Henry Ford. (Smith, 2010)

The characterization into product, process and service innovations is popular and is proposed as a good characterization (Smith, 2010). However the description can sometimes be confusing: for example Facebook is a company that offers a service to its clients and therefore Facebook is characterized as a service innovation. One could argue that this is not correct since the product that is offered by Facebook is an interactive network site. The same can be argued for the timber industry: some companies are simply performing contract work, for example the production of timber profiles. When these companies develop a really new profile for a client, how should it be characterized? It is possible to classify it as a product innovation since it is a new product that is

made, but it can also be classified as a service innovation since the innovation is performed as a service for a client.

Thus, it can sometimes be confusing to establish in which category an innovation belongs. The distinction between product and service innovation or service and process innovation can be vague and difficult to determine. A characterization is needed in which this distinction is clearer. In the forestry industry a modified version of the characterization in product, process and service innovations is used. Here the characterization into product, process or business system innovations is made (Han et al. 1998; in Hovgaard & Hansen, 2004). Thus, the category service innovations is replaced with the category business system innovations. Business system innovations are defined as innovations that are concerned with for example new marketing methods, management systems and administrative projects. One could say that business system innovations are modifications to the way how the business is organized, both internal and external. A product innovation is defined as a successful change in a firms output; either as goods or services. Service innovations in this case are part of product innovations and are not seen as a separate category. Process innovations are defined as the introduction of new elements in an organizations production process. (Crespell et al. 2006).

Han et al. (1998) characterize innovations differently. Facebook is classified as a product innovation since the product delivered by Facebook is an interactive network site. In the original characterization scheme Facebook was classified as a service innovation. The introduction of a new Customer Relationship Management system (CRM) is characterized as a business system innovation, whereas it would be characterized as a process innovation in the former characterization. Innovations that are performed for clients by contract companies in the timber industry are also easier to characterize. The earlier mentioned example of a company that develops a new profile for a client is easy to characterize in the categorization of Han et al. (1998), since it is a product innovation (In the former characterization it could be a service innovation or a product innovation).

Innovations can be characterized in different ways. Common characterizations are based on system and component innovations, or a characterization in product, process and service innovations. In the present study innovations can be characterized in 3 categories: product, process and business system innovations.

4.1.3 Classification of the Dutch timber industry

In the previous paragraph a definition for innovation and innovativeness was given. Furthermore a characterization for the different types of innovations was given in order to be able to distinguish the various types of innovations. However, innovation and innovativeness differs between companies and industries. Therefore, it is useful to be able to make comparisons between different industries. Comparisons between industries can help institutions and the government in order to determine how and if they should assist certain industries with innovation.

Classifying the level of innovativeness of the Dutch timber industry can be useful. Governments use classifications to determine which industries should be supported. For the industry itself it can also be useful in order to determine how they perform in comparison with other industries. The Organization for Economic Cooperation and Development (OECD) provides two widely recognized industry classifications, the first type of industry classification has three categories: high-technology, medium-technology and low-technology industries. Categorization is made based on R&D expenditure as ratio over turnover. The second type of industry classification is based on R&D expenditure as ratio over turnover and technology embodied in intermediate and capital goods over gross output. This typology has 4 categories: high technology, medium high technology, medium low technology and the low technology industries. Both classifications have the same drawback: they are only based on the R&D expenditure of a company. Although R&D expenditure is a method to measure innovativeness, but there are also other indicators for innovativeness. (Raymond et al. 2006).

The classifications of the OECD have as main drawback that they only take into account R&D expenditure. In the literature also other methods to classify innovativeness can be found, that use other methods than R&D expenditure. Pavitt (1984) developed a taxonomy with in total three categories: a supplier dominated category, a production intensive category and a science based category. The taxonomy is based on similarities and differences between industries in sources, nature and impact of the innovations (Pavitt, 1984). Also Hollenstein (1996) and Baldwin & Gellatly (2000) developed a classification system. Their classification system is based on a principal component analysis in which a number of innovation indicators are used. Examples of innovation indicators are worker skills and technology use (Raymond et al., 2006).

Both methods have another approach than the methods proposed by the OECD. They also use a different set of innovation indicators. Raymond et al. (2006) proposes to use a combination of the OECD methods and the methods proposed by Pavitt (1984), Hollenstein (1996) and Baldwin &

Gellatly (2000). It is proposed that a combination will give a better impression of the innovativeness of an industry. Raymond et al. (2006) proposes to study a number of variables, namely: innovation dummy, intensity of innovation, size, relative size, demand pull, technology push, subsidy, cooperation and R&D variables. In the study of Raymond et al. (2006) it was determined whether companies have innovation projects, how often innovations occur, the size of the company, if the innovation is a technology push or demand pull, if subsidy is used and what several R&D variables are. It seems that the method proposed by Raymond et al. (2006) gives a better insight in the innovativeness of certain industries.

The method of Raymond et al. (2006) gives a better insight in the innovativeness of industries, but misses which factors related to innovativeness can be influenced by companies. A model in which the external and internal variables are reviewed would be better suitable for the present study. Keizer et al. (2002) proposes to measure innovativeness at three different levels: input, throughput and output. In the present study the input – throughput – output model of Keizer et al. (2002) will be used.

All innovation efforts of a company can be measured with different methods, as was explained already. In this research an input – throughput – output model will be used to measure innovation efforts of companies. The input and throughput variables are also identified as external and internal variables; the definition in this research is the same. Input variables can be seen as the external conditions and refer to connections of the company with external parties. Throughput variables are the internal conditions, the characteristics a company has chosen and developed. Throughput variables largely determine whether and how stimulating innovation input (external variables) is received and processed (Keizer et al, 2002).

Keizer et al. (2002) studied the innovative efforts of Small Medium Enterprises (SME) in the metal-electro industry in the Netherlands. The factors that are identified in the study are all selected after an elaborate study of the literature concerning innovation efforts. The external variables used are: innovation subsidies, linkages with knowledge centers, transfer of knowledge, collaboration with other firms, collaboration subsidies and financial resources. Internal variables that are tested are: higher/academic level of education of employees, middle level of education of employees, education of manager, value production equipment, investment in production equipment, payback period, automation & information technology and finally R&D investment. The output variable that was measured by Keizer was the innovation effort of the interviewed SMEs. In the present study the model of Keizer et al. (2002) will be used. 3 variables are excluded namely ‘value of production

equipment', 'investment in production equipment' and 'payback period'. These variables are excluded since it is likely that the respondents are not willing to give such company specific information (Keizer et al, 2002).

Classifying innovation is useful to be able to compare different companies and industries with each other. In the literature a vast amount of studies can be found that all propose different methods to measure and classify innovation. In this research innovation will be measured and classified by an input-throughput-output model. Advantage of this model is that one is able to determine which variables support innovation and if a company can actively influence these variables.

4.1.4 General company strategies

One of the most important goals of companies is to increase their financial performance. To increase the financial performance of companies it is important to have a clear long term vision. The long term direction of an organization is typically associated with strategic decisions. Strategy is a common term in businesses and can be defined as 'direction and scope of an organization over the long term, which achieves advantage in a changing environment through its configuration of resources and competences with the aim of fulfilling stakeholder expectations'. Strategy can be identified at different levels within a company: corporate-level strategy, business-level strategy and operational strategy. The corporate-level strategy is mainly concerned with the overall purpose and scope of an organization and how value can be added to the different business units. A business-level strategy is concerned with how the company should compete successfully in the chosen markets. In the present research the focus will be on corporate-level strategy (Johnson et al., 2009).

Every company has a certain strategy that is pursued by the company; differences will mainly exist in how companies pursue their strategy, for example in a formal or informal way. A number of studies has been dedicated to how companies create and pursue a certain strategy. Well known articles that classify strategy in different categories are for example Competitive strategy (Porter), Value strategies (Traecy & Wiersma, 1993) and the Ansoff matrix (Ansoff). Traecy & Wiersma (1993) propose that there are three value strategies that can be pursued by companies: product leadership, operational excellence and customer intimacy. In product leadership a company focuses on producing superior products than the competition, in operational excellence companies focus on producing as efficient as possible. Finally, customer intimacy means customer leadership or being the best in 'relationship-marketing'. The theory developed by Porter is very similar, but misses a strategy for companies who are focusing especially on their clients like customer intimacy (Alsem, 2005).

The model developed by Porter is very similar to the format of Traecy & Wiersma, the main difference is that Traecy & Wiersma have a focus towards clients (external) and Porter has a more internal focus (Alsem, 2005). When comparing both models the model of Porter misses a clear strategy that focuses on customer satisfaction or customer leadership, something that is included in the model of Traecy & Wiersma. In line with Alsem (2005) in this research is chosen for the strategy developed by Traecy & Wiersma. During the interview, companies will be asked to grade 100 points over the 3 categories proposed. This enables us to determine which strategy is the most important for a company.

It is expected that the strategies presented above can have a positive effect on the innovative behavior of a firm. This can be explained by the fact that companies have a more clear focus. For example companies that are pursuing operational excellence will be directed towards increasing the efficiency of a company, through process optimizations. It is expected that they innovate on certain aspects depending on the company strategy. There are also strategies that focus on innovation within companies. For the present study we will not use specific innovation strategies described in the literature but the innovation performance of a company will be explained trough 2 different theories. The first theory that is used is the Resource Based View (RBV), second theory used is the Market Orientation (MO) of a firm.

This paragraph showed that there are various definitions for innovation and innovativeness. In this research innovation is defined as the successful exploitation of ideas. Innovativeness is defined as the tendency of companies to create and adopt new products, processes and business systems. Innovations can be characterized in three types: product innovations, process innovations and business system innovation. It is also useful to classify innovations since it enables comparisons between companies and industries. In this research innovation and innovativeness is measured in an input-throughput-output model. This model makes a clear distinction between variables that can (internal) and cannot (external) be influenced by companies.

4.2 What are drivers for innovation?

Both RBV and MO are theories that try to increase the financial performance of a company. Innovation is also an important method to increase the financial performance of a company. The difference between RBV and MO is a difference in focus: RBV focuses on firm resources, whereas MO focuses on market information to increase company performance. MO is more associated with new product success because commitment to the customer and market determined factors are important elements for new product success. RBV is more associated with product innovations because

resource endowment is associated with RBV. Employees should be motivated to create and deliver products/procedures that provide value to customers. This customer value can only be created when a firm is able to fully exploit and leverage its critical resources. Concluding, both MO and RBV seem to be important for innovations, which implies that a balance between RBV and MO is important for innovations (Paladino, 2007).

Stendahl and Roos (2008) claim that innovating Strategic Business Units (SBUs) have a larger MO than non-innovating SBUs. Hansen et al. (2007) found that companies in the forest products industry were oriented towards process innovations and less towards product and business system innovations. Companies active in the forest industry are working to change and adopt the culture of their company to a MO (Cohen and Kozak, 2001). In the specific literature concerning the forestry and timber industry there seems to be a general focus on MO, while a combination of MO and RBV seems to be ideal. This is also suggested in the study of Hansen et al. (2006) and Paladino (2007). In this study both RBV and MO will be used.

4.2.1 Resource Based View

Two different theories are used to explain the innovative performance of companies, the RBV and MO. In this section the RBV will be further explained. A RBV can be explained as a perspective or theory that is based on the resources of a firm. The RBV aims to explain the innovative performance of a company based on the resources used by a firm. In a RBV there is primarily an internal orientation and a focus on generating resources that are difficult or even impossible to imitate. In other words, a RBV focuses on the organization and how the organization can use internal sources to develop new products for customers (Paladino, 2007).

There are different studies about the RBV, for example by Paladino (2007). In this study the RBV was operationalized through the Resource Orientation (RO) of a company. RO assesses the extent to which a firm is oriented towards the development of unique resource bundles. In other words, the RO orientation describes to which extent a company practices a RBV. The RO of a firm can be described on 3 dimensions: synergy, uniqueness and dynamism. ‘Uniqueness’ measures which efforts companies undertake to maintain unique resources. ‘Synergy’ is measured by assessing how the resources provide benefits to departments and company levels within the company. The third component, ‘dynamism’, measures the influence of resources on the company. A disadvantage of the proposed method is that it is not specifically designed for Small and Medium sized Enterprises (SMEs). It is likely that SMEs behave differently than larger companies (Paladino, 2007).

In another study the RBV is used in a different way, it is used to explain the competitive advantage of SMEs compared to larger firms. In a literature study the different drivers that are associated with the RBV are identified. Secondly is defined what the performance implications of these drivers are on the company. The literature finally showed that it was possible to classify the drivers into 5 different dimensions that together can be associated with the RBV. The 5 dimensions are: innovation strategy, formal structure, customer & supplier relationships, innovation culture and technological capabilities. After conducting the study, the researchers found that 2 dimensions significantly contributed to the innovativeness of a company, being innovation strategy and formal structure (Terziovski, 2010).

Two elements significantly contributed to the innovativeness of companies. Both elements indicate that formalization is important for innovation. This is in contradiction with other studies that found that (young) firms with flexible structures have significant sources of competitive advantage (Damenpour, 1992). However, good arguments can be found to support the findings of Terziovski (2010). Flexibility can have a negative effect during the implementation of innovations (Patel, 2005; Prakash & Gupta, 2008; in Terziovski, 2010). Also formal systems and procedures are important because they tend to add clarity to employee roles, lead to employee commitment and ultimately lead to organizational effectiveness (Patel, 2005; Prakash & Gupta, 2008; in Terziovski, 2010).

Table 2: Company strategy and structure

Innovation strategy
The organizations vision or mission includes a reference to innovation
Innovation strategy has helped the organization to achieve its strategic goals
Increasing our production volume is an important measure of our process innovation
Improving administrative routines is seen as part of our innovation strategy
Internal cooperation is an important part of innovation strategy implementation
Improving product or service quality is one of our key objectives of innovation strategy
Formulating innovation strategy increases employee skills
Improving employee commitment, morale, or both is part of our innovation strategy monitoring
Formal structures
Managers formally allocate resources to the use of cross-functional teams
Employees formally monitor developments in new technologies
Employees document and use failures as opportunities to learn
Managers provide systems to facilitate formal communication
Action plans or timetables and procedures are used to monitor progress
The senior manager encourages all employees to challenge the status quo
Our flat structure facilitates searching for and incorporating diverse points of view

In table 2: 'Company strategy and structure' the drivers that are associated with the 'innovation strategy' and 'formal structures' of companies are shown. Both elements and the drivers are associated with the RBV and can be seen as a perspective that can be applied to analyze an organization. Companies cannot develop a RBV, but they can develop drivers that are associated with

the resources of a company. When companies score high on the drivers indicated in the table they will be relatively internally focused and they will try to create a unique set of resources. In this study the drivers that are indicated in table 2 will be tested in order to find out whether Dutch companies in the timber industry have a high focus on their resources (Terziovski, 2010).

Terziovski (2010) focused in his study on 5 different dimensions, which consisted of various innovation drivers. Finally it was concluded that 2 dimensions significantly contributed to the competitive advantage of companies. However, it seems that there are more drivers that could be associated with a RBV. Therefore in this study 2 additional dimensions that could be associated with a RBV are tested: Networks of collaboration and collective learning (Terziovski, 2010).

4.2.1.1 Networks of collaborations

Collaboration in innovation is becoming increasingly important for companies. It can be a method for companies to increase their knowledge and skills in certain areas. Research has shown that companies find innovation become more difficult to perform on their own (Tether, 2002). Networks of collaboration in innovation can be a good solution for these companies to continue with innovations. Companies in networks can take part in technologically challenging and economically promising innovations, where this was previously not possible (Semlinger, 1998; Harms, 2001; in Rese & Baier, 2011). In this study we focused on networks of collaboration which can be defined as the active participation in R&D and other innovation projects with other organizations on an equal basis. Innovations can be developed in-house but can also be acquired through external activities, for example the purchase of new equipment (Quesada-Pineda, 2010).

Tether (2002) gives a definition of cooperation in innovation: 'Innovation cooperation means active participation in joint R&D and other technical innovation projects with other organizations. It does not necessarily imply that both partners derive immediate commercial benefits from the venture. Pure contracting out work, where there is no active participation, is not regarded as cooperation'. Rese & Baier (2011) define networks of cooperation in innovation as 'A network that is used for cooperation in innovation consists of different companies or institutions that need to successfully cooperate with each other'. Both definitions have in common that companies need to cooperate to be successful.

Tether (2002) studied the cooperation between companies in the innovation process. Respondents in the study were asked if their company had any kind of cooperation arrangements during innovations. Furthermore it was asked what types of partners were used in the innovation process. Partners that

where identified are: suppliers, customers or clients, competitors, universities, consultants & private research institutes, government institutes, research associations and technology organizations. Probably companies will be able to identify more types of partners. In the study of Tether (2002) information is missing on what actually makes a network or cooperation a success. For this study it is interesting to know what the success factors are of cooperation in networks (Tether, 2002).

The previous paragraph concluded that it would be interesting for the present research to study the actual success factors or drivers of cooperation in networks. First of all respondents will be asked if they are active in a network that is used for innovations. In this case a network consists of different companies and/or institutions that need to successfully cooperate with each other. It is likely that the drivers known from new product development are also the drivers for innovation networks. In addition to these drivers it is likely that there are also specific drivers for innovation networks (Rese & Baier, 2011).

Rese & Baier (2011) studied the success factors for networks of cooperation's. In the study they included the traditional success factors known from new product development and a number of factors that possibly affect the success of networks of collaborations. In total 271 companies responded and after analysis of the results it was found that besides traditional success factors there are a number of other factors that affect the success of networks of collaborations. The dimensions 'project team organization', 'dependency' and 'compatibility of network partners' are success factors for networks of cooperation (Rese & Baier, 2011).

Table 3: Collaboration and project team organization

Project team organization
The person leading the network had the necessary qualities and skills
The project teams in your network were interdisciplinary
The teams were assigned to only one project during the life span of the project
Team members did not change during the project
The teams were motivated
The top management of the partners was committed to the projects
The project team organization was supported by different software applications
Dependency
The partners cover the entire value chain
The partners depend on the network
The partners work well with another
Compatibility of the network partners
Goals
Financial affairs
Quality specifications
Schedules and deadlines
Performance evaluation

Table 3: 'Collaboration and project team organization' shows the operationalization of the 3 dimensions associated with networks of collaborations. Because the 1st dimension, 'project team organization' is also associated with new product development it was decided to make a division during the interviews. First respondents will be asked how the teams that work on innovations are organized. Secondly the respondents are asked if they are active in innovation networks or collaboration networks. If they are active in a network the 2nd and 3rd item will also be asked to respondents. The 1st dimension, 'project team organization', does not need further explanation. 2nd dimension is 'dependency'. Companies that enter a network give up part of their autonomy, as a consequence the companies become dependent on each other. When partnerships are equally dependent, it will lead to higher stability. The 3rd dimension is 'compatibility'; meaning that partners should keep in mind the overall objective and align company goals. Compatibility in strategic and organizational aspects is advantageous for the network, think for example of the same quality standards (Rese & Baier, 2011).

The items presented in table 3 are tested and posed from a company perspective, meaning that it is the perception of the company. There will be no interviews with all companies of one specific network, therefore it is not possible to draw conclusions about networks as a whole. Collaboration in innovation becomes increasingly important, more and more companies are depending on networks for their innovations. Networks can consist out of a number of companies and institutions. The success factors for innovation in a network are project team organization, dependency and compatibility of the network partners. Project team organization is a success factor for innovations that are performed within an organization.

4.2.1.2 Collective learning

In the 5 different dimensions mentioned by Terziovski (2010) is no real remark to collective learning. Collective learning is a driver for innovation that could be linked with the RBV because it focuses on the development of knowledge, resources, in the organization. Therefore collective learning is added in this study. Bull & Ferguson (2006) found that collective learning is an important driver for innovation. Collective learning is performed in an environment where there is a combination of tacit and explicit knowledge. This combination of tacit and explicit knowledge should be clearly communicated and promoted within the company (Bull & Ferguson, 2006). According to Bull & Ferguson (2006) it is necessary to have a real or effective 'product champion', somebody who is able to make others enthusiastic. Hansen (2005) found that the major drivers of innovation are customers, competitors, upper management and employees. A pro-innovation climate is generated by supervisor encouragement, team cohesion, challenge, autonomy, openness to innovation and

availability of resources (Crespell & Hansen, 2008). In addition, organizational commitment and job satisfaction seem to have a positive and significant correlation with a climate for innovation (Crespell & Hansen, 2008).

In the previous paragraphs it was focused on different drivers for innovation that can be associated with a RBV. First of all it was argued that the elements innovation strategy and formal structures are drivers for innovation that are associated with an RBV. Because more drivers for innovation can be associated with an RBV two more elements are tested, namely networks of collaboration and collective learning. In this study in total 4 drivers for innovation are associated with a RBV.

4.2.2 Market orientation

Another method to explain the innovative efforts of a company is through a MO. Similar to the RBV a MO also increases the financial performance and innovativeness of a company (Paladino, 2007). In this section it will be explained what exactly a MO is and how it will be studied in this study. Companies that are pursuing a MO try to increase the value for their customers, and in this way also try to increase the value for their own company (Paladino, 2007). Narver & Slater (1990) define MO as "the organizational culture that most effectively and efficiently creates the necessary behaviors for the creation of superior value for buyers and thus, continuous superior performance for the business". In other words, MO generates the necessary behaviors in order to create superior value for customers that finally will result in better or superior performance of a company. In a RBV customer and supplier relationships were not significant, in a MO perspective is expected that these relationships are important. A seller with a high MO knows how they can share their resources best with its buyers. Companies that want to maximize their long run performance need to know how they can best share their resources with its buyers (Narver & Slater, 1990).

MO can be divided into 3 dimensions: customer orientation, competitor orientation and inter-functional coordination. The dimension customer orientation is concerned with acquiring all information about the customers in the target market. Customer orientation requires companies to understand the complete value chain, today but also in the future. Competitor orientation is concerned with acquiring all information on competitors in the target market. It is important that companies know the direct strengths and weaknesses of competitors and what the long term strategy and capabilities of (potential) competitors are. Inter-functional coordination is the third dimension of MO and comprises of the business coordinated efforts to create superior values for customers. In other words, it is the usage and distribution of company resources in creating superior value for customers. In principle every stage in the sellers' value chain offers potential to add value

for buyers. This means that potentially every employee can add value for buyers (Narver & Slater, 1990).

The scale that will be used in this study is used in different studies, for example Paladino (2007) used this scale to assess the MO of companies. Also in the timber industry the scale is used by Crespell et al. (2006). In table 4 the operationalization of the three dimensions is shown, in total 15 items are linked to the 3 dimensions that represent MO. One could argue that the items in table 3 actually increase the innovation performance of a company.

Table 4: MO innovation performance drivers

Customer orientation
Customer commitment
Create customer value
Understand customers' needs
Customer satisfaction objectives
After sales service
Competitor orientation
Salespeople share competitor information
Respond rapidly to competitors' actions
Top managers discuss competitors strategies
Target opportunities for competitive advantage
Interfunctional coordination
Interfunctional customer calls
Information shared among functions
All functions contribute to customer value

Source: Narver & Slater (1990)

In this study respondents are also asked to grade the items presented in table 4: "MO innovation performance drivers" on a Likert scale ranging from 1 – 7, from 'not at all' (1) until 'to an extreme extent' (7). This is similar to the studies of Narver & Slater (1990), Crespell et al. (2006) and Paladino (2007). Besides the scores given to every item respondents are also asked to provide evidence for the statements made. For example if a respondent states that 'measuring customer satisfaction' is very important, the person is asked to provide examples (or documents, memo's etc.) of how the company measures customer satisfaction. This will enable the researcher to compare the results better and get a better impression of the company.

Besides a perspective in which companies have a focus on the resources, it is likely that there are companies with a perspective on the market. Therefore in this study the drivers associated with a Market Orientation are tested. In fact the drivers can actually be seen as innovation performance drivers.

4.2.3 Other drivers for innovation

In the following paragraphs some drivers for innovation are presented that are not associated with the RBV perspective or the MO perspective. The different items were identified in general innovation literature and in specific innovation literature concerning the timber industry.

4.2.3.1 Subsidies

Innovations are necessary for companies in order to secure future growth and business. However, innovations also are a financial risk for companies, since companies need to earn back the investments made. When the financial risks of an innovation are relatively high, companies will be less willing to start or continue with an innovation (Montalvo, 2006). (SMEs account for an important part of the economic growth of the Netherlands). When the financial risks are relatively high, companies will be less willing to start an innovation, which is negative for the overall economy in the Netherlands. To stimulate economic growth there are various forms of subsidies that are provided by the government. Innovation subsidies are used to stimulate the innovative power of SMEs and increase the willingness of companies to engage in innovative activities. It is expected that companies that receive subsidies are more innovative (Raymond et al. 2006). Subsidies are mostly granted to companies in the high tech industry, in low-tech industries subsidies seem not to make a difference on the innovativeness of a company (Raymond et al, 2006). It is suggested that subsidies only have a positive effect on the innovative power of a company when the company actually knows what it is looking for (Keizer et al., 2002). This suggests that companies with a clear idea for an innovation will use subsidies more frequently.

In the Netherlands there are many possibilities for subsidies, according to Syntens there are about 1900 different subsidy arrangements available (Syntens is an organization stimulating innovation). On their website Syntens made an overview of the most important subsidy programs classified into 6 categories: subsidies for research, subsidies for energy and environment, subsidies for cooperation, subsidies for export, innovation credit and finally social innovation. This study will focus on a number of specific subsidies of which it is expected that they are used frequently by companies in the timber industry. Companies will be asked if they have used the following subsidies:

- TEMA: Research subsidy for environmental companies
- WBSO: When staff spends time on technical R&D companies can apply for a reduction on the tax for wages
- IPC: Subsidy for a group of companies that cooperate to exchange knowledge on specific innovations

- Innovation credit: Financial support for the development of innovations with high commercial potential

Besides the subsidies mentioned above there are more subsidy programs that can be important for companies. Agentschap NL is an organization of the ministry of Economic affairs, Agriculture and Innovation (EAI) and is concerned with the implementation of government policy. Agentschap NL is responsible for subsidy programs in the Netherlands. On their website information was retrieved about innovation vouchers for companies. With an innovation voucher companies could post a question at different knowledge institutions in the Netherlands or questions about patents. Therefore companies will be asked if they have used innovation vouchers.

It is expected that subsidies have a positive influence on the innovativeness of companies: companies that used subsidies will be more successful in innovations.

4.2.3.2 Company size

Innovation was subject in a number of studies directed specifically towards the forest products industry and the timber industry. Most of the topics are comparable with those in general innovation literature. Quesada-Pineda (2010) defines a firm as innovative when it has innovation activities, and recommends studying the ratio of expenses from innovation activities to the total sales. Crespell et al. (2006) argues that being innovative through the development of improved or new products, processes and business systems help companies to better stay ahead of competitors. Furthermore it will enable companies to better satisfy customer's needs (Crespell et al., 2006). Hansen et al. (2007) found that innovativeness in the perspective of forest product managers described 5 aspects: new, creating the right culture, managing the market-customer link, being a leader and focus on the future. Similar descriptions can be found in for example Smith (2010).

Stendahl & Roos (2008) indicated company size as a driver for innovation. Similar results were found by others. Hansen et al. (2006) found that company size is a positive indicator for innovativeness in forest industry companies. Similar findings are reported in the study of Wagner & Hansen (2005) who found that organizational size is a positive driver for innovativeness. Hansen et al. (2011) also found that firm size is positively related to innovation. Crespell et al. (2006) found that company size was a positive indicator for innovativeness, although the data were not significant. This is opposite to the findings of Quesada-Pineda (2010) who found that smaller companies were more likely to introduce new inventions and innovations.

4.3 Barriers towards innovation

It is important that SMEs need to better understand how they can overcome barriers in the innovation process (Teece, 1996; in Madrid-Guijarro et al, 2009). Managers perceptions of issues related to costs are more important barriers than human resources, which are lower barriers. Costs are an important barrier and can constrain innovations. It is important to understand the barriers that are faced by companies in the innovation process. Understanding barriers can aid in the development of firm strategies and government policies, finally contributing to economic growth, job creation and increased wealth (Madrid-Guijarro et al, 2009).

Barriers are for companies a reason why not to start or continue with an innovation. Madrid-Guijarro (2009) identified the barriers to innovation in Spanish manufacturing SMEs. After a literature study it was concluded that it is possible to divide barriers into roughly 2 different categories: Internal and external barriers. The internal barriers can be further divided into financial resources and human resources. Interestingly, with this classification the researchers couple the internal variables to a Resource Based View (RBV). The external barriers are not coupled to a theory or perspective to explain the innovative efforts of SMEs (Madrid-Guijarro et al, 2009).

As shown in the previous paragraph it is possible to divide barriers into external and internal barriers. In total there were 15 different external and internal barriers identified in the study of Madrid-Guijarro et al. (2009). The internal barriers were focused on the costs for innovations and on human resources, i.e. resistance to change. In the study a good overview is given of the possible barriers, however in the present study we will not use the barriers identified by Madrid-Guijarro et al. (2009). Main reason is that the researchers expect that there will be specific barriers concerning the raw materials used in the timber industry. Therefore, the focus will be on specific literature about barriers to innovation in the timber industry.

Stendahl & Roos (2008) investigated possible antecedents and barriers towards innovation in the Scandinavian wood industry. The barriers all can be associated with a RBV. Barriers can have a negative influence on innovations, sometimes innovations are not started or fully executed. A division can be made in internal and external barriers, similar to the division made by Keizer et al. (2002). External barriers can be difficulties in obtaining raw materials, lack of a demand for innovations, regulations or policies that obstruct innovations. Internal barriers can be a lack of competencies, resistance to change among employees, lack of time and a lack of resources (Stendahl & Roos, 2008).

In the past, the timber industry was depicted as a traditional industry where it is difficult to introduce innovations. This suggests that there are specific barriers to start an innovation. People active in the timber industry in the Netherlands typically describe the timber industry as traditional and conservative. In other countries the timber industry is also described as a traditional industry (Hansen et al. 2007). This is also confirmed in a study of Hovgaard & Hansen (2004). Tradition or a traditional attitude is identified as a challenge to innovation, tradition could be described as a resistance to change (Hansen et al. 2007).

Previous research has identified numerous possible barriers towards innovation. Stendahl & Roos (2008) made in their study a selection of barriers based on lists of the OECD/Eurostat (1997), Nord (2005) and Stendahl (2007). In total 13 barriers were identified and tested.

- The personnel dislikes change and development of work (Tradition)
- Product development is not prioritized in the daily work
- Product development is not prioritized in investment decisions
- The need for product development is very low
- Too little knowledge about process technology makes product development difficult
- Too little knowledge about wood properties makes product development difficult
- Too low level of competence among personnel makes product development difficult
- There are too few ideas for new products
- Too much variation in raw material quality makes product development difficult
- Too insecure raw material supply makes product development difficult
- Current process technology in the market gives no new possibilities for product development
- Too little knowledge about customer needs makes product development difficult
- Product development is considered difficult and expensive

The barriers that are presented above specifically address product innovation and product development. Therefore the items will be adapted that they represent all types of innovation. Furthermore it is possible to identify a number of barriers that could be identified with a Resource Based View. The first 7 items seem to be applicable for a RBV since they are focused on the internal organization.

Besides drivers for innovation companies in the Dutch timber industry will also face barriers that decrease the innovative efforts of companies to innovate.

4.4 Conclusions literature study

In the literature there are various definitions of innovation and innovativeness. This study will use the following definitions: An innovation is the successful exploitation of ideas. Innovativeness is defined as the tendency of companies to create and adopt new products, processes and business systems. Innovations can be characterized in different ways. Common characterizations are based on system and component innovations, or a characterization in product, process and service innovations. In the present study innovations can be characterized in 3 categories: product, process and business system innovations. Innovations will be classified in an input – throughput – output model, which enables to identify which variables support innovation.

Companies have certain characteristics that drive innovation. Therefore different innovation drivers were identified in the literature. First of all, it will be focused on the drivers that can be associated with a Resource Based View. Organizations that score high on the items associated with a RBV will be relatively internally oriented and try to develop innovation based on their resources. In this study the drivers associated with a RBV that will be tested are innovation strategy, formal structures, networks of collaboration and finally collective learning.

Another perspective that can be used to analyze companies is a Market Orientation. Companies have a perspective that is based on the market. Innovations are developed because of signals from the market. The items that are tested for MO are more than innovation drivers, it are innovation performance drivers. This means that an item increases the performance of the innovation. In this study is argued that companies should have developed a sufficient drivers associated with RBV and MO.

Besides the drivers that can be associated either with a RBV or MO other drivers have also influence on the innovation process. Subsidies are mentioned frequently as an innovation driver because they decrease the financial risk for companies. Another driver that is mentioned in specific literature concerning the timber industry abroad is company size. In some studies it was found that company size was a positive driver for innovation, however in other studies no conclusive evidence was found. Besides drivers for innovation various barriers towards innovations were found. Therefore the barriers towards innovation will be studied.

5. Results and Analysis

This chapter presents the results and analysis of a research in the Dutch timber industry. In total 16 different companies in the Dutch timber industry were interviewed about innovation at their company. The companies that were interviewed are active in different parts of the Dutch timber industry, respectively in wood treatment/modification, furniture manufacturers, window frame manufacturers and the production of timber profiles. The size of these companies varied from 10 employees until 110 employees, so they all can be classified as Small or Medium sized Enterprise (SME). All of the interviews were conducted with people involved in the innovative activities of the company, for example the innovation manager, owner or director of the company, technical director or the innovation manager. The interviews lasted for approximately 1 hour. 13 interviews were tape recorded, and during all interviews notes were taken. In appendix 2 an overview of the interviewed companies and persons can be found. The transcripts of the interviews are available as appendix on a CD-ROM.

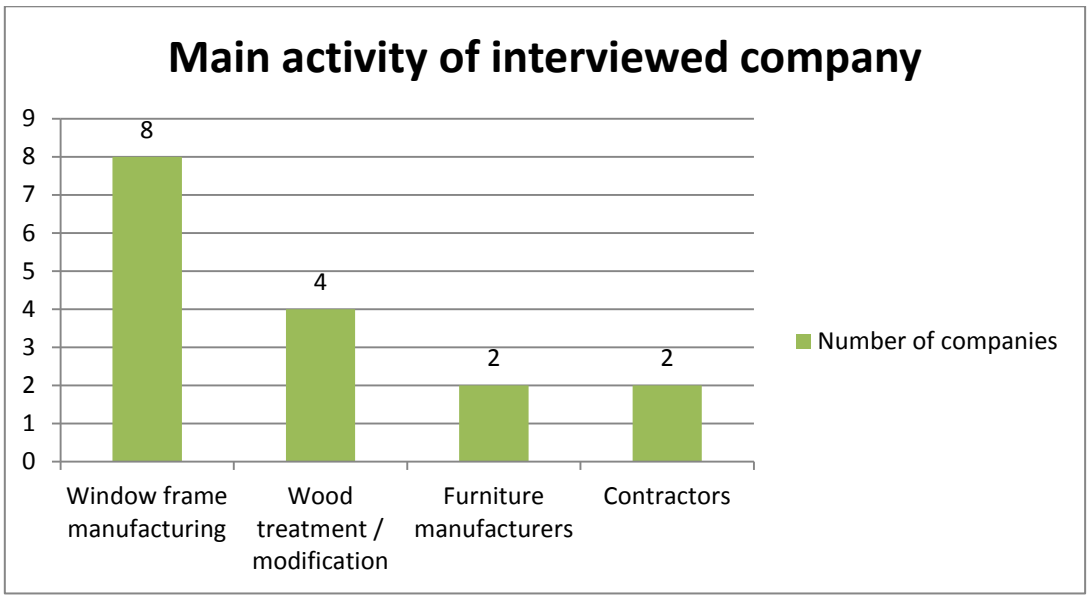

Figure 3: Main activity interviewed company

In this chapter a number of quotes of different respondents are used to clarify statements and to present results. To indicate which respondent made the statement a letter in superscript is placed after a statement. This letter corresponds to a company/respondent indicated in appendix 2. In figure 3: "Main activity of interviewed company" shows the main activities of the interviewed companies. This means, for example, that it is possible that a window frame manufacturer also is active as timber whole sale company. The statements presented in this chapter are translated from Dutch to English; sometimes the order of words is changed to place the statements in the correct context. Furthermore footnotes are used to clarify some statements by for example an enumeration.

5.1 General innovation literature

5.1.1Definition of innovation and innovativeness

Respondents were asked to give a general example of an innovation and every respondent was able to mention general examples of innovations. By giving examples the researcher got a good impression of the respondents and their knowledge about innovations. Examples of innovations that were mentioned are for example the Senseo coffee machine or more general innovations in biotechnology. In general everybody agreed that innovation is or should be something renewing for an industry or company. All respondents were also able to mention innovations specific for the timber industry or their company. Respondents also seem to understand the need for innovation, reflected by a statement of one of the respondents: *"We are continuously active with the renewal of techniques, and so on. It is part of entrepreneurship, if you don' it is the end, then it stops."* [D]

In the previous paragraph a possible explanation for the lower level of innovativeness of the timber industry is given. Because of the lack of raw materials there is a group of companies active as wholesale and trading company and therefore these companies are not really innovative. This could be a partial explanation, but gives no explanation for all companies that are active as producing company. As shown in chapter 2 'industry background' about 860 companies are active in the timber industry, 300 companies are member of the Dutch association of timber merchants (VVNH). These companies are active as trading company, but many also have own production facilities. Furthermore it gives no explanation for the other production companies in the timber industry.

After conducting 16 interviews it is possible to give a general impression of the companies and the innovativeness in the industry. In general all companies are active with different innovations and the impression that the industry is not innovative was not confirmed. All companies were active with different innovations. The industry has also an own character in the sense that real craftsmanship is still rewarded by customers. Customers of the timber industry are a conservative industry in which it takes time to introduce new innovations.

5.1.2 Types of innovations

The innovations that were mentioned as examples could be classified in the proposed categorization: all innovation could be classified as product, process or business system innovation. Some examples of product innovations are Accoya timber and Nobelwood. Other examples of product innovations are improved window frames and the introduction of new timber profiles. Improved window frames have for example new types of joints, or other timber species that are used. An example of a new

profile is a masonry profile. Normally these profiles are produced of beams in the requested length. The innovation is to produce these profiles of laminated and finger jointed pieces of timber. This increases the dimensional stability and durability of a profile. It seems that product innovations have more or less similar content, especially applicable for window frame manufacturers. Seven out of 8 companies mentioned an innovation in which an improved window frame was created and as additional feature the window frames are delivered readymade. The NBvT has described 4 different methods about how a window frame can be delivered which they have called 'concepts'. 7 companies delivered window frames according to 'concept 3 or 4'.

All the respondents performed innovations that could be categorized as product, process and business system innovations. 7 out of 8 window frame manufacturers performed product innovations in the past 5 years, only 1 company did not perform product innovations. All wood treatment/modification companies performed product innovations. All of the interviewed respondents performed process innovations, many companies perceive process innovations as daily business. It would be interesting to make a division between the different categories, but it was difficult for the respondents to give exact data about the quantity of product, process and business system innovations in the past 5 years.

As already mentioned process innovations were well known and present at all interviewed companies. Most of the companies were active in process innovations to optimize production. Examples were given of companies who developed special machines in house, or bought new machines of suppliers. Another example of a recently started innovation is that of a company who wants to burn sawdust (a rest product of production) to produce own electricity. Most companies perform process innovations when for example a new type of machine is bought. This is for most companies a suitable moment for performing process innovations because completely new systems and machines are available. New factory lay outs are performed on a more or less continues basis. 1 company mentioned that they did not really performed process innovations [/]. The reasoning of the respondent was that the company existed for more than 100 years and that it is logical that you do everything in the most efficient method. Although the respondent claimed that no process innovations were performed, in fact the company performed process innovations. For example, the company recently installed new treatment facilities that are among the most modern facilities of Europe.

There are also examples of business system innovations, of which most are concerned with new software packages, used for example in production planning. A number window frame

manufacturers recently invested in a software package called Bouw Informatie Model (BIM). The different companies and people involved in a specific project all use the same data. When one person changes something in for example the construction, this is automatically changed in all drawings. It enables them to work faster, and it will become easier to adapt or change the design. The drawings also can be easily converted into a technical drawing that can be sent directly to the production. Another example of a business system innovation is the introduction of a 'yellow' bill at a window frame manufacturer [G]. Normally a client needs to wait for its window frames for 12 weeks, also when it is a small batch and relatively easy to make window frame. The yellow bill takes care that the window frame is produced in less than half of the time. One company a number of years ago with a web shop for garden houses and other timber. For most companies is applicable that software has become an important part of everyday business. Software has changed the way how companies do business.

Concluding, product, process and business system innovations are all present in the Dutch timber industry. All respondents could mention examples of process innovations. Almost all companies could mention product innovations. Business system innovations are also performed, but probably less than other types of innovations. One possible explanation is that product and process innovations are more common and known within a company. The use of a new software package is less obvious and maybe not always recognized as an innovation for the company. Another explanation is that process and product innovations are more common because of the orientation of the employees and entrepreneurs. Most respondents showed a passion for the product that the company produced, and therefore product and process innovations are more on top of mind.

5.1.3 Classification of the Dutch timber industry

In the literature study was shown that the innovative efforts of companies in the timber industry could be classified in an input – throughput – output model. The model was composed out of different measures. The external variables measured are the use of innovation subsidies, transfer of knowledge, collaboration with other firms, collaboration subsidies and financial resources. The internal variables are higher/academic level of employees, middle education level of employees, education level of manager and R&D investment. The other mentioned internal variables: Investment in production equipment and payback period were also not asked for. This because it was expected that respondents were not able or willing to give this specific company information. The variable automation & information technology was also not asked for because of its general meaning. Probably every interviewed company uses computers in daily operations, so the question does not seem to be relevant.

First of all, respondents was asked what the number of innovative products was that was part of their assortment. Most respondents found it difficult to give an accurate figure for this question. However, some respondents were able to give an estimate. 1 company [K] only sells and produces timber products that are based on the thermal treatment of relatively cheap timber. The innovation for this type of product dates back about 20 years, but the product and production process is continuously improved. A manufacturer [M] of window frames stopped using tropical timber in its window frames. Instead of using tropical hardwoods alternatives are used, like Accoya timber and RoVu. RoVu is a combination of spruce timber and Robinia / Black Locust. RoVu is developed by the company itself and the Robinia is produced and imported from Hungary. The company has own production facilities in Hungary. Another window frame manufacturer [A] developed an improved version of the joints in window frames, and uses this new type of joint on all of his window frames.

Table 5: Paragraph number variables

Variable	Discussed in paragraph
Innovation subsidies	5.2.3.1 Financing of innovations
Collaboration subsidies	5.2.3.1 Financing of innovations
Financial resources	5.2.3.1 Financing of innovations
Transfer of knowledge	5.2.1.4 Collective learning
Higher / academic level of employees	5.2.1.4 Collective learning
Middle level of education	5.2.1.4 Collective learning
Education level of manager	5.2.1.4 Collective learning
R&D investment	5.1.3.1 R&D budget
Collaboration with other firms	5.2.1.1 Networks of collaborations

In the questionnaire the different variables were combined with other questions in order to avoid double questions. The results are therefore discussed throughout the chapter. In table 5: 'Paragraph number variables' the paragraph number can be found corresponding to were the results of the variables are discussed. In chapter 6 the overall conclusion towards the input-throughput-output model will be presented. However, It already can be concluded that the innovative efforts of companies in the timber industry can be classified in an input – throughput – output model.

5.1.3.1 R&D budget

Respondents were asked which percentage of the turnover was spend on innovation or R&D. Not every respondent was able to give an estimate. The companies that were not able to give an estimate seemed willing to give an answer, but did not have any idea. In total 5 companies[1] were able to give an estimation of the R&D budget of their company, with ratios between 2% and 5%.

[1] R&D budget indicated by: B, F, H, O, P

Figure 4: 'Specified R&D budget' gives a graphic representation. 2 companies[2] estimated that their R&D budget was lower than 1%. 1 respondent that was able to give an R&D estimate commented *"I estimate that we spent about 2% on R&D. If we as a company can make a profit of around 5% to 6 % on the total turnover it is fine for us. Last year we had a profit percentage around this figure. It means that you cannot spend a lot of money. What we do at the moment is keeping our team together and making sure we have some profit. Furthermore we invest a part of the profit in innovations".* [B] This statement is also confirmed by general statements of other respondents. Not all statements concerning the financial situation of companies are depicted in the transcripts, as some statements were made after the interview in an informal setting. 1 respondent [I] was not able to give an exact percentage, however it is likely that the company has a special R&D budget. This because the company had 1 employee who was fully dedicated to R&D and the development of innovations.

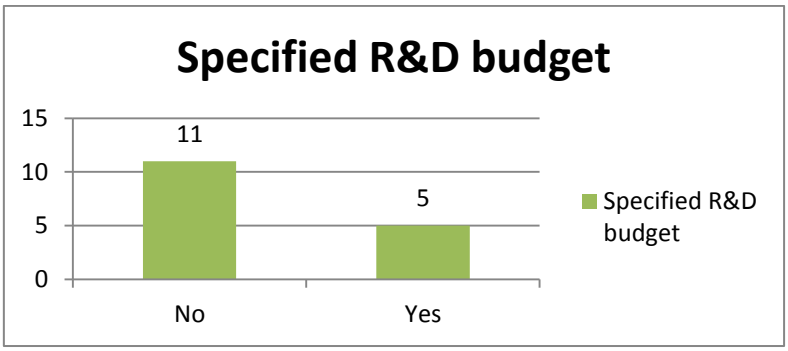

Figure 4: Specified R&D budget

In the literature the R&D expenditure as percentage of expenditure on the total turnover is mentioned as a suitable measure for measuring the level of innovation. Only 5 respondents were able to mention the R&D budget of the company. One would expect that companies have an idea on their expenditures on R&D. A possible partial explanation is that the companies are limited in scale, ranging between 10 and 110 employees. All of the organizations can be described as flat structures, with a low level of formalization. Future decisions are made based on the issues that arise that day. Because there are no real future plans it could be that the companies do not have a specified budget for innovations.

In total 5 respondents were able to mention a R&D budget as percentage of the turnover. 1 company did not mention an R&D budget, but it is likely that the management of that company can give this percentage. The other companies were not able to mention a percentage. In the literature the R&D percentage is mentioned as a good measure for innovativeness, but in the literature study was

[2] R&D budget lower than 1%: A, L

argued that this is a too narrow measure for innovativeness. Therefore we also asked to mention the number of new products. This was difficult to mention for most respondents, but almost every company developed new products. Also process innovations are very common in the timber industry, in every company new machines and for example factory layouts are designed. Business system innovations are also common at various companies, but respondents found it sometimes difficult to mention examples.

5.1.4 General company strategies

Initially respondents were asked to divide 100 points between the three proposed value strategies. After 3 interviews the researcher decided to adapt the question since it was a difficult question during the interview. Therefore the question was altered into a ranking from 1 – most important to 3 – least important. Adapting the question made the question easier to answer, the answers of the first 3 respondents are altered to the new question. Figure 5: "Type of value strategy" shows graphically the results

Product leadership[3] (P.L.) and operational excellence[4] (O.E.) were both 7 times graded as most important value strategy. Customer intimacy[5] (C.I.) was graded only 2 times as most important value strategy. It seems logical that O.E. is graded 7 times as most important value strategy. One respondent explained why O.E. is their most important value strategy: *"We are forced to compete on cost price; otherwise you are finished with business. Of course it is a choice that we have made, in every book is explained that it isn't sensible. But still, in the current crisis we are still able to make profit. Companies with other strategies have disappeared".* [J] Another respondent explains what O.E. for their company is: *"Do more with fewer employees is the ideal, or actually do more with the same amount of employees because you don't want to lose trained staff. You want to use the hours as optimal as possible, and get the highly efficient hours."* [O] O.E. seems a logical value strategy when companies are forced to compete on price.

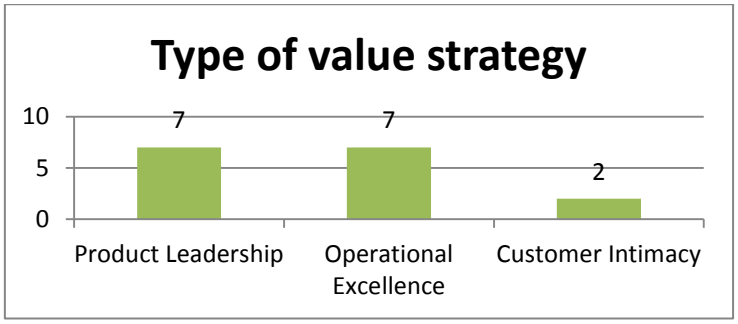

Figure 5: Type of value strategy

[3] Product Leadership most important strategy for: A, B, D, G, I, L, M
[4] Operational Excellence most important strategy for: C, E, J, K, N, O, P
[5] Customer Intimacy most important strategy for: F, H

P.L. was graded 7 times as most important value strategy. Several respondents commented why P.L. is the most important value strategy for them, for example *"The quality of our product is actually the most important, and we produce at a high quality level".* [D] Another respondent commented *"We try to develop products by ourselves and introduce these on the market. We look in the market for potential needs and develop and introduce a product"* [I]. The companies that have chosen P.L. argue that O.E. is part of normal business and that every company has a focus on efficiency. This indicates that O.E. is at a sufficient level for these companies.

C.I. was graded only 2 times as most important value strategy. Both respondents argued why to choose for C.I. as most important value strategy. One respondent explained their choice: *"Our strategy is focused on sales based on solutions. This means that for example we have an employee who focuses only on R&D. If the only thing in which you can distinguish yourself from competition is price you need to have a low cost price. We have an organization which distinguishes itself through knowledge, 'engineering-power' and solutions which costs money. The consequence is that we sometimes cannot be the cheapest..."* [H] The other respondent who claimed that C.I. was the most important value strategy had another reason to focus on C.I.: *"There still is a factor award. At the moment it is difficult and stiff, there is not enough workload. So if you are close to your customer it helps. Continuity has been very important in the past years. Companies who cannot ad any value for their customers, and those companies exist, face difficult times at the moment."* [F]

Although the following comments and results were not part of the initial set of questions it seems relevant to include the following information. 2 companies that were interviewed are also awarded with different innovation or durability awards. In 2010 1 company [I] was awarded with ranking 51 in the national innovation top 100 (Innovation top 100, 2010)[6]. The company was awarded with this ranking because of their development of a duo board, composed of tropical timber and softwood. It reduces the use of tropical timber and is mostly applied as protection of river banks. To protect the innovation a patent was acquired and currently a number of companies produce the board under license. Another company [B] was awarded with a number of prices because of its new type of timber. In brief, softwood is treated with a natural product in order to enhance the durability. The innovation was awarded in 2009 with the Dutch European Environmental Press award. Furthermore the product won the 'MVO award KVK Oost Nederland', a CSR award of the chamber of commerce East

[6] Innovatie top 100 2010: Nationwide ranking of 100 innovative companies or products. For further information: http://www.syntens.nl/Artikelen/Artikel/Creatieve-pluim-voor-Van-Swaay-Duurzaam-Hout-uit-Schijndel.aspx (retrieved from website: 2-11-2011)

Netherlands. At this moment the product is nominated for a 'blue tulip'[7]. Both companies can be categorized as companies that indicated an R&D budget.

In total 5 companies try to protect their innovations with one or more patents[8]. 4 of these companies indicated also a specific R&D budget. 1 company that did not have a specific budget for innovations had a patent to protect an innovation. Patents are not always successful for companies, reflected by the following statement (The company developed an adapter that reduces the number of grinding machines): *"I think we have developed a very innovative adapter and the costs were also substantial, mainly thinking was expensive. If this device finally works you want to protect it properly. At that moment you start exploring the market for the adapter and you find out that the market is very limited. There is a big chance that a machine manufacturer purchases the adapter and puts it away. It actually means that all the costs we have made to protect the innovation were useless. Machine factories are only interested in selling machines."* [O] The company has around 10 planing machines; together with every planing machine you need a grinding machine. The adapter reduces this figure to 1 grinding machine. A rough calculation of the researcher indicates that the company has potentially saved between € 500,000 and € 800,000 with the innovation.

5.2 What are drivers for innovation?

5.2.1 Resource Based View

The first perspective that is used to identify the drivers for innovation is the Resource Based View (RBV). 2 different dimensions, 'Innovation strategy' and 'Formal structure' are tested to find out which drivers are used by companies in the timber industry. The results are presented in table 6: 'Resource Based View'. In total 16 respondents answered the questions concerning the RBV.

[7] For more innovation: http://www.accenture.com/Microsites/innovation-awards/2011/cpa/inschrijven/pages/stem.aspx (retrieved from website: 29-11-2011)
[8] Companies with a patent: B, I, K, N, O

Table 6: Resource Based View (n=16)		
Innovation strategy	**Mean**	**SD**
The organizations vision or mission includes a reference to innovation	3,81	0,62
Innovation strategy has helped the organization to achieve its strategic goals	3,38	0,57
Increasing our production volume is an important measure of our process innovation	4,94	0,40
Improving administrative routines is seen as part of our innovation strategy	2,81	0,55
Internal cooperation is an important part of innovation strategy implementation	3,19	0,61
Improving product or service quality is one of our key objectives of innovation strategy	6,00	0,26
Formulating innovation strategy increases employee skills	4,19	0,59
Improving employee commitment, morale, or both is part of our innovation strategy monitoring	1,69	0,36
Formal structures		
Managers formally allocate resources to the use of cross-functional teams	4,25	0,50
Employees formally monitor developments in new technologies	5,56	0,35
Employees document and use failures as opportunities to learn	4,19	0,48
Managers provide systems to facilitate formal communication	2,00	0,41
Action plans or timetables and procedures are used to monitor progress	4,38	0,52
The senior manager encourages all employees to challenge the status quo	4,38	0,54
Our flat structure facilitates searching for and incorporating diverse points of view	4,75	0,46

In table 6 the results from question 4 and 5 of the questionnaire are shown. In total 16 different drivers were tested for their importance in companies in the timber industry. The respondents graded every item on a 7-point Likert scale. Overall both dimensions are not very important for the respondents as they were graded around neutral. However, some of the drivers do seem important for companies in the timber industry. The most important driver for the dimension 'innovation strategy' is 'improving our product or service quality is one of our key objectives of innovation strategy'. For the dimension 'formal structure' the most important driver is 'Employees formally monitor developments in new technologies'.

There are some drivers that score remarkably low. First of all the driver 'Improving employee commitment, morale, or both is part of our innovation strategy monitoring' (Mean: 1,69; SD: 0,36). The relatively small SD indicates that there is a consensus between the companies that it is not important to improve the commitment and moral of employees. At least this is not a part of the innovation strategy. The interviewed companies were all SMEs and most of the companies did not have a real vision or mission written down on paper. In most cases the respondent was able to

mention some sort of mission or vision, but not formally written down. Probably this is a good explanation why most respondents scored the drivers associated with RBV low.

Looking at the different drivers that have a low score it is possible to give some advises to companies in the timber industry. First of all, companies should try to formalize processes more. Formalization can help companies in the innovation process. In other industries the drivers presented above contributed significantly to the innovativeness of companies. Therefore companies in the Dutch timber industry should try to develop the different drivers as presented in table 6: Resource Based View. Perhaps it is not necessary to develop all different drivers as presented, especially when the size of the interviewed companies is taken into account (Terziovski, 2010).

During the analysis of the results it seemed interesting to analyze the different drivers associated with a RBV against the 3 different value strategies. For example, it seems logical that companies that are focused on product development score higher for the drivers associated with a RBV (Paladino, 2007). In appendix 3 the different scores for the value strategies are presented. The scores are divided into the three different value strategies. One would expect that companies with a product leadership strategy score higher on the drivers associated with RBV. As shown in appendix 3 this is not really the case. There are only relatively small differences, especially compared to operational efficiency. A very remarkable result is that 2 companies indicated customer intimacy as most important value strategy score higher on the different drivers associated with the RBV. One should be very careful with generalizing the results because only 2 companies indicated customer intimacy as most important value strategy.

In appendix 3 the results can be found for the analysis of the value strategies related to the drivers associated with a RBV. The 2 companies with customer intimacy seem to score higher than the other companies, especially the different drivers that can be categorized as ‘formal structures’. The driver ‘managers provide systems to facilitate formal communication’ (mean 1,00; SD 0,00) is scored as not applicable. A logical explanation for this score is that the organizations are SMEs with flat structures, which make formal communication superfluous.

It is possible to see some small differences between the value strategies. First of all it seems that operational excellence scores on average lower than companies with a product leadership or customer intimacy value strategy. The differences between companies with a product leadership strategy are smaller. Sometimes the scores of the companies that indicated a C.I. value strategy can be explained through the fact that only 2 companies scored under C.I. The standard deviation

sometimes differs a lot, and those scores are not relevant. However there are some drivers that have a standard deviation of 0,00. This means both companies gave the same score. Interpreting the results it seems that those 2 companies scored especially higher on the drivers categorized under Formal structures.

After further analysis of the data of the RBV and were combined with the companies that indicated that a R&D expenditure. In table 7: “RBV division in R&D budget’ the results are shown. Analysis clearly shows that companies that specified an R&D budget score higher on the different drivers for the RBV. Based on the drivers that are associated with the RBV it seems that the companies indicating an R&D budget are more innovative. At least they have more formalized structures and processes. The companies that indicated their R&D budget can act as an example for the other companies that not were able to indicate an R&D budget. A higher level, described in the literature as formalization, seems to be positive related to innovation. First possible and most logical explanation would be that the results are related to company size. But as we showed already the companies that indicated an R&D budget vary in size from roughly 25 to 100 employees.

Table 7: RBV division in R&D budget				
	No R&D budget (n=11)		R&D budget (n=5)	
Innovation strategy	Mean	SD	Mean	SD
The organizations vision or mission includes a reference to innovation	2,82	2,27	6,00	1,22
Innovation strategy has helped the organization to achieve its strategic goals	2,36	1,91	5,60	1,14
Increasing our production volume is an important measure of our process innovation	5,27	1,62	4,20	1,48
Improving administrative routines is seen as part of our innovation strategy	3,00	2,37	2,40	1,95
Internal cooperation is an important part of innovation strategy implementation	2,55	2,07	4,60	2,88
Improving product or service quality is one of our key objectives of innovation strategy	5,73	1,10	6,60	0,55
Formulating innovation strategy increases employee skills	4,18	2,48	4,20	2,28
Improving employee commitment, morale, or both is part of our innovation strategy monitoring	1,09	0,30	3,00	2,12
Formal structure				
Managers formally allocate resources to the use of cross-functional teams	3,64	2,01	5,60	1,14
Employees formally monitor developments in new technologies	5,36	1,69	6,00	0,00
Employees document and use failures as opportunities to learn	4,18	2,14	4,20	1,64
Managers provide systems to facilitate formal communication	1,82	1,40	2,40	2,19
Action plans or timetables and procedures are used to monitor progress	3,82	2,23	5,60	1,14
The senior manager encourages all employees to challenge the status quo	3,91	2,12	5,40	2,07
Our flat structure facilitates searching for and incorporating diverse points of view	4,36	2,01	5,60	1,14

As table 7 shows the companies that indicated an R&D budget score on average higher on the different drivers that can be associated with an RBV. However it is interesting to see that there are still a number of drivers that are scored as not important. First of all, similar to the companies without a R&D budget, the driver 'Improving administrative routines is seen as part of our innovation strategy' (mean 2,40; SD 1,95) is scored as not important/applicable. It is not clear why companies do not see this driver as a real driver for innovation. Another driver that scored as not important is the driver 'Improving employee commitment, morale, or both is part of our innovation strategy monitoring' (mean 3,00; SD 2,12). There are also no real reasons or explanations mentioned by the respondents why they do not find the driver important. A possible explanation could be that

companies not really monitor whether the commitment or morale improves. Measuring morale and commitment also seem to be relatively difficult to measure. Finally a third driver did not was applicable 'Managers provide systems to facilitate formal communication' (mean 2,40; SD 2,19). A good explanation for the score of this driver is that companies are not really concerned with communication within the company. Because of the small scale character of offices communication between people is relatively easy.

Concluding on the paragraphs above there seems to be a difference between companies that indicate a R&D budget and those companies without a specified R&D budget. The companies with a R&D budget have a higher level of formalization, meaning that they scored higher on the drivers that can be associated with the RBV. The companies that indicated a specified R&D budget can be seen as 'best practice' companies and can serve as examples for the timber industry in the Netherlands. One would also expect that companies with a product leadership value strategy would score higher on the different drivers. Presumably companies that indicate product leadership as value strategy and have a specified R&D budget will score higher on the drivers associated with R&D. Due to the limited range of the data this presumption cannot be supported with data.

5.2.1.1Networks of collaboration

In the literature study we concluded that the item networks of collaborations consisted of 3 different elements that would be tested: Project team organization, Dependency on the network and compatibility of network. During the interviews these elements were separated. First of all every respondent was asked how the project teams were organized in general (So not specifically for innovations in a network). Later in the interview it was asked whether companies were active in a network for the development of innovations. If the respondents answered with yes, the questions concerning dependency on the network and compatibility of the network were asked. In appendix 3 the results for the 3 elements of networks of collaboration are shown. In this study only the remarkable or surprising results will be discussed.

Analysis of the data reveal that project team organization has an average mean of 4,02 with an SD of 1,83. This is for all data together. After further analysis of the data the results in table 8: Project team organization were found. A division was made between companies that indicated an R&D budget and companies that did not indicate a specific R&D budget. In total 5 companies indicated a specific R&D budget. The results can be remarked as striking because of the differences, companies that indicated a R&D budget scored higher on the different elements. A general explanation for these results may

be that companies with a R&D budget have more formalized their R&D activities. Possibly they are also more active with innovations.

Table 8: Project team organization

	Mean	SD	Mean	SD
The person leading the team had the necessary qualities and skills	3,73	2,24	6,00	1,22
The project teams in your network were interdisciplinary	3,91	2,43	6,00	1,00
The teams were assigned to only one project during the life span of the project	2,09	1,58	**1,60**	0,55
Team members did not change during the project	2,91	1,92	4,20	1,92
The teams were motivated	4,45	2,30	5,00	2,24
The top management of the partners was committed to the projects	4,55	2,42	6,80	0,45
The project team organization was supported by different software applications	1,55	1,21	**3,00**	2,55

The companies with a R&D budget specified only 2 different elements as not applicable or not relevant. The first item that scored this low was the element 'The teams were assigned to only one project during the life span of the project' (Mean: 1,60; SD: 0,55). A possible explanation is that the companies interviewed are SMEs active in the manufacturing of products. A big part of the employees are production workers who are not directly involved in innovations. As a consequence a limited number of employees is able to execute or participate in the development of innovations.
The second item that scored low is the item 'The project team organization was supported by different software applications' (Mean: 3,00; SD 2,55). Finally the companies that were active in an innovation network were asked what happened when a member stops with the network. All 4 respondents indicated that this would not form a direct problem for the network. If more members stop with the network new members are sought.

To conclude on project team organization it seems that the companies with a specified R&D budget have better organized teams. A possible and likely explanation is that the companies that are able to mention a R&D budget have a strategy.

5.2.1.2 Cooperation and innovation networks

In practically almost all product innovations there is a cooperation with companies or organizations that test and certify new products. Some of the respondents contacted these organizations in an

early stage to find out what the possibilities were: *"….it is actually better to go to these organizations in advance of an innovation, talk with people there. Just get in the car and drive to Wageningen, then you know exactly where you are and what potential bottlenecks are. (In Wageningen Stichting Keur Hout and Stichting Hout Research are situated). If you do it like this than there are possibilities for your innovation. That is also a route you can take, in commissions etcetera you also talk to technical people, which makes it also easier. You can use that in an easy way. Most of the times this route is not very costly but you know better that you score".* [F] For 14 of the 16 companies certification organizations are also partner in a certain innovation. Mostly these organizations are used to obtain a certificate like for example KOMO. In KOMO certain specific characteristics of a product are tested, for example durability or strength of a product. All companies need these certificates to be able to sell the product to clients. For the innovation itself the institutions do not seem very important, reflected in the statement of a respondent: *"We cooperate for example with certification institutions, but they do not teach you to climb. You have to do it on your own, so we cooperate with them because we need them for certification. These institutions work according to a certain method, for example method A. If you ask them if they also can use method B, they just don't do it. They only know their own method and they certainly do not help you onwards".* [A] In general companies would appreciate it if these organizations would be more flexible and give more support during innovations.

All window frame manufacturers have contacts with colleagues and other companies in the timber industry. It seems that the cooperation is very superficial, reflected by the following statement: *"I regularly talk with colleagues; I have good contacts with a number of them. If we talk it is for example about the paint on a certain window frame, because it looks OK. But with many other colleagues I don't have contact. Yesterday we went with a number of colleagues to a plywood supplier, that's nice but next day you are again each other competitor. I never talk much about that, some try to get a lot of information of everybody, but OK."* [C] Another window frame manufacturer explained his vision on cooperation in the timber industry: *"Why we don't cooperate more I don't know. You have to imagine that everybody is a competitor of each other and that they do not allow any light in the eyes of each other. That is the old generation, they have joy in that. The only thing that they do is catch flies of each other. But my generation is different; we believe that we can learn from each other. Everybody is welcome and is allowed to take photographs and make videos, I don't care. Let's talk with each other and work together. I think we are going to see a big change in the coming 5 years."* [J] The respondent is also active in the NBvT and commented further: *"There is no material better then timber but as industry we don't have the power to propagate this, let alone to innovate. If you want to do research, which is really lacking in our industry, you have to do it by yourself. For example, if I want to test a window frame on fire resistance it will cost around € 25.000. If an architect wants*

another type of window frame you will have to test it again. This means that the costs get out of control. In the past years we already have done many tests apart from each other, let's join forces now". [J] Both statements show a certain distrust between companies which sometimes block innovations. Between companies and other organizations, like a certification institution, there seems to be a good relation without a big distrust.

There was also a respondent that did not cooperate with other companies or suppliers: *"All innovations are developed and executed within the company, we don't even use consultants. The world in which we operate is very limited, when you bring something outside everybody will immediately start to use it. I do not state that we want everything exclusively for our company, but we want to enjoy an innovation for a period. It is important for us to know how something works in the long run; at the start you just don't know that."* [O] Because the timber industry in the Netherlands is small and there are highly specialized companies active in the industry it can sometimes be impossible to cooperate in innovation. In certain specific parts of the industry are at most 8 – 10 companies active. Cooperation therefore can be complicated for these companies. Possibly these companies could find cooperation agreements outside the timber industry.

Suppliers are frequently mentioned as an important partner in innovations. This can be suppliers of raw materials and products like glue or paint, but also suppliers of new equipment and machines. In general, suppliers are important partners during innovations. Depending on the type of innovation this can be suppliers of for example paint, but more frequently mentioned are suppliers of new equipment and machines. Figure 4: 'Companies active in an innovation network' shows the division between companies that are active in a network and the companies that are not active in a network.

Companies in the Dutch timber industry seem to cooperate together to develop innovations. Only 1 company indicated that they do not cooperate in innovations with other companies. The other 15 companies cooperate for example with certification institutions and suppliers of machines and other equipment. Cooperation between direct competitors seems to be very limited. In the following paragraphs will be focused on so called innovation networks. Cooperation along the value chain is not a new phenomenon, but the current scale is new (Rese & Baier, 2011).

5.2.2.3 Innovation networks

As was shown in the previous paragraphs, cooperation in the timber industry is executed on a superficial level. Respondents were also asked if they are active in an innovation network, meaning that they cooperate with a select group of companies on regular basis. Figure 6: "companies active in

an innovation network" shows the results of which companies are active in an innovation network. Of the 16 respondents only 4 respondents indicated that there company was active in an innovation network. All 4 companies were window frame manufacturers. Companies active in the wood treatment, furniture manufacturing and contracting did not participate in innovation networks.

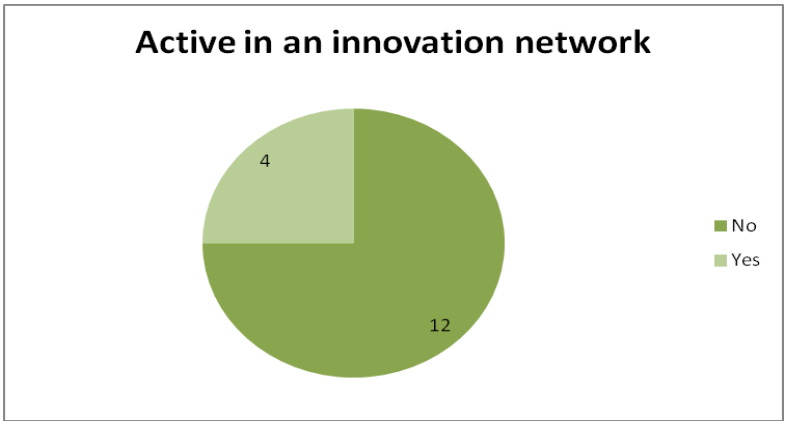

Figure 6: Companies active in an innovation network

In total 4 companies were active in 2 networks, the two networks are called Timmerselekt[9] and Ecologie Garantie Systeem (EGS)[10]. This was not known in advance of the interviews. The most likely explanation why companies active in the wood treatment are not a member of an innovation network has to do with scale. In the Netherlands there are about 250 carpentry factories but only 10 – 20 companies are active in the wood treatment. In previous paragraphs we already presented the results for project team organization. There was no difference made between companies that are active in a network and companies that are not member of a network. In table 9: 'members of innovation network' the results are presented for the other 2 elements indicated in the literature study. A division is made between companies that indicated to be active in a network and companies that are not a member of a network.

[9] www.timmerselekt.nl
[10] egs.wesenit.com

Table 9: Members of innovation network				
	Non – members (n=12)		Members (n=4)	
	Mean	SD	Mean	SD
Dependency				
The partners cover the entire value chain	2,83	2,25	1,25	0,50
The partners depend on the network	2,92	2,47	3,75	1,71
The partners work well with another	3,00	2,17	4,25	2,36
Compatibility of the network partners	4,08	2,39	5,25	2,22
Goals				
Financial affairs	3,67	2,31	4,50	2,38
Quality specifications	4,17	2,25	5,50	1,29
Schedules and deadlines	3,67	1,97	5,00	2,16
Performance evaluation	3,42	2,02	2,50	2,38

One would expect that more companies are active in an innovation network because of the advantages of networks for SMEs. Only 4 respondents indicated that their company was member of an innovation network. In the literature different advantages for innovation networks were given. Clearly companies in the timber industry have another opinion. A possible explanation can be that companies are afraid of the consequences of working in an innovation network, because it will mean that more companies will introduce similar innovations.

In table 9: 'Innovation networks' the results are presented concerning innovation networks. Members of the innovation network seem to be able to work well with the other members of the network, and the companies complement each other. However they do not cover the entire value chain, members are also not really dependent on the network. Also the members of innovation networks are better organized concerning specific goals. For example they make specific agreements on the financial affairs, quality specifications of innovations and there are clear agreements on schedules and deadlines. In the following paragraphs some additional statements are presented made during the interviews.

The companies that do participate in a network are positive about the cooperation in the network. Both networks did not cover the entire value chain. The innovations networks consist of fabricators of window frames and fabricators of doors. 1 respondent explained more about Timmerselekt network: *"We cooperate in innovation with in total about 10 companies. The network was the initiative of our company and in the network we share innovations. Most innovations are developed or initiated by our company and are made available for the partners in the network. The innovation*

developed is presented to the network and we determine if everybody is interested in the innovation. If all companies are interested we calculate the development costs, and from then on everybody can use the innovation." [M] The members of the network do not depend on each other for innovations, this was scored as neutral. One respondent of the EGS network explained: *"The members of the network are not dependent on each other for innovations. It happens that for example 2 partners continue with a certain innovation with each other. A good example is that our company and 1 other company produce their own doors, the other companies buy doors. This means that only our company and the other company have an interest in innovations concerning doors."* [L]

The scores for the compatibility of the network partners seem to be more applicable than the dependency for the company's active in a network. Especially the goals, quality specifications and schedules and deadlines seem to be. The financial affairs are more or less of neutral applicability. An actual performance evaluation is not really applicable. A respondent explained how they work together and what he expects for the future: *"Looking within Timmerselekt I foresee that we will become tougher for each other, and that we will look more to the individual performance. Of course everybody is enthusiastic, but you have also followers. As a group we have general goals, and we want to be able to do for example passive window framing. It cannot be that 3 companies are not able to reach the final goal. We have to promise to each other that everybody reaches the goals. If somebody does not comply with the appointments or goals then it can become nasty. If the group finds that you haven't complied with the goals for the 2nd time a discussion will start if the network is suitable for your company. Everybody is obliged to attend meetings, you share knowledge with each other and therefore everybody should be there. It is possible that you cannot come because of a funeral, but not 4 times a year."* [F] This statement reflects that the companies are dedicated to the network. Innovating without the network will be more difficult for most members of the network.

In the other network similar comments or rules apply: *"The network has specific goals. This is necessary also because we hire an external consultant, and he has to comply with something. About once in 3 weeks this person spends half a day working for the network. It is also important for the other partners of the network to have special goals. Everybody has other activities alongside the network. Those activities are always important, so you need goals. This is also an important task for the consultant; he keeps an overview on the network and the different activities."* [L] It seems that the networks do not really have to adapt their strategy when a member stops with the cooperation in the network. In recent years 1 network experienced bankruptcy of 3 members (Total number of members: 10). 1 respondent and member of the network explained: *"In total there are 10 companies member of the network. Past year 3 companies faced bankruptcy. In the first 2 cases we decided not*

to replace the companies, after the 3rd bankruptcy of a member we started searching for a replacing company. We have asked 2 potential window frame manufacturers to become member. This process is very selective, we look at the type of company that the network needs, what we miss exactly." [F] A member of the other network briefly commented that *"The network is a very solid network that exists for approximately 20 years, there have been companies joining the network, but they disappeared again very fast."* [L] The networks seem stable and have clear goals since strategy changes are not necessary. Maybe this can be explained because the network does not cover the entire value chain.

Concluding, it can be said that there is cooperation in the timber industry in the Netherlands. However, only a small number of companies is active in an innovation network, while innovation networks can increase the level of innovativeness. Companies should try to improve the different drivers indicated in table 7. First of all it will be helpful for all companies to have clear goals in advance of an innovation. During and after the innovation process it is useful to evaluate the entire process in order to learn what can be improved for next innovations. Furthermore companies should try to create an innovation network that covers the entire value chain.

5.2.1.4 Collective learning

Collective learning or the level of education can be linked as a driver associated with the RBV. Therefore respondents were first of all asked what the education level of their employees was. Generally it can be concluded that a mix of practical and theoretical knowledge is important for all companies. This means not per definition that theoretical knowledge can be translated to higher or academic level of employees. Every company has employees that are trained on middle level. 5 companies[11] indicated that they did not have employees that followed higher or academic education. 1 respondent was not sure if the company had employees trained at higher or academic level. This company is treated in this research as if it does not have employees that attended higher or academic education. 10 companies[12] indicated that they had employees that attended higher or academic education

The 5 companies that did not have any higher or academically trained employees were smaller than 40 employees. The companies that responded positively to the question ranged in size from 20 to 110 employees. It is therefore difficult to make statements based on company size. To the question whether the percentage of academically trained staff is sufficient enough for the interviewed

[11] Companies with higher/academic trained employees: C, D, F, L, N, A
[12] Companies with higher / academic trained employees: B, E, G, H, I, J, K, M, O, P

companies is difficult to answer. First of all the interviewed companies are primarily production companies with a large percentage of staff employed in the production. The production processes can be characterized as standardized processes that are repeated. Academic or higher education is therefore not necessary at these positions.

Most of the respondents made remarks during the interviews about the 'knowledge in the market'. In the past years the knowledge of customers about products have decreased. Expected is that this will continue in the future and this is a challenge and opportunity for most companies. Overall it can be concluded that the level of education in the timber industry is not surprisingly high. Companies in the timber industry try to maintain a combination of practical and theoretical knowledge. Because of specialist knowledge many employees are trained in practice and during their careers. Because of the decrease of knowledge by customers it is likely that companies in the industry have to increase their practical and theoretical knowledge.

5.2.2 Market orientation

In the previous paragraphs was focused on drivers for innovation that are associated with the Resource Based View. In the following paragraphs will be focused on drivers for innovation that are associated with a Market Orientation. Table 10: 'Items related to Market Orientation' shows the results.

Table 10: Items related to Market Orienation (n=16)

	Mean	SD
Customer orientation		
Customer commitment	5,69	1,30
Create customer value	6,00	1,46
Understand customers' needs	5,81	1,68
Customer satisfaction objectives	5,31	1,25
After sales service	5,00	1,86
Competitor orientation		
Salespeople share competitor information	4,13	2,09
Respond rapidly to competitors' actions	4,25	2,08
Top managers discuss competitors strategies	3,75	1,95
Target opportunities for competitive advantage	4,00	2,42
Interfunctional coordination		
Interfunctional customer calls	5,06	1,48
Information shared among functions	4,94	1,18
All functions contribute to customer value	4,88	1,54

The drivers can be categorized into 3 different elements, in total consisting out of 12 items. Respondents were asked to grade the different items, from not applicable at all - until applicable in

an extreme extent. All 3 different elements scored neutral or above neutral. It seems that companies in the timber industry score high on the drivers that are categorized as ‘customer commitment’. There seems to be a division between companies concerned with the drivers categorized under ‘competitor orientation’. There is relatively large SD of 2,14 (Mean: 4,03). An explanation for this phenomenon is that some of the interviewed companies have specialized activities. Also some companies are active in a niche market were the competition is limited.

The third element, interfunctional coordination, consists out of 3 different drivers. All 3 different drivers score positive and above neutral. It can even be argued that the elements are even more applicable than that they are graded. All the interviewed companies are SMEs and all have flat structures. Often employees are responsible for several different activities, for example sales and production planning. This enables communication because teams are small.

In the previous paragraph we analyzed whether companies with a product leadership value strategy scored the drivers associated with the RBV higher. A similar method can be applied for the MO. According to Paladino (2007) MO is associated more with new product success. This implies that companies that focus on the customer will score higher on the different drivers for MO. In table 11: ‘Market Orientation scores Value strategies’ the results for the division in the 3 value strategies is shown. It is important to remember that only 2 companies have graded customer intimacy as the most important value strategy.

Table 11: Market Orientation scores Value strategies

	Product leadership (n=7)		Operational excellence (n=7)		Customer intimacy (n=2)	
	Mean	SD	Mean	SD	Mean	SD
Customer orientation						
Customer commitment	5,71	1,25	5,29	1,38	**7,00**	0,00
Create customer value	6,43	0,53	5,43	2,07	6,50	0,71
Understand customers' needs	6,14	0,90	5,29	2,36	6,50	0,71
Customer satisfaction objectives	4,57	1,27	5,86	0,90	**6,00**	1,41
After sales service	4,43	2,44	5,57	1,27	**5,00**	1,41
Competitor orientation						
Salespeople share competitor information	3,57	2,51	4,43	1,90	**5,00**	1,41
Respond rapidly to competitors' actions	3,29	2,21	4,71	1,89	**6,00**	0,00
Top managers discuss competitors strategies	3,14	1,95	3,71	1,80	**6,00**	1,41
Target opportunities for competitive advantage	3,57	2,57	3,71	2,36	**6,50**	0,71
Interfunctional coordination						
Interfunctional customer calls	5,00	1,15	5,43	1,51	4,00	2,83
Information shared among functions	5,29	1,11	4,29	1,11	6,00	0,00
All functions contribute to customer value	5,29	1,11	4,29	1,98	5,50	0,71

As expected, companies with C.I. are committed to their customers. All the items for 'customer orientation' were graded as important or very important. Also the other value strategies had a customer orientation, but somewhat lower. The item competitor orientation gives a more clear distinction, companies with a C.I. strategy score much higher. Companies with O.E. as most important strategy seem to be in between the 2 other types of strategies. One could expect that companies with O.E. focus on competition because they competed mostly on cost price. It seems that companies with P.L. as most important strategy seem to focus less on the competition. This was supported by a comment of a respondent whose company focuses on P.L. *"Our company is not really involved in what competitors are doing. Contractors in the Netherlands are extremely conservative and do not want improvement. We bypass the contractors and go directly to clients and architects to promote new products".* [M]

One of the companies that focus on C.I. explained their philosophy about how they operate: *"Our company has a separate sales team consisting of 3 salespeople and 4 calculators. Together we try to listen carefully to the market, create a newsletter and attend trade fairs. The salespeople are also active in gathering questions; we hope that people have specific questions for us."* [H] Furthermore the company explained how they develop these innovations: *"We watch closely what our competitors*

are doing, and if it possibly fits within our company(Competitors strategy or activities). Within the Management Team we discuss this and also within the sales team we discuss it extensively. We then try to establish if we have to react on certain actions of the competition. We also try to find out what our competitive advantage could be. At a given moment we had added a lot of extra services to our product, so we finally made a separate concept of these services. This makes it more clear what our added value is for customers." [H] It seems that the companies that have C.I. as most important value strategy listen very closely to the comments and wishes of their customers.

Another company that had a focus on P.L. explained how they developed new products or innovations. *"We started with the innovation because of our market knowledge, not because we know a certain trick. Looking to the market we saw possibilities for a new type of product and that was the starting point. Nobody asked us to produce a certain product. You start with a certain innovation because you think there is a market for such a kind of product"* [B]. This company did not really focus on the competition, partly because competitors were active in other markets. In the past years the company has introduced a number of new products.

Concluding, it seems that all companies were more focused on MO than on RBV. Studies performed in the timber industry abroad also found that companies in the timber industry had develop more drivers associated with MO. Companies with P.L. seem to focus less on the competition than companies with another strategy. The items that compose 'Interfunctional coordination' are all graded between neutral and important. Probably this is because all companies are SMEs that have a flat structure. Communication between different functions within the company is therefore relatively easy.

Companies in the timber industry in the Netherlands seem to have a focus towards a Market Orientation. The 9 different drivers which are associated with MO score higher than the drivers that are associated with a RBV. Remarkably it was not possible to find evidence that companies with a Product leadership strategy scored higher on drivers associated with a RBV. One would expect that companies with a focus on new product development would focus more on the internal organization. In order for Dutch companies in the timber industry to become more innovative they could try and focus more on the resources of their company. When the level of formalization is increased it is likely that the level of innovativeness also increases.

5.2.3 Other innovation drivers

5.2.3.1 Financing of innovations

To develop and execute innovations financing of the innovations is needed. All respondents indicated that innovations executed by their company are executed with own budget. Also other ways of financing of innovations are mentioned, subsidies also seem to be an important source of financing innovations. None of the respondents indicated that they used the credit facilities provided by the European Investment Bank. In total 5 companies indicated a percentage of their turnover that they spend on R&D. However all companies indicated that the most important reason for financing innovations is intuition. If one is convinced that a certain innovation will be a good investment the company will invest in the innovation. Likely this is not specifically described in a company strategy or similar documents. This can already explain why not all companies were able to mention their R&D budget. The opportunistic behavior of most respondents is also reflected in the following statements:

"We don't have a specific budget for innovations. We are a family business and look what we think the revenues will be for a certain project. If we are convinced we continue." [G]

"We don't have a specific budget for innovations, we sit around a table and discuss if we start a certain innovation. We now more or less what we are going to do, and during the project we decide how much to invest and what the return will be. Then we determine if we invest or not." [C] The respondent also identified an R&D budget of around 2% per year.

Respondents that participated in the study were also asked which other methods their company uses to finance innovations. Besides an own R&D and innovation budget or an extra investment companies also indicated that they use subsidies to finance certain innovations. In order to get an impression of what types of subsidies are used, respondents were asked several questions about subsidies. A number of companies use subsidies for the finance of certain innovations. All the companies that have a specific R&D budget related to the turnover have used subsidies. All interviewed companies except 1 had used subsidies in the past. Not every company is still using subsidies; a reason mentioned is that it is complex to get a subsidy. 1 respondent explained further: *"Our company does not have the right structure to be eligible for a subsidy."* [O] Another respondent that only uses innovation vouchers gave also his opinion about other subsidy types: *"It is way too difficult for us to be eligible for a subsidy. In my opinion should companies that are frontrunners and really innovative receive subsidy. At this moment there are too many companies that follow receive subsidies and frontrunners that do not receive any subsidy."* [N] Companies that have more radical

ideas for new innovations find it sometimes difficult to finance all innovations. Sometimes it is a real battle for companies to get a subsidy. This is reflected in a statement of a respondent: *"A couple of years ago we would like to apply for and S&T subsidy. It has been a real fight for our company because Accoya was recently introduced. We explained that our company are the entrepreneurs, and Accoya are not real entrepreneurs. They explained that our product was superfluous. It has been a real fight, my sun in front. At that time he worked for a subsidy consultancy firm. He had good support and finally we got the subsidy. Our company needs the subsidy. We also have to perform research and we have to pay everything. We are a family company with a limited turnover, so we need a subsidy."* [B]

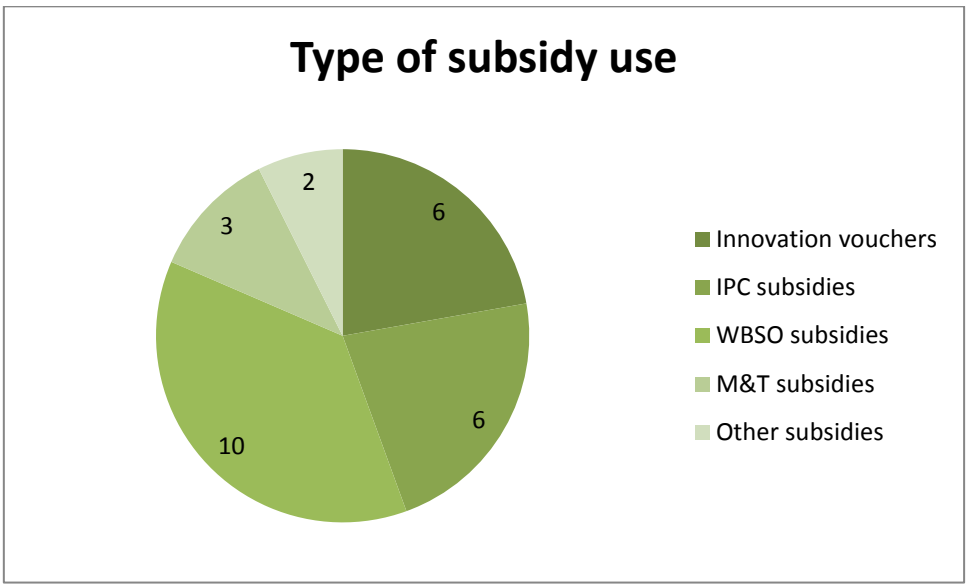

Figure 7: Types of subsidies used

During the interviews respondents was asked what type of subsidies were used by the company. In figure 7: 'Types of subsidies used' the results are shown. In this paragraph a short explanation is given. In the interviews nobody mentioned innovation credit as a method to finance innovations. Innovation vouchers were used by 6 companies[13]. Also IPC subsidies were mentioned by 6 respondents[14] as subsidy form that is or was used by the company. Different branch organizations started IPC subsidies. WBSO subsidies were mentioned by 10 companies[15] in total and can be seen as most important subsidy for companies in the timber industry. 1 respondent explained why the WBSO subsidy was important for their company: *"For our company the WBSO subsidy is important and enables us to hire a young professional (HTS). We made a new target for our company; we want to*

[13] Innovation vouchers used by: E, F, G, I, N, P
[14] IPC subsidy used by: F, H, J, L, P, M
[15] WBSO subsidy used by: A, D, G, H, I, J, K, L, M, P

innovate more. We used to do this already in the past, but we did not use any form of subsidy. We made a more serious planning and keep track of ours etc. We now get an insight in our activities. So we profit from the subsidy in 2 ways." [J] 2 other companies commented that it was very difficult to apply for a WBSO subsidy. You need to keep an extensive log of all the activities performed. This costs extra time which is sometimes scarce. M&T subsidies were mentioned only 3 times as used subsidy[16]. The subsidy was mainly used for the development of innovations specific targeted at reducing the effect of products on the environment.

The respondents were asked to grade the importance of subsidies for their company. Respondents graded the importance on a 7-point Likert scale, 1 meaning not important at all till 7- very important. Subsidies were graded as 3,81, just below the neutral value. This seems to indicate that for some companies subsidies are important, but also a number of respondents grade subsidies as not important. Overall a neutral score can be awarded to the use of subsidies.

It is interesting to look at the motivations of companies why they use or do not use subsidies. Main critique is that it is too complex to be eligible for a subsidy. This is especially applicable for WBSO subsidies. However, a part of the problem can also be linked to the companies themselves. In the analysis of drivers we also indicated drivers that could be linked to a RBV. The analysis showed that formalization was important and could be associated with the drivers. When companies would have more formalized processes it will also become easier to be eligible for subsidies. Formalization will therefore also have a positive effect on the ability of companies to be eligible for subsidies.

Besides using subsidies there are other possibilities for companies to finance innovations. Every company indicated that they use own budget for innovations. Not every company has a policy or percentage of the total budget that they use for innovations. Most companies calculate the potential revenues and costs of a certain innovation and decide to execute the innovation based on these data. Respondents was also asked if they use other ways of financing besides own budget and subsidies. Other forms of financing were not indicated by the respondents. Companies did not indicated that they use bank financing for innovations and also credit facilities provided by an investment bank was not indicated. However it is likely that large investments in for example new production facilities are financed by loans.

[16] M&T subsidies used by: E, I, K

5.2.3.2 Company size

In the literature study it was indicated that company size was related to the innovativeness of a company. Therefore all respondents were asked to the size of their company expressed in the number of employees. The number of employees ranged between 10 and 110 employees. This means that all companies can be categorized as Small or Medium sized Enterprise (SME). This confirms the reasoning in the literature study where it was assumed that most companies in the Dutch timber industry could be characterized as a SME. In the paragraphs above was concluded that companies with a specified R&D budget seem to be more innovative. A division in company size does not make a difference in the results. Companies that indicated an R&D budget differ in size, roughly taken from 20 to 100 employees. Therefore it is not possible to conclude that small companies are more innovative than their larger counterparts.

A number of companies had two or more production locations[17], 2 companies had also production facilities abroad[18]. This could be an explanation why no difference was found between larger and smaller companies. It is possible that the multiple locations of the company function as a separate company. For these companies it seems to be applicable that more synergy can be achieved between the locations. Already was shown that companies should be more formalized. Therefore one can expect that this also applies for two locations of a company. When the companies function as separate entities at this moment, companies can derive more synergy effects.

Although no indications were found that larger companies were more or less innovative than smaller companies some remarks can be made. It can be assumed that larger companies will be able to better organize innovations than smaller organizations. First and most important reason is that there is budget available for an employee who is fully dedicated to innovations and R&D. For smaller companies innovations will primarily be a 'side activity'. In at least 3 companies an employee was fully dedicated to innovations (larger than 50 employees).

5.2.4 Barriers towards innovation

The timber industry is described in the literature as a traditional and conservative industry. However this is not seen by most respondents as a barrier towards innovation. Table 12 gives an overview of the barriers mentioned by respondents. In the following paragraphs a short explanation is given to each item in the table.

[17] 2 or more production in the Netherlands locations: B, I, J, N
[18] Production facilities abroad: I, O

Table 12: Mentioned barriers in innovation	
Barrier	**Times mentioned**
The market	5
Time / speed of process	3
Knowledge in the market	2
Variation of raw material	2
Regulations	1
Organization of innovation	1
Costs attached to innovations	1
Economic situation	1

During the interviews was noticed that most respondents could not identify barriers that were really blocking their innovations. In the literature study more barriers were indicated, but not all of them were mentioned, even when specifically was referred to a barrier. Possibly the respondents were afraid of mentioning a barrier, or they wanted to show how well their company performed. For example, mentioning that 'the personnel dislike change and development of work' could be perceived by respondents as a kind of failing that they do not want to admit. During the interviews and in the analysis it was noticed that the companies primarily mention barriers outside their own companies. Although not all barriers were identified the barriers in table 12 are analyzed.

The market is the most frequently mentioned barrier towards innovations. This is a very general barrier, more specific the market has a lack of knowledge about products. The market was also described as traditional which makes it difficult to introduce new products. A specific example was given by a window frame manufacturer: *"At our company the problem is that construction workers don't know how they should handle our product. We get a lot of complaints about window frames that are not installed correct in the façade. The details on window frames are dangerous because the architect wants it that way. They get cocky and the window frame is placed in front of the masonry. This causes a lot of moisture problems around the window frame. Within 3 to 4 years the paint gets lose, and people start claiming: See, the timber starts rotting already! That is not the problem, the problem is that it isn't used properly. People haven't thought about it properly. That is most of the times the problem."* [A] Another window frame manufacturer [G] noticed that the market reacts sometimes with skepticism. In the past companies have had negative experience with spruce timber and hemlock timber. This makes it more difficult to introduce window frames produced with Accoya. Accoya is compared very easily with softwoods, but its properties are completely different. 1 company [I] uses example projects to reduce the skepticism in the market.

For another company the market has been a problem for the overall company. In 2007 the company faced bankruptcy and continued with a smaller production. Today the production is being outsourced to low labor cost countries. The respondent explained: *"In general I think that the market can be a problem. If you asked me 8 years ago if it was possible that the company went bankrupt in 2007, I would have sad no way. Still it happened. At a certain moment the demand completely stalled, and then it is difficult. Everybody starts searching to possible solutions and unrest starts, that is disastrous. Why the demand completely stalled is a bit of a mystery. The dollar exchange rate was strong and the costs for timber purchase increased. But also the demand on the national market disappeared."* [E] At this moment it is difficult for many companies in the timber industry. The economic crisis influences all companies. Some of the companies were forced to decrease production or even fire a number of employees. Remarkably this is only mentioned by 1 company [F] as real barrier towards innovation.

Variation of the raw material is mentioned by only 1 company as a potential barrier [L]. Although the respondent mentions the raw material as potential barrier, the company is well able to control the variation of the raw material. Variation in the raw material is controlled by making good appointments with the various suppliers of timber. The barrier is not only caused by properties of the timber, it is also caused through preferences of the end users of timber. Certain aesthetic properties of the timber are not liked by consumers. It seems that the other companies can control this barrier very well. Probably this can be explained through the fact that practical knowledge is seen as important in the industry. Personal has practical knowledge about the properties of timber and its different applications. Possible restrictions are known and taken into account during innovations.

For 1 company the organization of his company was a barrier towards innovation. The company invested in 2007 in a fully automated production but had difficulties in organizing his company. To overcome these problems the company is now participating in a program that improves company processes. *"Before we started with the program "timmer slimmer" we already used the services of other consultants, but that didn't work. Those companies enter into you company with the message that they are a management bureau which cost fortunes, and the only thing you get is a lot of bull shit. I haven't learned at home or at school. I only have secondary education and for the rest I have followed courses and education during evenings. I always have worked in the carpentry factory of my father. I have never worked at another company, so I can't compare with other companies. The grass will not be greener there, but I don't have a message to that."* [C] This statement is somewhat confusing. The machine was sold at 2 other companies, but the respondent does not have any

contact with the other companies. It is likely that the other 2 companies faced similar problems, or have a good idea of what possible solutions could be.

Several respondents mentioned during the interview that regulations can really be big obstacles. This was nicely illustrated with an example by a respondent: *"You have to imagine that there are regulations about how many times I have to paint a window frame. That is really ridiculous. Luckily this regulation has disappeared now, but I almost went to court for it. It should be about the performance of a window frame, not about a rule that every window frame should be painted 10 times. This is also applicable for the entire 'Bouwbesluit' (Buildins Decree), let's be honest. As Dutch people we are a bit hypocrite since we keep the French and German outside our market. That is why we still have a carpentry industry. If you think logically we would buy a window frame in the Czech Republic. We have to produce a window frame with all kinds of details, but if I think at night about how I would built my house, I would buy a window frame abroad. At German factories you can buy a window frame with very high performance. But in the Netherlands we have all kinds of strange regulations. We keep ourselves to work."* [J] Of course the respondent does not want that all regulations disappear, but they should be organized in a different way. The regulations should describe what kind of performance the window frame should have. This would mean more freedom for the producers to decide what is best.

It is possible that companies do not perceive some barriers as an obstacle or barrier towards innovations. For example the barrier 'too little knowledge about wood properties makes product development difficult'. It is possible that companies in the Dutch timber industry perceive timber as a material that cannot be innovated and treat the material as if it cannot be changed. It could also be the contrary, companies that want to innovate the product wood maybe search for alternatives. To the reasons why only 5 barriers are indicated can only be speculated.

In conclusion, some remarks can be made. First off all, companies in the Dutch timber industry should realize that there are obstacles for innovations in their own company. There are of course barriers outside the control of their company, but it is unlikely that there are no barriers at all within their own company. A large obstacle that is likely to be faced by most companies in the timber industry is the decrease or even lack of knowledge of products. Companies and branch organizations should try to overcome this barrier because it faces a threat for the future of the timber industry. Possibilities to overcome this barrier are for example by teaching and educating people from other industries, like the construction sector.

6. Conclusions

In total 16 interviews with companies from the timber industry are used to answer the specific and main research question. The first 2 specific research questions were already answered in the literature study. Question 3, 4 and 5 are answered in this chapter. All the data are already presented in previous chapter and are summarized in this chapter to answer the specific research questions.

Some general questions were posed to all respondents in order to get an impression on the topic innovation in the Dutch timber industry. First of all respondents was asked to mention some examples of innovations. All respondents were able to mention examples. Secondly respondents was asked to mention examples of innovations within the timber industry. Again all respondents were able to mention examples, frequently mentioned were Accoya and Plato (Plato was also mentioned as example of a failed innovation). Thirdly respondents was asked to give some examples of innovations at their own company, also all respondents were able to mention examples. Therefore can be concluded that innovation is a well-known and actual topic in the Dutch timber industry. The respondents are well aware of the necessity for innovation.

Besides asking for general examples respondents was also asked to the different types of innovations that they performed. All innovations could be classified into the proposed categorization in product, process and business system innovations. The respondents seem to understand that there are different types of innovations, and also perform these different types of innovation. Process and product innovations are probably executed most frequently, less frequent are business system innovations. The concepts of innovation and innovativeness are therefore applicable to the Dutch timber industry.

One of the goals of this research was to establish if the Dutch timber industry is less innovative than other industries in the Netherlands. Therefore it was necessary to classify innovation into a input – throughput – output model. In the following paragraph the results of the research will be briefly summarized, furthermore will be concluded what the level of innovation in the Dutch timber industry is.

6.1 What is the level of innovation?

In the literature study, chapter 4.1.3, was concluded that the level of innovation can be established using an input – throughput – output model. In order to be able to assess the level of innovation the model should be applicable to companies in the Dutch timber industry. When the model is applicable to the companies in the Dutch timber industry, the companies in the timber industry are comparable

to other manufacturing industries. Input variables are in fact the external conditions and the connections of a company with the external environment. Throughput variables are the internal conditions, the chosen characteristics that are developed by the company. The output of the model was measured by the number of innovative products on the total assortment (Keizer et al, 2002).

Input

The different variables that are measured during the interviews are linkages with knowledge institutions, transfer of knowledge, collaboration with other firms, collaboration subsidies, innovation subsidies and financial resources.

First of all it is interesting to monitor that all respondents are aware of the knowledge institutions in the Netherlands. Because of the limited size of the timber industry, the research institutes are also relatively small. At the TU Delft is a research group active in the research of wood fibers and structures, and in Wageningen is Stichting Hout Research (SHR) located. These two institutes are the most important partners in cooperation for additional knowledge. Not all respondents had connections with these institutions, which can be explained because of the limited scale. Also, the research interests of these institutions can be on different topics than the knowledge requested/needed by companies in the timber industry.

All the companies that participated in this study have connections with certification institutes. Certification institutes mainly advise and certify companies who want to comply to quality standards that are prescribed in regulations or certification schemes. Respondents indicated that cooperation with these organizations is necessary, but would like that certification institutes become more involved in innovations and actually cooperate in innovations.

In total 15 out of 16 participating companies cooperates with other companies during innovations, it are mainly suppliers of machines and techniques with whom is cooperated. Furthermore some companies cooperate with suppliers of materials, but on a less frequent basis. Innovation networks are only used by 4 out of 16 respondents, while the literature showed that companies can really benefit from innovation networks. Although only 4 companies are active in an innovation network, 6 companies applied and participated for a collaboration subsidy (IPC). Cooperation in innovation networks is not per definition with direct competitors, companies should also understand that there are possibilities for cooperation's along the vertical value chain.

Subsidies are mentioned in total 27 times, in different forms. Only 1 company indicated that they never use subsidies because they have no idea for the possibilities. The company had only 10 employees, all the other respondents indicated that they did use or still use subsidies. Companies seem to be aware for the possibilities of a subsidy, but subsidies are not really necessary or important for the execution of an innovation. Although the respondents indicated that subsidies are not really important it is likely that subsidies will have a positive effect on the innovative output of companies. Companies find it difficult to be eligible for a subsidy because complex regulations attached to subsidies. Therefore companies should be assisted with applying for subsidies, an overview of the possibilities and requirements would be helpful for companies.

Companies seem to make an opportunistic decision when investing in an innovation, this view is supported by the fact that only 5 companies were able to mention their R&D expenditure as percentage of the turnover. As effect it is possible and likely that companies miss out on opportunities to improve the financial performance of their company. Although the decision to invest is based on an opportunistic decision, all companies indicated to finance innovations with own budget. Bank loans were not indicated as method to finance innovations, however it is likely that investments in new production equipment will partially be financed through bank loans.

Throughput

The throughput variables that were measured during the interviews were the number of employees with middle level education, the number of employees with higher/academic level of education, level of education of general manager and transfer of knowledge.

First of all the respondents in the study remarked that it is important in the timber industry to have a combination of practical and theoretical knowledge. The level of education is less important according to the respondents. Many companies in the timber industry have a specialized character where specialized knowledge is needed that cannot be learned through schools and universities. In most cases new employees receive training on the job and get familiar and more involved in the company through experience. Every company has a number of employees that attended middle level education. Furthermore 10 companies indicated that they have employees trained at higher or academic level. Important to remember is that all companies are manufacturing products for a low tech industry, which probably requires a lower education level.

An interesting development on the market for timber products is that the knowledge about timber is disappearing out of the market. Companies and employees with knowledge about timber products

are becoming increasingly more valuable. Taking this development into account, education about timber and timber products seems to be a good method to increase the knowledge about timber products again. Automation and mechanization is also arrived in the timber industry, which demands a higher education level of employees. Furthermore it is expected that finding suitable employees will become a challenge in the future, education could offer a possible solution for this problem.

In the timber industry the education level does not seem to be very important, especially because of the mix of practical and theoretical knowledge. It can be interesting for companies to look into the possibilities for receiving subsidies for training programs. These subsidies decrease the costs for educating employees and offer a the possibility for employees to further develop themselves. The education level of the general manager or director of a company does not seem to influence the innovativeness of a company. Probably the innovativeness is not directly influenced by the education level of the manager, however the company manager should be able to create and support innovation teams.

Output

To categorize innovation it is necessary to measure the innovative output of companies. In this study the output was measured through different concepts, for example was asked to the number of innovative products as part of the total assortment. Furthermore respondents was asked to their R&D percentage as part of the total turnover. In the results was already explained that most respondents found it difficult to mention the number of innovative products in their assortment. It was also difficult for most respondents to mention their R&D expenditure as percentage of the total turnover.

In the previous paragraph is already mentioned that respondents found it difficult to estimate the number of innovative products in the total assortment. This is probably mainly concerned with the operationalization of the concept. This can be best explained with an example: for example a company that has executed an innovation and is now using a new type of joists in window frames. It applies its innovation to all different types of window frames. Is this just 1 innovation, or is it an innovation for the entire company?

Besides the number of innovative products R&D expenditure as percentage of the turnover is indicated in the literature as a good method to measure the innovativeness of a company. In total 5 companies were able to mention a percentage, one more company indicated that they employed 1 person fully dedicated to innovation. The percentages that were mentioned ranged between 2% and

5%, although 5% seems a rather high amount to spend on R&D. When you compare these results to the top 1000 of innovative companies the companies in the timber industry perform quite well. The top 1000 companies spend on average 3,75 % on R&D. Especially when one takes into account that all companies interviewed in this study were SMEs with a maximum of 110 employees, active in a manufacturing industry (Booz, 2010).

The innovative output of companies was only measured with 2 different measures. However a number of companies indicated other ways that can be used to establish the innovative output. In total at least 5 respondents mentioned that they protected innovations with patents. Furthermore 2 companies were awarded with prices for their innovative efforts.

Overall can be concluded that it is possible to classify the innovative efforts of a company in an input – throughput model. It was difficult to measure the innovative output of companies in the timber industry. However we also measured the output of companies in the timber industry, but not at all interviewed companies. This seems to justify the conclusion that it is possible to measure innovation in the timber industry in an input – throughput – output model. Because innovativeness in the timber industry can also be measured in an input – throughput – output model we can conclude that it is likely that the timber industry is comparable with other manufacturing industries. In this study we did not had the possibility to compare the data with data from other industries, but one can expect that there will be no differences.

6.2 Can a lack of willingness explain a lower innovation level in the Dutch timber industry?

In the previous paragraph is concluded that it is likely that the timber industry is comparable with other manufacturing industries in the Netherlands. Another possible reason mentioned for the lower innovation level in the Dutch timber industry is simply that companies are not willing to innovate. 'Willingness' is a vague concept that is difficult to apply in its current form. Therefore the concept 'willingness' is operationalized through a number of different elements that can be tested. Based on the elements can also be advised which innovation drivers need to be stimulated.

Montalvo (2006) argues that innovation can be explained through the 'willingness' of companies. 'Willingness', again can be explained through 3 different elements, which are dependence on attitudes, social pressure and perceived behavioral control. Therefore the willingness of a company can be tested through a number of perceptions of company managers: social outcomes, economic risk, community pressure, market pressure, regulatory pressure, technological capabilities and finally

the organizational capabilities. Organizational capabilities is composed out of 3 different items: organizational learning, strategic alliances and networks of collaboration (Montalvo, 2006).

In this study we have focused on certain parts of the proposed model since the perceptions of company managers is not asked for. The economic risk is researched through the use of subsidies and the method in which innovations are financed. Community pressure, market pressure and regulatory pressure are not tested, because the perceptions of company managers ate not tested. Technological capabilities and the organizational capabilities are tested through potential barriers for innovation and the RBV and MO. The social outcomes also explained little of the willingness of companies to engage in innovative activities. The proposed factors increase the control of companies on innovations (Montalvo, 2006).

6.2.1Economic risks

The most important method in which companies are financing innovations is through own budget, and some companies use subsidies to reduce the financial risk attached to an innovation. It is remarkable to notice that most companies have no formal structures to reduce the risk attached to innovations. Companies try to estimate the (financial) benefits attached to an innovation and the cost attached to an innovation. If they believe it will be a good investment they will start the innovation. Also the intuition is an important tool for companies to establish if they have to start an innovation. In the literature subsidies are mentioned as a good method to reduce the financial risks attached to an innovation. However not every company uses subsidies to reduce the financial risk. Respondents was asked how important subsidies are for their company, graded on a 7 – point Likert scale. Results showed that subsidies are scored are not really important, but also not unimportant.

Concluding, companies in the timber industry finance innovations mostly through own capital. Also subsidies are used by some companies. It seems that the companies are prepared to invest in innovations with own capital. Therefore, in economic sense are companies willing to invest in innovation.

6.2.2 Technological capabilities

In the Netherlands a large part of the timber industry is depending on the construction industry. It can be estimated that around 1/3 of the timber industry is composed of carpentry factories and window frame manufacturers. Because of the strict regulations in the Netherlands one would expect that regulations that block the technological capabilities of the timber industry. However, regulations were only mentioned 1 time as a barrier towards innovation. Respondents also mentioned ‘the market’(5 times) and ‘knowledge in the market’ (2 times) as a potential barrier.

Timber is a natural product and can also limit the technological capabilities of companies, mainly because of the variation in the raw material. Therefore respondents were asked whether the material is a barrier towards innovation. 2 companies indicated that variation in the raw material can block innovations. In the timber industry there are some examples of successful innovations in the raw material. Therefore it seems that the raw material itself is not a real barrier towards innovations. During the interviews was also noticed that companies seem to accept that there are limitations to the use of the raw material. Concluding, companies in the timber industry are not blocked in performing innovations because of the technological capabilities.

6.2.3 Organizational learning

In this study organizational learning was not tested directly, but through the drivers connected to Resource Based View and Market Orientation. According to Paladino (2007) both theories are associated to organizational learning. An interesting difference was found during the analysis of the data retrieved in the interviews. Companies that indicated an R&D budget as percentage of turnover scored the drivers associated to RBV as more important. For MO no real difference was found. It seems that the companies with an R&D budget have a higher level of formalization. However, Paladino (2007) claims that it is sufficient for companies to pursue one strategy being RBV or MO. For all interviewed companies the drivers associated score above neutral, meaning that most companies have somewhat a MO. Therefore it can be concluded that the companies are also 'willing' to innovate based on the drivers attached to RBV and MO.

6.2.4 Strategic alliances and networks of collaboration

Networks and cooperation was identified in this study as a potential driver for innovation. The results showed that there is cooperation in the timber industry with partners. These partners can vary depending on the specific needs for an innovation. Suppliers and certification institutes were among others identified as collaborative partners. Companies were also asked if they were active in so called 'innovation networks'. Only 4 companies were active in this type of networks. There also seems to be a certain distrust between companies, cooperation between direct competitors seems to be limited between the partners in an innovation network. Another reason why cooperation between companies is limited has to do with the scale of the industry. In some niche markets only a few companies are active, and cooperation between these companies seems to be impossible.

Concluding, for some parts of the timber industry cooperation or collaboration networks seem to be impossible. In that sense these companies are not really willing to cooperate. However other parts of the industry still have enough possibilities for collaborations between companies. At this moment

there is a limited cooperation, possibly caused by a lack of trust between companies. Not all companies seem to be willing at this moment to enter a collaboration with a direct competitor.

Through operationalization of the concept 'willingness' we have tried to establish if the companies in the Dutch timber industry are willing to innovate. No evidence was found that these companies are less willing to innovate. Although the model of Montalvo (2006) seems to be a good method to operationalize 'willingness' we should be careful to conclude that the companies are willing to innovate. If one would like to establish if the companies in the timber industry behave the same as in other industries one should have data from other industries.

6.3 How can the drivers for innovation be better used to stimulate innovation?

In previous paragraphs was concluded that no evidence can be found that companies in the Dutch timber industry are different than other companies active in manufacturing industries. This does not automatically imply that the companies in the Dutch timber industry do not have to improve their innovative activities. There are opportunities for the companies to improve their innovative activities and innovative output. Therefore this paragraph will indicate how companies in the Dutch timber industry can use the drivers indicated in the literature to improve their innovative behavior.

Not only the drivers for innovation are studied, respondents was also asked which value strategy best fitted their company. The results show that produdct leadership and operational excellence are the most important value strategies. Both were mentioned 7 times as most applicable value strategy. Although companies have indicated a certain value strategy as most important, there are some results suggesting that companies can improve which value strategy they pursue. For example companies indicating a product leadership strategy should also score higher on the drivers associated with a RBV. This is not the case, suggesting that companies can improve the way how they pursue their value strategy. When pursuing a value strategy companies should be aware that this value strategy should be pursued in all possible methods.

In this study is argued that companies should have both a sufficient level of drivers associated with RBV and drivers associated with a MO. Furthermore was concluded that companies that can indicate an R&D budget score higher on the drivers associated with a RBV. On basis of these results can be concluded that companies in the Dutch timber industry should develop the drivers associated with a RBV to a higher level. In the literature study and in the results was referred to the elements of the RBV as 'formalization'. When companies improve the different drivers associated with a RBV they

actually increase the level of formalization in their company. Formalization will have a positive effect on the innovativeness of companies in the Dutch timber industry. However, companies should also maintain their MO on a sufficient level in order to gain competitive advantage.

The conclusion drawn in the previous paragraph is somewhat opposite than is currently described in the literature. In the current literature is claimed that companies should either develop the drivers associated with a RBV or the drivers that are associated with MO. This study claims that companies should develop the drivers associated both with RBV and MO.

All companies cooperate with other companies and organizations during innovations, however only 4 companies are active in an innovation network. In the literature is clearly described and shown that collaboration in innovation networks positively influences the innovative performance of companies. Based on these findings can be concluded that companies in the Dutch timber industry should cooperate more in innovation networks. This does not directly imply that they should cooperate with direct competitors. This study found that the identified innovation networks were only companies that have the same activities, and do not cover the entire value chain. The current networks and future new innovation networks should try to develop a network that covers the entire value chain. For example, an innovation network with suppliers of raw materials, a fabricator and end users can develop more innovations.

The development of innovations is organized in project teams and companies was asked how project teams were organized in their company. However it can be concluded that the project teams are not really organized in a structured way at this moment. When companies improve the project team organization it is likely that it will positively influence the innovative output. At this moment the project leader does not always have sufficient qualities and skills. Furthermore, interdisciplinary teams and no changes in the team members will positively influence innovation. Finally it is important that the management is committed to innovations. This relates also to a number of items in the RBV, for example a company should have a reference to innovation in its mission or vision.

Innovations are financed primarily with own budget. In most cases the decision to invest in an innovation is based on an opportunistic decision. A positive effect of this decision method is that the employees will be motivated to make the innovation a success. There are also some downsides to this method of investment decision-making. First of all, it is likely that feasible innovations will be rejected too early, meaning that the performance of companies is not optimized. Secondly companies also risk that they invest in unfeasible innovations, which again has a negative effect on

the performance of companies. Thirdly there is the risk that innovations are executed on wrong assumptions, causing unnecessary cost and risk. Companies in the Dutch timber industry should try to structure investment decisions better. Investments in innovations should not only be based on feeling and expectations.

A method to reduce the financial risk of an innovation is using subsidies. The respondents in the study were able to identify a number of different subsidy types. Main objection mentioned by the respondents is that it is difficult to apply for subsidies, this because of complex regulations. Many subsidies require that for example the hours spend on an innovation are accounted for and progress should be monitored. Companies find this a barrier because they cannot account for all hours spend on innovations. They also find it difficult to monitor progress during an innovation. However, it is likely that more formalization will have a positive effect on this barrier. Companies will be better able to account for the hours spend on innovations, making them more eligible for subsidies.

7. Discussion

The results of this study show that companies in the Dutch timber industry are willing to innovate and that they can be compared with other manufacturing industries. In total 16 companies were interviewed about the innovative activities of their company. All companies were active in different sectors of the timber industry. Trading companies were not selected for interviewing because it was assumed that they have less innovative activities, since they are mainly active as trading company. However it can be interesting to dedicate a research to the innovative activities of these trading companies. A comparison with trading companies outside the timber industry could provide insights in how these companies perform.

To ensure reliable results all interviewed respondents were owner, director, innovation manager or production manager. Possibly these respondents depicted a too positive or negative image of their company and the innovation activities. Therefore it would be interesting for future research to focus on a small group of companies and interview a number of employees of these companies.

In the literature study company size was indicated as a driver for innovation, however in the results of this study no evidence for this driver could be found. Two possible explanations are that the innovative activities of a company are not related to innovation or there should be a larger difference in company size to find evidence for this driver. Further research is necessary to provide conclusive results if company size is a driver for innovation.

Respondents indicated the value strategy that best applied to the strategy of their company. In the data analysis the value strategies were used to find difference in the drivers associated with a RBV. One would expect that companies indicating a Product Leadership value strategy score higher on the drivers associated with a RBV. However this was not the case in this study, since the companies who indicated customer intimacy scored higher on the drivers associated with a RBV. Only 2 companies indicated customer intimacy so it is difficult to generalize the results to all companies in the timber industry, but it is interesting if the results still apply in a larger population.

In the current literature the output of innovative efforts made by companies is measured through the number of innovative products in the total assortment. In this study it was difficult to establish what the exact number is. Most companies do not have a standardized assortment, and innovations are sometimes performed on the total assortment. The measure also does not take into account the process and business system innovations. Therefore another method should be developed in which

the innovative efforts of companies are measured. This could be for example a combination of different measures, in which for example awards & prices, patents and the number of innovations performed are taken into account. By translating these data to a relative scale the innovative efforts of a company can be established and compared with each other.

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Appendices

Appendix 1: Questionnaire

Appendix 2: Contact information interviewed companies

Appendix 3: Resource Based view divided by value strategy

Appendix 4: Networks of collaboration no division

Appendix 5: CD-rom

Appendix 1

Uit onderzoek in de afgelopen jaren blijkt dat de houtsector minder innovatief is dan andere sectoren. Innovatie is belangrijk omdat het economische groei stimuleert. Met de gegevens van dit interview wordt geprobeerd om vast te stellen of de Nederlandse houtindustrie minder innovatief is, en wat hiervan mogelijke oorzaken zijn. Aan de hand van voorbeelden en ervaringen wordt geprobeerd om vast te stellen welke factoren innovatie bevorderen, en welke innovatie juist blokkeren.

Wanneer er in het interview om een getal of percentage wordt gevraagd wordt geprobeerd om zo accuraat mogelijke data te verkrijgen. Wanneer respondenten de data niet exact kunnen geven wordt gevraagd om een passende schatting te maken. De codes achter iedere vraag corresponderen met de verschillende paragraafnummers van de literatuurstudie.

Bedrijfsnaam:	Aantal werknemers:
Naam geïnterviewde:	Functie:
Bedrijfsactiviteiten:	

1.
    a. Wat verstaat u onder innovatie, kunt u een voorbeeld noemen voor een innovatie in het algemeen? § 5.1.1
    b. Kunt u een voorbeeld noemen van een innovatie die typisch is voor uw bedrijf of typisch is voor de houtsector? § 5.1.1
    c. Wat voor soort innovaties hebben er plaatsgevonden op uw bedrijf / in uw sector in de afgelopen 5 jaar? § 5.1.2
        □ Product:
        □ Proces:
        □ Bedrijfssystemen:
        □ Logistiek:
        □ Marketing:
        □ Anders, nl.:

Vraag 1 is een inleidende vraag voor het interview en geeft een beeld van hoezeer bedrijven actief met innovatie bezig zijn. In deze studie maken we een onderverdeling van innovaties in de volgende categorieën: product innovaties, proces innovaties en bedrijfssysteem innovaties. Verder worden een paar mogelijke extra antwoorden weergegeven zoals logistieke innovaties (procesinnovaties) en marketing (bedrijfssysteeminnovatie).

2.
    a. Wat is het aandeel van innovatieve producten op het totale assortiment? (#) § 5.1.3
    b. Hoeveel procent van de totale omzet wordt gehaald met de verkoop van innovatieve producten, en met welke producten? § 5.1.3
    c. Wat is het innovatie budget op de totale omzet? (%) § 5.1.3

Innovativiteit wordt gemeten door een input – throughput - output model. De output is gemeten op verschillende manieren: aandeel van innovatieve producten op het totaal, percentage van de omzet dat gehaald wordt met innovatieve producten en het innovatie budget (percentage) ten opzichte van de totale omzet. (Keizer et al. 2002). Deze vraag stelt de onderzoeker in staat om de houtsector te vergelijken met andere sectoren om te bepalen of bedrijven meer of minder innovatief zijn.

3. Welke strategie omschrijving past het best bij uw bedrijf; verdeel 100 punten over de 3 omschrijvingen: § 5.1.4
    a. Product leadership: Het bedrijf ontwikkelt innovatieve waarde toevoegende producten. Uitgangspunt is dat producten de hoogste kwaliteit hebben en het best voorzien in klantbehoeften.
    b. Operational excellence: uitblinken in het goed en efficiënt uitvoeren van alle bedrijfsprocessen. Uiteindelijk moet dit ertoe leiden dat de kosten voor de klant het laagste zijn.
    c. Customer intimacy: individuele klantbenadering. Het verkrijgen van intieme relaties met de klant door het leveren van producten op maat en het beleid is op de individuele klant gericht.

Vraag 3 heeft betrekking op de algemene bedrijfsstrategie van bedrijven. Het geeft een algemene indruk over welke strategie een bedrijf voert. Wanneer geïnterviewde personen niet in staat zijn om te kunnen aangeven of ze meer een RBV of MO hebben, dan heeft de onderzoeker toch een algemeen beeld van de strategie binnen het bedrijf.

4. Innovatie strategie; zijn de volgende stellingen van toepassing op uw bedrijf: § 5.2.1

	Totaal niet toepasselijk			Neutraal			Zeer toepasselijk
De visie/missie heeft een referentie naar innovatie[19]	1	2	3	4	5	6	7
De innovatiestrategie heeft geholpen doelen te bereiken	1	2	3	4	5	6	7

	Totaal geen prioriteit			Neutraal			Zeer hoge prioriteit
Toename in productievolume is maatstaaf van procesinnovatie	1	2	3	4	5	6	7
Verbetering van administratieve handelingen is onderdeel innovatiestrategie	1	2	3	4	5	6	7
Interne samenwerking is onderdeel van innovatiestrategie	1	2	3	4	5	6	7
Verbeteren van product/service is hoofddoel van innovatiestrategie	1	2	3	4	5	6	7

[19] Bij deze vraag specifiek vragen naar documenten, memo's websites etc. waarin de visie of missie staat omschreven.

Training van personeel vergroot vaardigheden m.b.t. innovatie	1	2	3	4	5	6	7
Verbeteren moraal/betrokkenheid is onderdeel innovatiestrategie	1	2	3	4	5	6	7

5. Formele structuur; zijn de volgende stellingen van toepassing op uw bedrijf: § 5.2.1

	Totaal niet toepasselijk			Neutraal			Zeer toepasselijk
Middelen worden ter beschikking gesteld voor interdisciplinaire teams	1	2	3	4	5	6	7
Nieuwe ontwikkelingen worden bijgehouden[20]	1	2	3	4	5	6	7
Van mislukkingen wordt geleerd[21]	1	2	3	4	5	6	7
Communicatie systemen zijn beschikbaar[22]	1	2	3	4	5	6	7
Voortgang van projecten wordt gemonitord[23]	1	2	3	4	5	6	7
Iedereen wordt uitgedaagd door het management[24]	1	2	3	4	5	6	7
Verschillende denkbeelden worden bespreekbaar gemaakt	1	2	3	4	5	6	7

Vraag 5 en 6 gaan over de RBV van een bedrijf. Vraag 5 richt zich vooral op de innovatie strategie van een bedrijf, de verschillende onderdelen zijn daar aan gerelateerd. De onderdelen vragen naar mogelijke onderdelen van de innovatiestrategie. Aan bedrijven wordt ook gevraagd om 'bewijs' aan te leveren wanneer ze zeggen iets belangrijk te vinden. Dit kunnen bijvoorbeeld interne memo's zijn, maar ook een verwijzing naar de website van het bedrijf. In vraag 6 ligt de focus op de structuur van het bedrijf. De verschillende onderdelen gaan over de organisatie van het bedrijf, ook hier wordt om 'bewijs' gevraagd wanneer er een hoge score wordt toegekend. Dit kunnen verwijzingen zijn naar memo's, websites etc. De variabelen zijn afkomstig uit de studie van Terziovski (2010) en zijn zo passend mogelijk vertaald.

6. Klant oriëntatie; zijn de volgende stellingen van toepassing op uw bedrijf: § 5.2.2

	Totaal niet toepasselijk			Neutraal			Zeer toepasselijk
Toegewijd aan de klant	1	2	3	4	5	6	7

[20] Er wordt doorgevraagd op de frequentie, hoe en wie nieuwe ontwikkelingen bijhouden
[21] Er wordt doorgevraagd naar hoe er geleerd wordt, en of er een systeem is
[22] Er wordt naar voorbeelden gevraagd
[23] Er wordt doorgevraagd op de frequentie, hoe en wie de voortgang monitort
[24] Er wordt doorgevraagd hoe mensen worden uitgedaagd

Klantwaarde creëren	1	2	3	4	5	6	7
Behoeften van klant begrijpen	1	2	3	4	5	6	7
Er is een focus op klanttevredenheid	1	2	3	4	5	6	7
After sales services	1	2	3	4	5	6	7

7. Concurrentie; zijn de volgende stellingen van toepassing op uw bedrijf: § 3.2.2

	Totaal niet toepasselijk			Neutraal			Zeer toepasselijk
Verkopers delen informatie over concurrentie met andere afdelingen	1	2	3	4	5	6	7
We reageren snel op acties van concurrenten	1	2	3	4	5	6	7
Strategieën van concurrenten worden geanalyseerd	1	2	3	4	5	6	7
Kansen voor concurrentievoordeel worden benoemd	1	2	3	4	5	6	7

8. Interfunctional communicatie[25]; zijn de volgende stellingen van toepassing op uw bedrijf: § 5.2.2

	Totaal niet toepasselijk			Neutraal			Zeer toepasselijk
Communicatiekanalen naar klant zijn beperkt	1	2	3	4	5	6	7
Klantinformatie wordt gedeeld tussen afdelingen	1	2	3	4	5	6	7
Informatie wordt gedeeld met verschillende functies	1	2	3	4	5	6	7

Vraag 7, 8 en 9 gaat over de markt oriëntatie van bedrijven. De verschillende variabelen meten in hoeverre een bedrijf gericht is op de markt. Vraag 7 gaat over de hoe klantgericht de verschillende bedrijven zijn. Vraag 8 richt zich op de concurrentie van bedrijven en vraag 9 gaat over de communicatie binnen het bedrijf en de communicatie naar buiten toe. Bedrijven die hoog scoren op de verschillende variabelen zijn sterk gericht op de markt. Alle variabelen zijn afkomstig uit het artikel van Narver & Slater (1990) en zijn zo passend mogelijk vertaald.

[25] Interfunctional communicatie: Bedrijfs gezamenlijke activiteiten, vaak meer dan alleen marketing, om superieure waarde te creëren voor klanten.

9. Samenstelling van 'project - teams' voor innovaties; zijn de volgende stellingen toepasselijk voor uw bedrijf: § 5.2.1.1

	Totaal niet toepasselijk			Neutraal			Zeer toepasselijk
Leider van het project team heeft de juiste competenties[26]	1	2	3	4	5	6	7
Projectteams zijn interdisciplinair	1	2	3	4	5	6	7
Teams werken aan 1 innovatie tegelijkertijd	1	2	3	4	5	6	7
Teamsamenstellingen veranderen niet tijdens een project	1	2	3	4	5	6	7
De motivatie binnen het team is groot	1	2	3	4	5	6	7
Teams worden gesteund door het management	1	2	3	4	5	6	7
Softwareapplicaties ondersteunen teams[27]	1	2	3	4	5	6	7

Vraag 10 gaat over de samenstelling van de teams die betrokken zijn bij innovaties. De samenstelling van project teams is een succesfactor voor innovaties, maar ook een succes factor in nieuwe product ontwikkeling. Wanneer bedrijven laag scoren op de verschillende onderdelen, dan kan dit een verklaring zijn waarom bedrijven minder succesvol zijn in het uitvoeren van innovaties.

10. Wat is het opleidingsniveau van personeel %: § 5.2.1.2
    - □ Hoger opgeleid (Universiteit / HBO):
    - □ Middelbaar beroepsonderwijs (MBO):
    - □ Opleiding algemeen manager/directeur:
    - □ Opleiding innovatie manager:

Vraag 2 vraagt naar het opleidingsniveau van het personeel. Dit is volgens Keizer et al (2002) en Stendahl & Roos (2008) een parameter voor innovativiteit. Een combinatie van praktische en theoretische kennis is volgens Bull & Ferguson (2006) belangrijk voor de innovativiteit van bedrijven.

11.

a. Maakt u gebruik van kennisinstellingen bij een innovatie (%)? § 5.2.1.1
    - □ Universiteiten
    - □ Onderzoeksinstellingen
    - □ Consultants
    - □ HBO
    - □ Anders, nl.:

b. Maakt u gebruik van diensten van andere bedrijven tijdens innovaties (%)? § 5.2.1.1
    - □ Concurrenten

[26] Competenties kunnen zijn: leiderschap, deskundigheid, etc.
[27] Bijvoorbeeld MS project, CRM systemen etc.

□ Klanten
□ Leveranciers
□ Commerciële onderzoeksbureaus
□ Anders, nl.:

Samenwerkingen zijn steeds belangrijker voor bedrijven om te kunnen innoveren. In vraag 11 wordt er gevraagd naar of en met wie bedrijven samenwerken binnen innovaties. Er wordt gevraagd om percentages, dus in hoeveel gevallen er wordt samengewerkt met kennisinstellingen en bedrijven.

12. In hoeveel innovaties in de afgelopen 5 jaar heeft u samengewerkt met andere bedrijven? (Als gelijkwaardige partner, niet als opdrachtgever of opdrachtnemer, %) § 5.2.1.1

In vraag 12 wordt concreet gevraagd hoe vaak bedrijven samenwerken met andere bedrijven in innovaties. Het gaat hierbij om bedrijven die daadwerkelijk samenwerken, dus niet wanneer een bedrijf een ander bedrijf een opdracht geeft tot het doen van bijvoorbeeld onderzoek met betrekking tot innovatie.

13. Als u kijkt naar de belangrijkste innovatie in de afgelopen 5 jaar, hoeveel bedrijven en kennisinstellingen zijn er betrokken geweest bij deze innovatie? § 5.2.1.1
    □ Universiteiten
    □ Onderzoeksinstellingen
    □ Consultants
    □ HBO
    □ Anders, nl.:
    □ Concurrenten
    □ Klanten
    □ Leveranciers
    □ Commerciële onderzoeksbureaus
    □ Anders, nl.:

Vraag 13 volgt de suggestie van Tether (2002) om te testen hoeveel bedrijven en instellingen er meewerken aan een innovatie.

14. Wat waren redenen om samen te werken met deze bedrijven of kennisinstellingen? § 5.2.1.1

Vraag 14 volgt de suggestie van Tether (2002) om naar de motivaties van samenwerkingen te kijken.

Vraag 10, 11 en 12 gaat over de samenwerking van bedrijven met andere bedrijven en (kennis)instellingen. Aldus Tether (2002) zijn samenwerkingen steeds belangrijker voor bedrijven met betrekking tot innovaties. In vraag 13 en 14 wordt gekeken hoeveel partijen betrokken zijn bij innovaties, en wat de redenen van samenwerkingen zijn.

15.
    a. Afhankelijkheid van het netwerk; zijn de volgende stellingen toepasselijk voor uw bedrijf: §5.2.1.1

	Totaal niet toepasselijk			Neutraal			Zeer toepasselijk
Partners komen uit de gehele keten	1	2	3	4	5	6	7

Partners hebben het netwerk nodig om te kunnen innoveren	1	2	3	4	5	6	7
Partners kunnen goed samenwerken met elkaar	1	2	3	4	5	6	7

b. Wat gebeurt er wanneer een partner besluit te stoppen met de samenwerking binnen een netwerk? § 5.2.1.1

16. Welke zaken worden vastgelegd voordat er begonnen wordt aan een innovatie? § 5.2.1.1

	Totaal niet toepasselijk			Neutraal			Zeer toepasselijk
Doelen	1	2	3	4	5	6	7
Financiële aspecten	1	2	3	4	5	6	7
Kwaliteitsspecificaties	1	2	3	4	5	6	7
Schema's en deadlines	1	2	3	4	5	6	7
Evaluatie criteria van de prestaties	1	2	3	4	5	6	7

Samenwerkingen met andere partijen wordt steeds belangrijker voor het slagen van innovaties aldus Tether (2002). In vraag 15 en 16 wordt specifiek gekeken naar de succesfactoren voor innoveren binnen netwerken. Wanneer bedrijven een deel van hun autonomie opgeven en beiden afhankelijk zijn van het netwerk dan zal dit een positief effect hebben op het netwerk.

17.

a. Hoe financiert u innovaties (%)? § 5.2.3.1
   - □ Uit het R&D budget
   - □ Eenmalige extra uitgave
   - □ Lening via de bank
   - □ Subsidie - regelingen
   - □ Anders, nl.:

b. Van welke subsidieregelingen heeft u gebruik gemaakt tijdens een specifiek innovatietraject? § 5.2.3.1
   - □ Innovatiekrediet
   - □ Innovatievouchers (Kennisvraag of octrooi aanvraag)
   - □ IPC subsidie (Innovaties binnen een netwerk)
   - □ WBSO (Loonkostensubsidie)
   - □ Milieu en techniek (subsidie voor beter milieu)
   - □ Anders, nl.:

Vraag 17 vraagt naar de manier waarop innovaties worden gefinancierd. Subsidies zijn volgens Keizer et al. (2002) een indicator voor innovativiteit. Subsidies kunnen het risico voor bedrijven ook verkleinen, waardoor ze eerder starten of doorgaan met een innovatie.

18. Wanneer u gebruik maakt van subsidies, waarom precies: § 5.2.3.1
   - □ Extra inkomsten
   - □ Noodzakelijk om innovatie mogelijk te maken
   - □ Reden om aan een innovatie te beginnen

□ Anders, nl: ...

Wanneer u geen gebruik maakt van subsidies, waarom niet: § 5.2.3.1
□ Complex om in aanmerking voor subsidie te komen
□ Geen idee van de mogelijkheden voor subsidieregelingen
□ Geen subsidiemogelijkheid
□ Anders, nl:…

Vraag 18 vraagt specifiek naar subsidies en wat de redenen zijn om gebruik te maken van een subsidie. Het is interessant om te weten waarom bedrijven wel of geen gebruik maken van subsidies omdat beleid hierop kan worden aangepast. Tevens is het zo dat bedrijven die gebruik maken van subsidies meer innovatief zijn.

19. Hoe belangrijk waren de subsidies voor het slagen van de innovatie? § 5.2.3.1

Zeer onbelangrijk			Neutraal			Zeer belangrijk
1	2	3	4	5	6	7

Vraag 19 vraagt naar hoe belangrijk de subsidie was voor het slagen van de innovatie, subsidies vergroten de bereidheid tot innoveren (Montalvo, 2006). Vragen 17, 18 en 19 gaan in op het effect en de invloed van subsidies op de innovativiteit van bedrijven.

20.

a. Wat zijn barrières die u bent tegengekomen tijdens innovaties? § 5.3
□ Variatie in de grondstof
□ Onzekere aanvoer van grondstoffen
□ Huidige technieken
□ Laag competentieniveau van personeel
□ Weinig kennis van de markt
□ Weinig kennis van processen
□ Weinig kennis van houteigenschappen
□ Er is weinig behoefte aan innovaties
□ Er zijn te weinig ideeën voor innovaties
□ Innovaties hebben geen prioriteit
□ Innovaties zijn te duur om uit te voeren
□ Innovaties hebben geen prioriteit in investeringsbeslissingen
□ Personeel heeft een hekel aan veranderingen
□ Anders, nl.:….

b. Hoe zijn de barrières opgelost? § 5.3

Naast mogelijke prikkels zijn er ook barrières of obstakels die bedrijven tegen kunnen komen wanneer ze willen starten met innovaties. Vraag 20 gaat over de mogelijke obstakels tijdens of voor innovaties (Stendahl & Roos, 2008). Barrières verkleinen de bereidheid om te innoveren (H6). Wanneer je ervoor kunt zorgen dat er zo min mogelijk obstakels zijn, dan is een bedrijf meer succesvol in innovaties.

Aan het begin van de vragenlijst staan een aantal standaard vragen om een algemene indruk te krijgen van het bedrijf. Ook wordt het makkelijker om eventuele verschillen tussen bedrijven aan te merken. Het aantal werknemers van het bedrijf wordt ook gevraagd, in verschillende literatuur wordt aangegeven dat het aantal werknemers een prikkel is voor innovativiteit. § 5.2.3.2

Appendix 2: Contact information interviewed companies

	Naam bedrijf	Naam geïnterviewde	Functie	Bedrijfsactiviteiten
a	De Jong's timmerfabriek	G. Harding	Directeur / eigenaar	Timmerfabriek - Kastenproductie - Binnenspouwbladen
b	Foreco	P. Swager	Directeur / eigenaar	Houtverduurzaming - Speeltoestellen - Houtconstructies
c	F. Ruiter timmerfabriek	D. Ruiter	Directeur / eigenaar	Kozijnenfabriek
d	De Linde vof	T. van der Linden	Directeur / eigenaar	Meubelproductie
e	Lundia / Varsseveld Meubelproductie	H. Veldhorst	Technisch directeur	Meubelproductie
f	Groothuis timmerfabriek	R. Groothuis	Directeur / eigenaar	Timmerfabriek
g	Helwig timmerfabriek	L. Reijnaerdts W. Helwig	Manager operations Directeur / eigenaar	Timmerfabriek - Houthandel - Prefab wandelementen - montage
h	Van de Vin ramen & kozijnen BV	M. van de Vin	Directeur / eigenaar	Timmerfabriek
i	Van Swaay duurzaam hout	P. van den Tillaart T. van Swaay	Bedrijfsanalist Directeur / eigenaar	Houtverduurzaming
j	Webo kozijnen & HSB elementen	W. Haaze	Directeur / eigenaar	Timmerfabriek - Gevelelementen
k	Plato	M. Boonstra	Productieplanning / ontwikkeling	Thermische houtmodificatie
l	Timmerfabriek Neede	H. Slüter	Directeur / eigenaar	Timmerfabriek
m	Timmerselekt Doornenbal	P. de Bree	Productieleider	Timmerfabriek - lamineren - vingerlassen
n	Van Aarle houtbedrijf / BPG	E. van Aarle	Directeur / eigenaar	Houtverduurzaming - houtconstructies - bouwmaterialen
o	Hout Industrie Schijndel	P. van Roy	Directeur / eigenaar	Loonwerk - schaven - profileren - vloerenproductie
p	Mevo	R. Kok	Bedrijfsleider	Loonwerk - schaven - vingerlassen - lamineren

Appendix 3: Resource Based View divided by value strategy

	Product leadership (n=7)		Customer intimacy (n=2)		Operational excellence (n=7)	
Innovation strategy	Mean	SD	Mean	SD	Mean	SD
The organizations vision or mission includes a reference to innovation	4,29	2,87	5,00	1,41	3,00	2,31
Innovation strategy has helped the organization to achieve its strategic goals	3,71	2,56	5,50	0,71	2,43	1,90
Increasing our production volume is an important measure of our process innovation	4,86	1,46	4,00	2,83	5,29	1,60
Improving administrative routines is seen as part of our innovation strategy	2,29	1,98	3,00	2,83	3,29	2,50
Internal cooperation is an important part of innovation strategy implementation	2,71	2,29	4,00	4,24	3,43	2,51
Improving product or service quality is one of our key objectives of innovation strategy	6,00	1,15	6,50	0,71	5,86	1,07
Formulating innovation strategy increases employee skills	3,43	2,23	6,00	1,41	4,43	2,57
Improving employee commitment, morale, or both is part of our innovation strategy monitoring	2,14	1,86	1,00	0,00	1,43	1,13
Formal structures						
Managers formally allocate resources to the use of cross-functional teams	3,57	2,07	6,00	1,41	4,43	1,90
Employees formally monitor developments in new technologies	5,14	2,04	6,00	0,00	5,86	0,69
Employees document and use failures as opportunities to learn	3,57	1,90	4,00	1,41	4,86	2,12
Managers provide systems to facilitate formal communication	2,14	1,86	1,00	0,00	2,14	1,68
Action plans or timetables and procedures are used to monitor progress	3,57	2,30	6,00	0,00	4,71	1,98
The senior manager encourages all employees to challenge the status quo	4,43	1,99	7,00	0,00	3,57	2,15
Our flat structure facilitates searching for and incorporating diverse points of view	5,14	1,46	6,50	0,71	3,86	2,04

Appendix 4: Networks of collaboration no division (n=16)

	Mean	SD
Project team organization		
The person leading the network had the necessary qualities and skills	4,44	2,22
The project teams in your network were interdisciplinary	4,56	2,28
The teams were assigned to only one project during the life span of the project	1,94	1,34
Team members did not change during the project	3,31	1,96
The teams were motivated	4,63	2,22
The top management of the partners was committed to the projects	5,25	2,27
The project team organization was supported by different software applications	2,00	1,79
Dependency		
The partners cover the entire value chain	2,44	2,06
The partners depend on the network	3,13	2,28
The partners work well with another	3,31	2,21
Compatibility of the network partners		
Goals	4,38	2,33
Financial affairs	3,88	2,28
Quality specifications	4,50	2,10
Schedules and deadlines	4,00	2,03
Performance evaluation	3,19	2,07

Appendix 5