Exploring Design-Driven Innovation

A study on value creation by SMEs in the Swedish wood products industry

Heleen de Goey
Abstract

Design-driven innovation, focused on the innovation of product meanings, provides a new perspective to better understand the contribution of design to innovation. Additionally, it enables new opportunities for value creation. At small and medium-sized enterprises (SMEs) in the Swedish wood products industry there is a need for such new value creation in order to remain competitive. However, design-driven innovation is not yet common in this context. Furthermore, there is little research on the innovation of product meanings focused on value creation. Therefore, the aim of this research is to explore value creation through design-driven innovation, in the context of SMEs in the Swedish wood products industry. This research addresses what value might be expected from design-driven innovation, as well as what enables and hinders this value creation.

To address the aim, three studies have been conducted which are described in four appended papers. The studies consist of one systematic literature review and two case studies. The findings demonstrate that design-driven innovation contributes to value creation by focusing on product meanings, which intentionally addresses both tangible and intangible needs and therefore increases the perceived value of products. This research identified five facets of design-driven innovation which provide a structure to discuss what enables and hinders value creation. These are: (1) understanding new product meanings, (2) knowledge generation, (3) actors and collaborations, (4) capabilities, and (5) process. The facets can be seen as the origin of both enablers and barriers to value creation through design-driven innovation, depending on how they are addressed. Moreover, this research suggests that whether or not value is created is further influenced by the SMEs, their networks and the context in which they operate.

Keywords: design-driven innovation, product meaning, value creation, perceived value, SMEs, Swedish wood products industry
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Heleen de Goey
Göteborg, 29th of May 2017
List of appended papers

This licentiate thesis is based on the following appended papers:

Paper 1

Paper 2

Paper 3

Paper 4

1 An earlier version of this paper was presented at the 23rd EurOMA Conference, Trondheim, Norway, 19-21 June 2016.
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List of definitions

**Design:** “The human capacity to shape and make our environments in ways without precedent in nature, to serve our needs and give meaning to our lives” (Heskett, 2005, p. 5)

**Design-driven innovation:** Innovation focused on the creation of novel product meanings (Verganti, 2008; Verganti, 2003)

**Innovation:** “An idea, practice, or object that is perceived as new by an individual or other unit of adoption” (Rogers, 2003, p. 11)

**Innovation barrier:** A factor that either prevents or delays innovative activities (Piatier, 1984; Sandberg & Aarikka-Stenroos, 2014)

**Innovation enabler:** A factor that either enables or supports innovative activities (Hadjimanolis, 2003)

**Perceived value:** An individual interpretation of the benefits gained from a product (Doyle, 2011)

**Product meaning:** “The purpose of a product as perceived by a human” (Öberg, 2012, p. 20)

**Small and medium-sized enterprises (SMEs):** Companies with less than 250 employees and a turnover of 50 million Euros or less (European Commission, 2015)

**Value:** The quota between the perceived value (according to the beholder) and exchange value (exchanged through monetary or other means) (Bowman & Ambrosini, 2000; Doyle, 2011; Lindstedt et al., 2003)

**Wood products industry:** The industry in the later phases of the wood value chain, following sawmilling and initial refinement. Activities include for example joinery, carpentry and furniture making (Brege et al., 2004; Ekberg, 2005; Sandberg et al., 2014).
1. Introduction

This chapter first provides a background to the research, the research context and the problem area. Second, the research aim and the research questions are provided. Then, the scope of the research is described. Last, the outline of this licentiate thesis is provided.

1.1 Background

“Design must become an innovative, highly creative, cross-disciplinary tool responsive to the true needs of men. It must be more research-oriented, and we must stop defiling the earth itself with poorly-designed objects and structures.”

– Papanek (1985, p. x)

The potential positive impact of design to innovation and value creation has been long known (Fitzsimmons et al., 1991; Kotler & Rath, 1984; Schneider, 1989). Where some early research focused on the contribution of design to product appearance and styling (Kotler & Rath, 1984; Ravasi & Lojacono, 2005), others already discussed the value of design to problem solving and innovation (Schneider, 1989). The role of design as an enabler of creativity and innovation became increasingly important as companies started to search for new ways to create value due to changing global circumstances (Kimbell, 2011; Perks et al., 2005). For example, the world-wide accessibility to technology and materials has made it more difficult for companies to distinguish themselves solely based on technology (den Ouden, 2012; Öberg, 2012). Especially in mature markets it is becoming difficult to continuously differentiate products (Cooper, 2011; Hilletoft, 2010).

The integration of design beyond its traditional application, popularized as design thinking, has expanded into different directions (Johansson-Sköldberg et al., 2013; Stewart, 2011). And over the years, design thinking has especially gained attention as an approach to problem solving (Brown, 2008; Buchanan, 1992; Carlsgren, 2013; Hobday et al., 2012; Jahnke & Hansson, 2010). This direction demonstrates a broader contribution of design beyond a focus on aesthetics. Yet, it does not capture the full potential benefit of design to innovation and value creation. As Öberg and Verganti (2014, p. 77) explain: “People are not only searching for new solutions to existing problems. They
are also searching for new meanings because their life keeps changing and
because they are delighted by the discovery of new directions.” Verganti
(2003) introduced the concept of design-driven innovation based on this
understanding. Here innovation is inspired by new meanings, rather than
existing problems. The focus on meaning-making sets design-driven
innovation apart from other forms of innovation, such as technological
innovation, focused on how products are developed, and user or market
innovation, focused on who products are developed for (Öberg & Verganti,
2014). Thus, design-driven innovation provides a new perspective to better
understand the role of design in innovation and opens up for new opportunities
to create value.

1.2 Research context

This research has been conducted within research school ProWOOD. This
is a joint research effort between Jönköping University, Linnaeus University,
two research institutes and several companies within the Swedish wood
industry. The goal of ProWOOD is to support innovative capabilities and
competitiveness of the Swedish wood industry. This licentiate thesis focuses
on small and medium-sized enterprises (SMEs) in the Swedish wood products
industry, as a part of the global wood industry (Figure 1).

Global wood industry

Global wood products industry

Swedish wood products industry

SMEs in the Swedish wood products industry

SMEs in the Swedish wood furniture industry

Figure 1: Overview of the research context
The global wood products industry is facing increasing competition from the use of alternative materials. In addition, production in low-cost economies increases competition further for companies in countries like Sweden (Hovgaard & Hansen, 2004; NRA, 2012; Stendahl, 2009). Overall, there is a need to become more innovative in order to remain competitive (Tellis et al., 2009). Companies in this industry have long been able to compete based on technological development and process innovation (Hansen et al., 2007). Yet, this narrow focus will not allow the industry to remain competitive in the future. Companies need to focus on other types of innovation as well (Hovgaard & Hansen, 2004). However, the global wood products industry is described as traditional and the companies do not change easily. There is a low rate of innovation and the companies struggle to develop innovations based on market needs (Hansen et al., 2007).

The Swedish wood products industry plays an important role in the country’s economy. The industry contributes especially to employment opportunities and export (NRA, 2012; Sandberg et al., 2014). However, the companies in this context meet increasing competition as well (Hilletofth et al., 2012). As said, both small and large companies need to compete with production in low-cost economies and with substitute materials (Stendahl, 2009). SMEs in this context meet additional competition from the expanding influence of IKEA (Brege et al., 2004). Current practice in the Swedish wood products industry focuses on production efficiency and the export of raw materials (Sandberg et al., 2014; SP Trå, 2013). To remain competitive there is a need to increase value creation by including product development and business model development as well (Sandberg et al., 2014). However, like in the global wood products industry, the efforts to innovate are too few and they are too fragmented (Brege et al., 2004). Stendahl & Roos (2008, p. 672) have identified five barriers to a more innovative culture in the Swedish and Finnish wood industry:

- Product development is not prioritized in the daily operations
- Product development is considered difficult and costly
- There are few ideas for new products
- Low knowledge of customer needs
- Raw material suppliers are not open to change
Furthermore, the majority of companies in the Swedish context are SMEs (Brege et al., 2004; SP Trä, 2013). This is an additional barrier, since small companies struggle more to adapt to changing global circumstances (Sandberg et al., 2014). Besides, they lack the resources to implement a structured innovation process (Hovgaard & Hansen, 2004).

1.3 Problem area

“Now everyone just wants to survive. The Swedish wood industry is brought to its knees, we know that. But if we work together, for example with design, then I believe we will win in the long term.” – Furniture designer (in an interview with the author, 2016)

As discussed in 1.2 Research context, in both the global and Swedish wood products industry there is a need to increase value creation in order to remain competitive. Generally, companies can increase value creation by lowering costs, by increasing the value perceived by consumers, or by a combination of these two strategies (Lindstedt et al., 2003; Porter, 1996). Companies in the global wood products industry have traditionally focused on lowering costs by increasing production efficiency (Hansen, 2014). However, as the market continues to mature, the necessity to develop higher value for consumers increases (Cooper, 2005). In other contexts, such as the electronics industry, examples are found of companies that compete based on perceived value instead of costs (Hilletoft et al., 2010). And Intuit, a provider of financial software, increased its market share by expanding its focus from incremental developments, to increasing the perceived value by integrating design and focusing on emotion and delight (Smith, 2015).

In the global wood products industry few efforts are made to change existing practices towards increasing the perceived value of products (Hansen, 2014). The companies stick to core competencies centered around production efficiency (Hansen et al., 2007; Hansen, 2014; Stendahl & Roos, 2008). Due to this narrow focus on lowering costs, opportunities for value creation currently remain unexploited (Hansen et al., 2015). Product innovation could enable the companies in the wood products industry to increase the perceived value of their products (Cooper, 2011; Eriksson et al., 2013; Hansen et al., 2015). Previous research, focused on lead-user innovation, has demonstrated
the potential to implement new methods to increase value creation in this context (Hansen et al., 2015).

In Sweden, the costs for raw materials and wages are relatively high compared to other countries (Stendahl, 2009). This makes it difficult for companies in this context to compete based on costs. Therefore, they need to seek new ways to create value. Previous research has shown that SMEs in this context could increase value creation by enhancing the perceived value of their products instead (Eriksson et al., 2013).

Various actors in the Swedish wood products industry recognize the importance of product innovation (Brege et al., 2004; Forest-Based Sector Technology Platform, 2005; Rådström & Thor, 2014; NRA, 2012; SP Trä, 2013; Stendahl, 2009). However, the companies have “**too little understanding of consumers’ priorities regarding design, functionality and other values**” (Brege et al., 2004, p. 24). The companies could benefit from new ways of working with product innovation (Rådström & Thor, 2014). As stated above, in **1.1 Background**, design contributes to value creation in product development (Fitzsimmons et al., 1991; Kotler & Rath, 1984; Schneider, 1989). The potential benefits of integrating design have also been demonstrated at SMEs in the Swedish wood products industry. However, this potential is not yet fully utilized (Brege et al., 2004; Ekberg, 2005).

There seems to be some consensus among authors that finding new ways to create value is necessary. Due to limited options to compete based on costs, the SMEs in Sweden need to seek new approaches to increase the perceived value instead. However, few authors discuss how this is actually accomplished. Previous research has identified enablers and barriers to innovation in the Swedish wood products industry in general (Stendahl & Roos, 2008). Yet, less is known on what enables and hinders increasing the perceived value of products.

This research focuses on design-driven innovation as a means to create value. As stated above, there is an unrealized potential to integrate design in product development at SMEs in the Swedish wood products industry (Brege et al., 2004; Ekberg, 2005). Research in other contexts has demonstrated that design-driven innovation contributes to product differentiation and increases value creation (Bellini et al., 2012; Dell’Era & Verganti, 2009; Öberg, 2012; Simoni et al., 2014; Verganti, 2009). However, value creation through design-driven innovation at SMEs in the Swedish wood products industry has not yet been explored.
1.4 Aim and research questions

A focus on design-driven innovation is not common at SMEs in the Swedish wood products industry. In addition to that, this type of innovation has not yet been explored in depth. Further research is needed to contribute with knowledge on design-driven innovation (Johansson-Sköldberg et al., 2013; Öberg, 2012; Öberg & Verganti, 2014; Verganti, 2008). Therefore, the aim of this research is:

To explore value creation through design-driven innovation, in the context of SMEs in the Swedish wood products industry

It is a relatively new concept to understand design as a process of meaning-making to inspire innovation (Johansson-Sköldberg et al., 2013; Verganti, 2008). A comprehensive overview of previous research, addressing the contribution of design-driven innovation to value creation, is currently missing. This knowledge, based on research in varied contexts, provides a foundation for further research within the scope of this licentiate thesis. This leads to the first research question:

RQ1: How does design-driven innovation contribute to value creation?

Answering this question provides an understanding on the value creation that could be expected through design-driven innovation. However, whether or not this value creation is actually realized depends on the SMEs’ ability to implement and manage design-driven innovation (Figure 2). This raises questions about the required conditions to become and remain innovative (Garibaldo, 2011; Trantow et al., 2011). To understand these required conditions, this research looks into what enables and hinders design-driven innovation. Knowledge about innovation barriers is needed to address them adequately and to create favorable conditions which support innovation (Hadjimanolis, 2003; Sandberg & Aarikka-Stenroos, 2014; Stendahl & Roos, 2008; Story et al., 2014). Innovation barriers are commonly linked to innovation enablers, which contribute to preventing or resolving these barriers (Hadjimanolis, 2003; Story et al., 2014). Thus, knowledge about enablers is also needed to understand the required conditions for value creation through
design-driven innovation. This is addressed by answering the second research question:

**RQ2:** What enables and hinders value creation through design-driven innovation, in the context of SMEs in the Swedish wood products industry?

To summarize, Figure 2 presents how the two research questions contribute to addressing the aim to explore value creation through design-driven innovation, in the context of SMEs in the Swedish wood products industry. As Figure 2 demonstrates, this research focuses on the expected value and the required conditions to realize this value. However, the research presented in this licentiate thesis does not include the assessment whether or not this value is actually realized.

![Figure 2: Connection between the two research questions](image)

**1.5 Scope and delimitations**

This research explores value creation through design-driven innovation at SMEs in the Swedish wood products industry. In literature, there is often overlap between: (1) the forest-based, wood and wood products industry; (2) the Swedish and global context; and, (3) large companies and SMEs. Distinctions are not always clearly stated or defined. However, in order to address the aim of this research, it is too restrictive to only include research referring specifically to SMEs in the Swedish wood products industry, due to
limited availability. Instead, the effort is made to clearly refer to the topics discussed in the original research.

The wood industry includes a broad variety of activities (Figure 3) (Forest-Based Sector Technology Platform, 2005). This research focuses on companies that develop wood products, including furniture and interior solutions (“living with wood” in Figure 3). Construction (“building with wood” in Figure 3) and other activities (“packaging, printing, hygiene products, composites, energy and fuels” and chemicals” in Figure 3) are excluded in this research.

![Figure 3: Overview of different areas within the wood industry, based on Forest-Based Sector Technology Platform (2005)](image)

The research is delimited further by focusing on SMEs in the Swedish wood products industry (Figure 4). SMEs are defined as companies with less than 250 employees and a turnover of 50 million Euros or less (European Commission, 2015). This is a relevant context to study because the majority of companies in the Swedish wood products industry are SMEs (Brege et al., 2004; SP Trä, 2013). Furthermore, it is important to distinguish between large
companies and SMEs in research, since SMEs face different challenges to innovation (Chang & Hughes, 2012; Hovgaard & Hansen, 2004; Sandberg et al., 2014). These challenges affect value creation through design-driven innovation and therefore, the outcome of this research.

Figure 4: Research scope

Last, this research focuses on value creation. As written in 1.3 Problem area, there are limited opportunities for SMEs in the Swedish wood products industry to increase value creation by lowering costs. Therefore, the focus here lies on increasing the perceived value of products instead. Although that does not necessarily exclude lowering costs as well, this is not given special attention in this research. Different types of innovation contribute to increasing the perceived value of products (Kim & Mauborgne, 1997; MacMillan & McGrath, 1997; OECD & European Communities, 2005). Each direction has a different origin and includes different activities. To provide a clear scope, this research only focuses on increasing the perceived value of products through of design-driven innovation.
1.6 Outline of the thesis

This licentiate thesis consists of six chapters and four appended papers. It is structured as follows:

In Chapter 1: Introduction a background to the research, the research context and the problem area are described. Second, the research aim and the research questions are provided. Last, the research scope is described.

In Chapter 2: Frame of reference the theoretical background to this research is presented. The following topics are included in the frame of reference: design, innovation and value.

In Chapter 3: Methodology the research process is described first. Second, the research approach is explained. Third, the selected research methods are described. This is followed by a description of the data collection and analysis techniques. Last, the chapter provides a discussion on the efforts taken to establish the quality of the research.

In Chapter 4: Summary of papers first an overview is given which presents how the appended papers are connected to the research aim and research questions. Second, each paper is summarized, including the aim, main results, conclusions and authors’ contributions.

In Chapter 5: Discussion the findings presented in Chapter 4 are discussed and a summary of the fulfillment of the research questions is provided. Second, the theoretical and practical implications are discussed. This is followed by a discussion on the limitations of this research.

In Chapter 6: Conclusion the main contributions of this research are summarized. Last, suggestions for future research are provided.
2. Frame of reference

This chapter presents the frame of reference for this research. The following topics are presented: design, innovation and value.

2.1 Introduction to the frame of reference

Design-driven innovation, as the term suggests, is rooted in design and continues to have strong ties to design practice (Johansson-Sköldberg et al., 2013; Rampino, 2011). Therefore, the frame of reference first introduces design, with a focus on the role of design in meaning-making. Second, the concept of innovation is introduced and defined. Then, the connections between design and innovation are discussed. In this research design-driven innovation is explored in relation to value creation. However, the concept of value is quite broad (den Ouden, 2012; Lepak et al., 2007). Therefore, value and value creation are described last in order to clarify how these concepts are understood in this research (Figure 5).

Figure 5: Overview of frame of reference
2.2 Design

“Design is to design a design to produce a design”- Heskett (2005, p. 3)

Taking this sentence as a starting point, it is not difficult to see why discussing “design” without further explanation easily causes confusion. Design refers to either: (1) the academic and professional field, (2) an activity, (3) a proposal, or (4) an outcome (Heskett, 2005). These meanings are distinct, but strongly intertwined and often discussed in relation to each other. To complicate the issue further, various authors have provided different definitions of design. Perhaps the broadest description of design is provided by Cross (2011, p. 4) who states: “Everything that we have around us has been designed. Anything that isn’t a simple, untouched piece of nature has been designed by someone.”

Regarding the reasons why we design, some take a practical interpretation focused on problem solving and addressing needs (Buchanan, 1992; Ulrich, 2011). Others focus more on the normative aspects of design. For example, Simon (1996) argues that designers work towards how things ought to be. Based on the origin of the word “design” Krippendorff (1989, p. 9) provides an alternative definition: “Design is making sense (of things)”. He clarifies this by stating that “the products of design are to be understandable or meaningful to someone.” Design-driven innovation is rooted in this definition of design (Johansson-Sköldberg et al., 2013; Verganti, 2008), as discussed further in 2.3.4 Design-driven innovation.

Combining the interpretations of design as problem solving and design as meaning-making, Heskett (2005, p. 5) has defined design as: “The human capacity to shape and make our environments in ways without precedent in nature, to serve our needs and give meaning to our lives.” Taking the definitions mentioned above into account, this definition of design is most relevant to the research presented in this licentiate thesis.

2.2.1 Design and product development

This research focuses on the design of physical products. Therefore, the products need to be materialized in order to address needs and give meaning. These activities are part of the product development process (Brown & Eisenhardt, 1995; Crawford & Di Benedetto, 2008). Various generalizations
and models have been made of both design and product development processes. Overall, literature focused on product development presents more structured models of the process (Cooper, 1990; Ulrich & Eppinger, 2012), compared to design literature. Here it is often stressed that design processes are not concrete or standardized (Dorst, 2011; Johansson-Skäldberg et al., 2013). The connection between design and product development processes is not always made clear, even though design influences different phases of product development. The role of design in the product development process varies from one company to the other, depending on their understanding of the potential impact of design. However, as product differentiation becomes increasingly important, there is a need to better integrate design throughout the product development process (Veryzer & Borja de Mota, 2005).

In order to accommodate literature from various fields used in this research, the “Double Diamond” process model is used as a reference (Figure 6). This model, developed by the Design Council (2007), consists of four phases: (1) discover, (2) define, (3) develop, and (4) deliver. These phases are described in Table 1. This model is broad and flexible enough to include the varied literature, but still enables to structure the insights gained from the empirical research conducted at companies with different product development processes.

![Figure 6: “Double Diamond” model, based on Design Council (2007)](image-url)
Table 1: Key activities in the “Double Diamond” model (Design Council, 2007, p. 6-7)

<table>
<thead>
<tr>
<th>Key activities</th>
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<tbody>
<tr>
<td><strong>Discover</strong></td>
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<tr>
<td>• Market research (gaining consumer insights and identify gaps in the market)</td>
</tr>
<tr>
<td>• User research (identify how to address user needs)</td>
</tr>
<tr>
<td>• Managing information (communication and sharing of information gained during the discovery phase)</td>
</tr>
<tr>
<td>• Design research groups (formation of groups with the purpose to generate ideas)</td>
</tr>
<tr>
<td><strong>Define</strong></td>
</tr>
<tr>
<td>• Project development</td>
</tr>
<tr>
<td>• Project management</td>
</tr>
<tr>
<td>• Project sign-off (approval of final concept)</td>
</tr>
<tr>
<td><strong>Develop</strong></td>
</tr>
<tr>
<td>• Multidisciplinary working</td>
</tr>
<tr>
<td>• Visual management (use of visuals to track and communicate process)</td>
</tr>
<tr>
<td>• Development methods (iterating development of prototypes)</td>
</tr>
<tr>
<td>• Testing (testing prototypes)</td>
</tr>
<tr>
<td><strong>Deliver</strong></td>
</tr>
<tr>
<td>• Final testing, approval and launch (resolve final problems before manufacturing and launch)</td>
</tr>
<tr>
<td>• Targets, evaluation and feedback loops</td>
</tr>
</tbody>
</table>

2.2.2 Design and meaning-making

As written above, design can be understood as a process of meaning-making, where the results of design ought to be meaningful to others (Krippendorff, 1989). “Meaning” is a broad concept which can be analyzed from various fields and perspectives. In this licentiate thesis, focused on the development of physical products, meaning is defined as “the purpose of a product or service as perceived by a human. This is about the purpose of ‘why’ a product is used” (Öberg, 2012, p. 20). Product meanings are defined by both tangible and intangible needs. Tangible needs refer to utility and functionality. Whereas intangible needs for example refer to emotional and socio-cultural needs (Beltagui et al., 2012; Kum et al., 2012). Along these lines, products represent identity, goals and social ties (Csikszentmihalyi & Rochberg-Halton, 1981; Richins, 1994) and contribute to psychological satisfaction (Dell’Era et al., 2011). Alternatively, Ligas (2000) distinguishes between functional product meanings and symbolic product meanings.

The interpretation of product meanings is a complex process. People constantly give meaning to the products around them, whether they are aware
of it or not (Monô, 1997). This process of interpretation can be a source for experimentation and manipulation (Papanek, 1985). However, this also creates an inherent conflict to design and innovation, where the outcomes need to be new, yet still meaningful and understandable (Krippendorff, 1989). The meaning of innovative products could be missed if it cannot be interpreted by the beholder (Monô, 1997). The product meaning is communicated through features such as form, materials and color (Goode et al., 2013; Jahnke & Hansson, 2010; Monô, 1997). Beltagui et al. (2012, p. 114) state: “The design of the product communicates clues to help create a meaning that goes beyond the sum of its parts.” The beholder aims to interpret these different parts, influenced by the context in which the product is placed. The designer aims to find the right combination of product features to assist the beholder in interpreting the new meaning (Micheli et al., 2012). The designer relies on previous experience and tacit knowledge to create these combinations (Wong & Radcliffe, 2000). Rosen et al. (2016) have created a model to present how a designer, based on a proposed meaning, combines product features to communicate this meaning to a beholder in a specific context (Figure 7).

![Diagram](example.png)

Figure 7: A model on communicating product meanings, adapted from Rosen et al. (2016, p.4)

Context plays an important role in interpreting product meanings (Karana & Hekkert, 2010; Krippendorff, 1989; Rampino, 2011). Karana (2009) provides the example of a porcelain tea pot: its meaning will be interpreted differently depending on if it is placed in a kitchen, an antique shop or another context. Influenced by culture, previous knowledge and experiences, the beholder aims to make sense of an object in the specific context (Karana & Hekkert, 2010; Krippendorff, 1989; Krippendorff & Butter, 1984; Rampino, 2011). As a consequence, since contexts change over time, product meanings change over time as well (Heskett, 2005).
2.3 Innovation

It is often stated that innovation plays an important role for companies to remain competitive (Cooper, 2011; Gebauer, 2011; Stamm, 2004; Van de Ven, 1986). Innovation is commonly assumed to be something positive, although it is not always clearly defined what it entails (Trantow et al., 2011). It has become a broad term with various meanings. For example, some refer to various types of innovation, such as process, product or service innovation (Stamm, 2004). Others differ between technological or product innovation (Trantow et al., 2011), or between the form, function and meaning of innovation (Rogers, 2003). Here, innovation is defined as “an idea, practice, or object that is perceived as new by an individual or other unit of adoption” (Rogers, 2003, p. 11). This definition does not refer to what is objectively new. Instead, the level of newness is determined by the beholder. Like product meanings, the perception of innovation is individual and context-dependent. What is understood as new and innovative in one context, could be misunderstood or overlooked in another (Pehrsson, 2016; Rogers, 2003).

Literature on innovation commonly distinguishes between radical and incremental innovation (Norman & Verganti, 2014; Sandberg & Aarikka-Stenroos, 2014; Stamm, 2004; Story et al., 2014). The distinction between incremental and radical innovation is not well understood. As with innovation in general, it depends on varying perceptions of newness (Sandberg & Aarikka-Stenroos, 2014). Incremental innovation can be understood as continuous improvements, whereas radical innovation concerns something completely new (Norman & Verganti, 2014; Stamm, 2004). Design-driven innovation entails both incremental and radical innovations, depending on the interpretation of the novelty of the product meaning (Öberg, 2012).

2.3.1 Innovation management

The importance of innovation raises questions about how companies innovate. Trantow et al. (2011) argue that the innovative capability of companies is determined by a complex dynamic between human, organizational and technological requirements. This makes it difficult to manage and control. Despite this complex dynamic, it is generally acknowledged that companies, and the individuals in the companies, influence the rate of innovation (Green & Cluley, 2014; Jahnke & Johansson-Sköldberg,
2014; Stamm, 2004). For example, a company’s management has a strong influence on creating the right conditions for innovative activities (Hult et al., 2004).

Innovation management should not aim to control and regulate uncertainty, since this may hinder innovation. Böhle (2011, p. 20) explains that “The goal of innovations is to replace or complement that which is currently known with that which is currently unknown and therefore uncertain.” These levels of uncertainty increase even further as the innovation moves more towards radical innovation (Bessant et al., 2014; Rogers, 2003). When companies focus on efficiency and struggle to deal with uncertainty and ambiguity, it will be more difficult for them to innovate. It is therefore important that different departments in the company have similar understandings on this uncertainty and not work against each other. Discussing different opinions and expectations regarding innovation enables management to better address these challenges and to divide resources adequately (Storey, 2000). Furthermore, companies need to be aware that the conditions for innovation change as the company evolves. Therefore, innovation management needs to evolve and a high reliance on previous experience may be counterproductive (Koberg et al., 1996).

2.3.2 Design and innovation

Trantow et al. (2011) argue that innovations do not emerge by following structured processes: instead they are developed through complex thinking. As a result, creativity is gaining more attention in the field of innovation (Heskett, 2005). According to Collopy a “design attitude” is required for innovation, because multiple alternatives are available. At the same time, stability and clearly defined boundaries are often missing (Collopy, 2010 in Hobday et al., 2012). In design, there are commonly no known end-goals, instead the aim is to create new end-goals. Therefore, design is inherently linked to uncertainty. There are multiple outcomes available to solve design problems, unlike with conventional problem solving where only one answer is correct. Designers are used to dealing with this complexity and they have developed the practice to address it (Cross, 2011). Dorst (2011) explains that design is valuable when both working principle (how to solve a problem) and the outcome (what will solve the problem) are unknown. Companies could therefore benefit from this practice in order to become more innovative.
Through the concept of design thinking designers were enabled to address various complex challenges (Johansson-Sköldberg et al., 2013). And nowadays, design is given more attention in innovation (Kimbell, 2011).

2.3.3 Challenges with problem solving and user needs

It has become popular to view the contribution of design to innovation in relation to a user-centered perspective (Beckman & Barry, 2007; Brown, 2009; Kimbell, 2011) and problem solving (Dorst, 2011). As companies aim to become and remain competitive, understanding and adequately addressing user needs is considered to be an important factor (Cooper, 2011; Ulrich & Eppinger, 2012; Veryzer & Borja de Mozota, 2005). However, more recently the challenge of user-centered design in innovation started to gain attention. People are not always aware of their own needs or they might not be able to articulate these. They may not recognize a need until they are presented with the solution (den Ouden, 2012; Matthyssens et al., 2006; Verganti, 2009). For example, before the introduction of smart phones, people would have struggled to ask for these devices, unaware of new technological opportunities and their own desire to communicate differently. Previous research has indicated that an overreliance on user feedback often results in incremental improvements. User involvement might lead to a focus on addressing current needs, whereas radical innovations address what people could want in the future (Carlsgren, 2013; Verganti, 2008).

2.3.4 Design-driven innovation

Based on the understanding that design can be seen as meaning-making, Verganti (2003) introduced the concept of design-driven innovation. This broadened the perspective beyond on user needs and problem solving, in order to inspire more radical innovations. Design-driven innovation focuses on the creation of new product meanings, which address both tangible and intangible needs (Verganti, 2008). Others also refer to this concept as “meaning innovation” (Rampino, 2011; Rogers, 2003). According to Rampino (2011, p. 10) this is the type of innovation “that best expresses the nature of design.” Due to the design influence, it does not stem from a predetermined and linear process. Instead, product meanings are innovated through exploration, reflection and interaction (Jahnke & Hansson, 2010). Verganti (2009) has
defined three main phases in design-driven innovation; (1) listening, (2) interpreting and (3) addressing. Throughout these phases knowledge about product language, user needs and technological development are integrated to develop and communicate new product meanings (Verganti, 2003).

Development of theory on the role of design and meaning-making in innovation is still quite nascent (Johansson-Sköldberg et al., 2013). Early examples of doctoral research on meaning-making in innovation are provided by Öberg (2012) and Jahnke (2013). Öberg mainly explored the nature of design-driven innovation. One of her main contributions regards the character of innovation of product meanings, which she refers to as: (1) context-dependent, (2) not optimized, (3) outlandish, and (4) co-generated. Jahnke’s research focuses more on design practice in innovation and he substantiates the influential role meaning-making has in innovation.

Although research is still fairly limited, various examples have already demonstrated the potential of design-driven innovation. These examples include Kartell’s Bookworm, Artemide’s Metamorfosi and Alessi’s “Family Follows Fiction” line, which are frequently discussed by Verganti (2003; 2008; 2009). Another well-known example is Apple’s Macintosh series. By emphasizing design and meaning, Apple was able to stimulate emotional bonds between computers and users. This influences how people perceive personal computers today (Ravasi & Lojacono, 2005). Where Apple’s example was strongly influenced by design, Goto and Ishida (2014) discuss how technological developments changed models of television and broadcasting. Through innovations as “Smart TV” companies changed what it means to watch television, influencing consumers’ perception of television.

2.4 Value

Value and value creation are important themes in literature on innovation (Lepak et al., 2007; Smith & Colgate, 2007). Trantow et al. (2011) distinguish innovation from non-innovation based on the criteria that it provides some value, regardless if this value can be measured in monetary terms or not. However, the concepts of value and value creation are not well understood (Lepak et al., 2007; Smith & Colgate, 2007). Furthermore, the concepts are interpreted differently depending on the academic and professional field in which they are discussed (den Ouden, 2012).
People interpret both an objective and a subjective value of products (den Ouden, 2012). Subjective value is also referred to as perceived value. This is defined as an individual interpretation of the benefits gained from buying a product (Doyle, 2011). It describes the value that is perceived by people, for example based on utilitarian and emotional needs (Bowman & Ambrosini, 2000; den Ouden, 2012). These individual perceptions are influenced by previous knowledge, individual goals, and on the context (den Ouden, 2012; Lepak et al., 2007). To illustrate, Trung et al. (2014) found that for novelty-seeking consumers the perceived value increases when product features are more innovative (individual goals). Wooden homes generally have a lower perceived value in Germany, while they have a higher perceived value in Mediterranean countries (context). And an indication of recognized certification may also increase the perceived value (knowledge) (Ljungberg & Edwards, 2003).

These individual perceptions make it difficult to objectively assess value creation. One approach to assess perceived value is to translate this value into the price a consumer would be willing to pay. Here willingness-to-pay is not the same as exchange value, which refers to the price that is actually paid (Bowman & Ambrosini, 2000). Linking perceived and exchange value, value is defined as the quota between the perceived value (in the eye of the beholder) and the exchange value (exchanged through monetary means or otherwise) (Bowman & Ambrosini, 2000; Doyle, 2011; Lindstedt et al., 2003).

Based on this definition of value, it is deduced that value is created by increasing the perceived value, by lowering the costs, or a combination of these two strategies (Bowman & Ambrosini, 2000; Lindstedt et al., 2003; Porter, 1996). This definition of value mostly applies when discussing “value to a consumer”. At the same time, value creation can also refer to “value to a company”. In this licentiate thesis, value to a company concerns the value that the company is able to capture (Bowman & Ambrosini, 2000; Lepak et al., 2007).

2.4.1 Design-driven innovation and value creation

Already in 1959 Levy stated: “People buy things not only for what they can do, but also for what they mean” (Levy, 1959, p. 118). This is an early indication that innovation of product meanings can create value for both consumer and company. New product meanings influence the perceived value
of products. Nevertheless, the value created through design-driven innovation is difficult to quantify (den Ouden, 2012; Jahnke & Johansson-Sköldberg, 2014; Öberg, 2012). Research has provided evidence for increased value creation through the integration of design in general (Ward et al., 2009). And although some anecdotal evidence is available on companies that were able to increase value creation by innovating product meanings (Jahnke & Johansson-Sköldberg, 2014; Smith, 2015), research on this topic is scarce. An important contribution here is the research conducted by Öberg (2012). She states that design-driven innovation can create value for the company by: (1) developing business areas, (2) increasing sales and market shares, or (3) gaining competitive assets. Furthermore, she argues that product meanings can be renewed continuously. Therefore, there are continuous opportunities to develop new meanings and create value.
3. Methodology

This chapter presents the methodology. First, the research process is described. Second, the research approach is introduced. Third, an overview of the applied methods is provided, followed by a section on data collection and analysis. Last, this chapter describes the efforts taken to establish credible research.

3.1 Research process

This research has been conducted between January 2015 and April 2017. The research started with a broad exploratory study on design, innovation and sustainability at SMEs in the Swedish wood products industry (de Goey et al., 2015). Although it is not included in this licentiate thesis, the study did enable the author to become familiar with the research context and to refine the research aim.

In order to address the research aim, three studies have been conducted. Study I started in November 2015. Quickly thereafter, the author joined an ongoing research project, presented as Study II in this licentiate thesis. Study II is part of a longitudinal case study, where data collection had started earlier in 2009. The author contributed with additional data collection and analysis in the spring and summer of 2016. During this time, data collection and analysis for Study I and II partly overlapped. Once Study I and II were completed, Study III started in September 2016 and continued until January 2017. The licentiate thesis was finalized between January and April 2017.

3.2 Research approach

Research on design-driven innovation and its impact on value creation is still in its early stages (Johansson-Sköldberg et al., 2013; Öberg, 2012). Furthermore, to the best of the author’s knowledge, no previous research has specifically focused on what enables and hinders value creation through design-driven innovation. Therefore, this subject is best studied with an explorative and qualitative approach (Edmondson & McManus, 2007; Williamson, 2002). Study I was entirely based on previous literature on
design-driven innovation in general, while Study II and III combined empirical and theoretical findings. Study II started with empirical findings, which were compared to literature. In contrast, Study III originated from literature and explored the combination of two theoretical models in practice (Figure 8).

![Figure 8: Research approach](image)

### 3.3 Research methods

In order to address the research aim, three studies have been conducted. These are presented and discussed in four publications. A systematic literature review was conducted to address the aim of Study I. The focus of this study was mainly descriptive. The aim of Study II and III was more explorative. Therefore, case studies were conducted. A complete overview of the research is presented in Table 2. The selected methods and applied data collection and analysis techniques are described further below.
Table 2: Overview of the research methods

<table>
<thead>
<tr>
<th>Publication Aim</th>
<th>Study I</th>
<th>Study II</th>
<th>Study III</th>
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<tbody>
<tr>
<td><strong>Aim</strong></td>
<td>Paper I</td>
<td>Paper II &amp; III</td>
<td>Paper IV</td>
</tr>
<tr>
<td><strong>Descriptive:</strong></td>
<td>To provide a comprehensive overview of previous research on value creation through design-driven innovation</td>
<td>To identify enablers and barriers to value creation through design-driven innovation</td>
<td>To explore how companies consider different stakeholders in knowledge generation and meaning-making</td>
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<tr>
<th>Method</th>
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<tr>
<td>Systematic literature review</td>
<td>Single case study</td>
<td>Multiple case study</td>
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<th>Data collection</th>
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<tr>
<td>Systematic search for peer-reviewed articles</td>
<td>Semi-structured interviews</td>
<td>Documents</td>
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<td></td>
<td>Observations</td>
<td></td>
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<td></td>
<td>Qualitative data analysis</td>
<td>Iterative coding</td>
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<td>Iterative coding</td>
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<th>Data analysis</th>
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<td>Qualitative data analysis</td>
<td>Iterative coding</td>
<td>Within-case analysis</td>
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<td>Iterative coding</td>
<td>Cross-case analysis</td>
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3.3.1 Systematic literature review

A systematic literature review was conducted in order to address the aim of Study I. A literature review increases knowledge on how and what other researchers have studied on a specific topic and helps to identify research gaps (Jesson et al., 2011; Williamson, 2002). The review was systematic since it had “a clear stated purpose, a question, a defined search approach, stating inclusion and exclusion criteria, producing a qualitative appraisal of articles” (Jesson et al., 2011, p. 12). The review was based on four steps for content analysis: (1) material collection, (2) descriptive analysis, (3) category selection, and (4) material evaluation (Seuring & Gold, 2012).

3.3.2 Case study

Case studies were conducted to address the aim of Study II and III. Case study research is “a research strategy which focuses on understanding the
dynamics present within single settings” (Eisenhardt, 1989, p. 534). Previous research has stressed the importance to include the context and conditions which influence innovation (Pehrsson, 2016). This makes case study research a suitable method, since it enables research on contemporary events, which cannot be manipulated, in their context (Williamson, 2002; Yin, 2014). Furthermore, it is an appropriate method for subjects which have not yet been researched extensively (Williamson, 2002).

The aim of Study II was addressed by a longitudinal single case study. A single case study was appropriate due to the uniqueness of the case (Yin, 2014). The case company, here referred to as FurnitureCO, made the deliberate decision in 2004 to change their approach from wholesale to focusing on perceived value in product development. Furthermore, the long-term research collaboration with the first author of Paper III (and co-author on Paper II) provided a rich understanding of the impact of this change (Williamson, 2002). Study III consisted of a multiple case study in which two case companies participated, here referred to as ToolsCO and SoundCO, for within-case and cross-case analysis.

The participating case companies, FurnitureCO, ToolsCO and SoundCO, have in common that they work in the Swedish wood products industry. FurnitureCO and SoundCO fall within the definition of SMEs. However, it should be noted that ToolsCO, although it only has 76 employees, has a turnover which exceeds 50 million Euros. All three companies have their own product development processes and they have employees working on these processes. Due to the focus of Study III, on meaning-making for multiple stakeholders in business-to-business and public contexts, ToolsCO and SoundCo have the additional similarity that they both work in these contexts.

3.4 Data collection and analysis

3.4.1 Data collection Study I: Systematic literature review

The data for the literature review was collected in January 2016. The databases Scopus and Web of Science were used to collect literature on “design-driven innovation” and “product meaning”. The search was delimited by only including articles and reviews in English. An abstract review and a full paper review were conducted to screen the identified literature for
suitability. Last, additional literature, which was referred to in three or more of the sources, was added to the final sample.

The final sample was initially collected with the aim to conduct the systematic literature review presented in Paper I. The same sample was later reviewed again to identify enablers and barriers discussed in literature to provide a theoretical framework to Paper II.

3.4.2 Data collection Study II and III: Case studies

In case study research the use of multiple sources and data collection techniques is encouraged (Yin, 2014). Study II and III included multiple sources and data collection techniques (Table 3). In both case studies semi-structured interviews were conducted with several interviewees. This technique was chosen because it allows for the collection of the sought data, while allowing respondents to expand on unexpected topics or to provide more detail on issues which are important to them (O’Leary, 2014; Williamson, 2002). The majority of the interviews were one-to-one interviews to allow respondents to talk freely (O’Leary, 2014). However, due to limitations in planning, one interview with multiple interviewees was conducted at SoundCO.

The interviews were conducted at the case companies and designers’ studios. This allowed the author to visit and observe showrooms, production facilities and design studios. This contributed to gaining a deeper understanding of the companies’ and designers’ work. Furthermore, it facilitated discussion between the author and interviewees about the products available on site.

Last, additional data was collected through various documents. These included both publicly available documents, such as marketing material, and company confidential documents, such as internal presentations. This data included both recent and older documents. This supported gaining a better understanding of the companies’ developments.
Table 3: Overview of data collection for Study II and III

<table>
<thead>
<tr>
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<th>Study II2</th>
<th>Study III</th>
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<tbody>
<tr>
<td>Semi-structured interviews</td>
<td><strong>FurnitureCO:</strong> - Managing director - Sales and export manager - Product coordinator - 2 external furniture designers</td>
<td><strong>ToolsCO:</strong> - Head of product development - Manager product development - Head of design - Test engineer - 2 product development engineers</td>
</tr>
<tr>
<td>Observations</td>
<td><strong>FurnitureCO:</strong> - 1 company visit - 2 visit to design studios from external furniture designers</td>
<td><strong>ToolsCO:</strong> - 3 company visits</td>
</tr>
<tr>
<td>Documents</td>
<td><strong>FurnitureCO:</strong> - Meeting protocols - Inventory and sales data - Annual reports - Product information - Marketing material</td>
<td><strong>ToolsCO:</strong> - Annual reports - Marketing material - Product information - Internal company presentations</td>
</tr>
<tr>
<td></td>
<td><strong>SoundCO:</strong> - CEO - Manager product development</td>
<td><strong>SoundCO:</strong> - 1 company visit</td>
</tr>
</tbody>
</table>

2 The data collection for Study II described here only concerns the data collected by the author of this licentiate thesis. Additional data has been collected between 2009 and 2016 by the first author of Paper III and co-author of Paper II.
3.4.3 Qualitative data analysis

Mainly qualitative data was collected in the three studies. Some quantitative data was collected in the systematic literature review to describe the formal characteristics, such as publication year and applied research methods. Moreover, quantitative data was collected in Study II to support the qualitative findings. In all studies the data was evaluated according to the three phases for qualitative data analysis, as defined by Miles and Huberman (1994): (1) data reduction, (2) data display, and (3) conclusion drawing.

In the first phase, data reduction, the data from the systematic literature review was condensed, coded and structured in categories. In the case studies the interviews were transcribed and notes were structured. The interview transcripts were coded and structured in categories (Harding, 2013; Williamson, 2002). In all three studies the coding process started by organizing the data in predefined categories. Next, an iterative approach was used to identify and refine specific themes within each category.

In the second phase, data display, the condensed data and categories were first organized in a data matrix. And, depending on the study, tables or figures were created to structure the data. In the third phase, conclusion drawing, the data matrices, tables and figures were evaluated and interpreted in order to address the specific research questions.

3.5 Research quality

The aim of this research is to explore a relatively new subject in its real-life context, rather than to test hypotheses or to make generalizations on value creation through design-driven innovation. Based on this aim, the efforts taken to provide credible results are described here, rather than to focus on ensuring validity or reliability. The quality of this research is discussed based on the following criteria to assess credibility: neutrality, authenticity, dependability, transferability, and auditability (O’Leary, 2014).

Neutrality concerns the efforts taken to avoid bias in results and conclusions (O’Leary, 2014). The systematic literature review followed a predefined structure. The suitability of all the collected sources was assessed based on predefined criteria in order to avoid researcher bias in material selection and analysis. Multiple sources were included in the case studies to obtain data from varied perspectives (Williamson, 2002). It is stated in the
results and discussions of the papers when conflicting perspectives occurred. This provides an accurate representation of the situation to the reader. Moreover, to reduce researcher bias, planning the studies, data collection, analysis and conclusions were discussed among two to three researchers (Yin, 2014).

Authenticity refers to the truthfulness obtained through the research (O’Leary, 2014). Here, method and source triangulation was applied to cross-check the consistency of the collected data (Williamson, 2002). Apart from data triangulation, the findings were also verified by the respondents (Lincoln & Guba, 1985). Findings were presented to the respondents, either through personal communication or through written reports. The respondents were given the opportunity to express their thoughts on the findings. When needed additional data was collected to address specific concerns. In case differences between the qualitative and quantitative data occurred, the quantitative data was viewed as a more accurate representation of what actually happened (Yin, 2014). However, the qualitative data provided information about the respondents’ perspectives and interpretations of certain events. Last, during the interviews, different concepts were defined and discussed using specific examples. This increases the certainty that the interviewer and respondent were discussing the same topics.

Transferability concerns the relevance of the practical and theoretical contributions in other contexts (O’Leary, 2014). This research has a specific focus on SMEs in the Swedish wood products industry. Although it is not the aim to make generalizations, some insights will be of interest for other contexts as well. The effort has been made to give relevant data, regarding the case companies and research context, to enable the reader to interpret the relevance of the findings in other contexts.

Dependability refers to the recognition that not all studies can be repeated. Instead, measures need to be taken to demonstrate how subjectivities are addressed. This enables the reader to assess the credibility of the research (O’Leary, 2014). Related to this, auditability recognizes the role of the research context. In order to increase credibility, applied methods need to be clearly explained (O’Leary, 2014). Both in this chapter, as well as in the appended papers, it has been the aim to clearly describe the motivation for and application of specific methods. This enables the reader to assess the consistency of the research and provides insight to understand how and why conclusions were drawn.
4. Summary of appended papers

This chapter first provides an overview that presents how the appended papers connect to the research questions. Second, each appended paper is summarized, including the aim, main results and conclusions. The authors’ contributions for each paper are briefly stated. Last, the main contributions of each appended papers to the research questions are summarized.

4.1 Connection between research questions and appended papers

The research presented in this licentiate thesis is preceded by a broad study on design, innovation and sustainability at SMEs in the Swedish wood products industry (Figure 9). This study demonstrated the potential for design thinking to enable SMEs to: (1) address user needs, (2) focus on purpose and meaning, and (3) increase sustainability (de Goey et al., 2015). In addition, this study provided the insight that there was a need to narrow down the research aim. Focusing on the connection between design and meaning, the research was narrowed down to design-driven innovation.

The aim was formulated to explore value creation through design-driven innovation at SMEs in the Swedish wood products industry. Two research questions were formulated to address this aim (Figure 9). The first research question is mainly addressed in Paper I, which describes the results of the systematic literature review on design-driven innovation. Although Paper II mostly focuses on the second research question, it also provides empirical evidence to support the conclusions presented in Paper I. Paper II explores the enablers and barriers to design-driven innovation in the product development process. This paper focuses on the case company, whereas Paper III explores the value gaps which occur in the collaboration between different partners in the demand and supply chain. These potential value gaps present a specific barrier to value creation. Last, Paper IV presents the results of a study focused on exploring how companies address multiple stakeholders in design-driven innovation. Here, additional barriers to value creation were identified for companies working in business-to-business as well as public contexts.
4.2 Paper I - Design-driven innovation: a literature review

Paper I presents the results of Study I. The aim of this study was to develop a comprehensive understanding on the contribution of design-driven innovation to value creation. A systematic literature review on design-driven innovation was conducted to address this aim. The final sample of the review consisted of 57 sources. The majority of these sources are peer-reviewed journal articles. Other sources are books, book chapters and popular science publications. The sources have been published between 1982 and 2015. The distribution of sources over time demonstrates that the concept of product meanings has been researched long before design-driven innovation (Figure 10). The earliest identification of the concept of design-driven innovation is

![Distribution of publications between 1982 and 2015 (N=57)](image)

The results demonstrate that design-driven innovation has mainly been discussed within the field of design management, but it is expanding into new areas, such as material design and industrial ecology. Furthermore, it shows that design-driven innovation has been studied in a variety of contexts, ranging from household products, to the food industry and automotive industry. However, the majority of the studies has been conducted in multiple industries, without specifying the contexts.

Regarding the impact of design-driven innovation on value creation, previous research mainly stresses the importance of including intangible needs, such as emotional or cultural needs. Both in mature and emerging markets, the inclusion of these intangible needs is becoming more important to enable consumers to distinguish between the variety of available products (Dell’Era et al., 2011; Dell’Era & Verganti, 2009; Farhana & Bimenyimana, 2015; Gotzsch, 2006; Verganti, 2009). By including the intangible needs, companies are better able to compete based on product differentiation.

Five facets of design-driven innovation which contribute to value creation were identified in the qualitative analysis of the review. These are: (1) understanding new product meanings, (2) knowledge generation, (3) actors and collaborations, (4) capabilities, and (5) processes. The connections between these facets are presented in a theoretical framework (Figure 11).
Figure 11: Proposed theoretical framework of the five facets of design-driven innovation that contribute to value creation

In this framework design-driven innovation is defined as the innovation of product meanings. The top left, light grey box presents how collaborations with new actors contribute to knowledge generation. These collaborations and generated knowledge guide the development of new product meanings. These interactions and activities are enabled through specific capabilities. Last, they take place in an iterative process.

Regarding value creation, Paper I concludes that design-driven innovation increases value for both companies and consumers: the former, because they become more competitive, and the latter, because both their tangible and intangible needs are met. This paper concludes by emphasizing the need to consider all five facets of design-driven innovation in a holistic perspective, since they interact and reinforce each other.
Contribution: De Goey and Hilletoft initiated the paper. De Goey was responsible for planning the review, data collection, data analysis and writing. Hilletoft contributed to the methodology and structure of the review. Both Hilletoft and Eriksson contributed with comments, literature and improvements.

4.3 Paper II - Design-driven innovation: exploring enablers and barriers

Paper II presents the results of Study II. The aim of the study was to explore the enablers and barriers to design-driven innovation in the product development process. This aim was addressed by conducting a single case study at a Swedish wood furniture company, here referred to as FurnitureCO. The paper discusses the identified enablers and barriers, where in the product development process they occur and how they are connected to each other. The Double Diamond process model (Design Council, 2007) was used to structure the identified enablers and barriers.

The case company in this case study was initially a conventional wholesaler. However, in 2004 they decided to start their own product development to meet increasing competition and price pressure. The company decided to focus on creating unique furniture with increased perceived value. The case study started in 2009 and was on-going in 2016. This long-term research collaboration facilitated knowledge generation about enablers and barriers that occur and change over time.

At the case company enablers and barriers were identified in all phases of product development (Figure 12). While some of these enablers and barriers have been discussed in literature before, the case study also brought forward enablers and barriers not previously discussed. Second, the case study demonstrated how enablers and barriers are connected, both within, as well across different phases of the product development process. Exploring the enablers and barriers further also demonstrated how some issues have their roots in an earlier phase, yet this does not become a noticeable barrier until later.
<table>
<thead>
<tr>
<th>Enablers</th>
<th>Barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design-driven innovation identified as new approach to gain competitive advantage</td>
<td>Challenge to change company culture</td>
</tr>
<tr>
<td>Employees’ affinity with design-driven innovation</td>
<td>FurnitureCO’s old image hinders collaboration with new designers</td>
</tr>
<tr>
<td>Collaboration with a variety of designers</td>
<td></td>
</tr>
<tr>
<td>Student teams as interpreters</td>
<td>No continuity in exploration and discovery</td>
</tr>
<tr>
<td>Methods from empathic design</td>
<td>Different visions on exploration and discovery</td>
</tr>
<tr>
<td>Collaboration with various actors (e.g. trend institutes and university)</td>
<td>Too many cooks in the kitchen*</td>
</tr>
<tr>
<td>No feedback from resellers</td>
<td>Narrow design brief limits designers’ creativity</td>
</tr>
<tr>
<td></td>
<td>Pre-defined material choice and production hinders designers’ creativity</td>
</tr>
<tr>
<td>Common thread in collections</td>
<td>Not director who could create a common thread is missing</td>
</tr>
<tr>
<td>Increased collaboration between all departments and external designers</td>
<td>Insufficient collaboration between all departments and external designers</td>
</tr>
<tr>
<td>Cross-functional meetings</td>
<td>Challenge to define the ‘next big thing’</td>
</tr>
<tr>
<td>Long term collaboration allows designer to make something which fits the company</td>
<td></td>
</tr>
<tr>
<td>Fully attention to details saves time and money later on</td>
<td>Designers are limited in choice of material and color</td>
</tr>
<tr>
<td>FurnitureCO works with a target matrix</td>
<td>Not all designers can or want to work with the target matrix</td>
</tr>
<tr>
<td>Collaboration with upstream supply chain partners</td>
<td>Lack of flexibility at some suppliers</td>
</tr>
<tr>
<td>FurnitureCO works with color and material matrix</td>
<td>Different expectations between designers and company on design changes and quality</td>
</tr>
<tr>
<td>Experience with material and production processes allows designers to contribute to improved production</td>
<td>Challenge to ensure quality for smaller series</td>
</tr>
<tr>
<td>Main production of certain components enables higher quality of details</td>
<td>Limited options to include details and manufacture more complex designs</td>
</tr>
<tr>
<td></td>
<td>FurnitureCO blocks collaboration between designers and factories</td>
</tr>
<tr>
<td>Collaboration with retailers in the right segment</td>
<td>furnitureCO’s old image hinders collaboration with new retailers in the right segment</td>
</tr>
<tr>
<td>Showrooms organized around different brands</td>
<td>Retailers lacking adequate knowledge on how to display and sell the furniture</td>
</tr>
<tr>
<td></td>
<td>Innovative value is not always immediately apparent</td>
</tr>
<tr>
<td>Design ‘with its own story’ generates interest over longer time</td>
<td>Difficult to impose on consumers how they should interpret the furniture</td>
</tr>
<tr>
<td>Publications in magazines on interior design</td>
<td></td>
</tr>
</tbody>
</table>

Figure 12: Connections between the enablers and barriers identified at FurnitureCO
The paper discusses three main theoretical implications derived from the case study. First of all, the case study substantiates previous research discussing the value of creating networks with actors outside the company (Verganti, 2008). At the same time, the study also demonstrates the role of internal collaborations. Factors like company culture, communication barriers and opposing views on management hindered value creation through design-driven innovation. Second, this case study demonstrates how enablers and barriers to design-driven innovation are linked, both within, as well as across different phases of product development. Often, barriers arise when enablers are absent (Hadjimanolis, 2003). Therefore, research needs to focus on exploring the cause of both enablers and barriers. This contributes to better insights on how companies can establish the required conditions for design-driven innovation. Last, this study shows that the enablers and barriers are dynamic and change over time. This is in line with previous research on barriers to radical innovation (Hadjimanolis, 2003; Sandberg & Aarikka-Stenroos, 2014). Therefore, there is a need for more long-term studies to better understand the dynamic changes of enablers and barriers to design-driven innovation.

In addition to the theoretical implications, two main practical implications were discussed. The first one concerns the links between the enablers and barriers, within and across the different phases of product development. Companies need to be aware of how certain changes influence other phases of product development. Furthermore, companies need to be able to map the enablers and barriers to design-driven innovation in order to understand these links. Second, communication and company culture caused some barriers. The case study demonstrates the need to address these barriers on time to prevent additional barriers later on in the process.

The paper concludes by stressing the importance of gaining a comprehensive understanding of the origins and connections between the enablers and barriers. This will allow companies to continue to benefit from the present enablers, while aiming to eliminate the barriers.

**Contribution:** De Goey, Hilletoft and Eriksson co-initiated and wrote the paper on enablers and barriers. The paper describes a long-term case study initiated and conducted by Eriksson, in collaboration with Hilletoft. De Goey conducted additional interviews and observations in 2016. Eriksson was responsible for the case description. De Goey was responsible for the
4.4 Paper III - Toward an understanding of value gaps in demand and supply chains

Paper III presents the results of Study II. This paper focuses on value gaps in the demand and supply chain. The presence of value gaps in the demand and supply chain has a negative impact on value creation. Therefore, it is important to understand where and why these value gaps occur. The aim was addressed by the same case study conducted at FurnitureCO (referred to as “Alpha” in Paper III), described above in 4.3 Paper II – Design-driven innovation: exploring enablers and barriers.

Paper III builds on the model on value gaps in service quality developed by Parasuraman et al. (1985). It applies this model to physical products, in this case furniture. The model is extended to include multiple actors, opposed to the focus on one company in the original model.

The demand chain consists of processes aimed at gathering consumer insights and translating these into new products with higher perceived value. The supply chain concerns the processes involved in delivering these new products. The value gaps identified in the study are presented in Figure 13 and described in Table 4. The value gaps in the demand chain arise due to challenges to generate knowledge about consumers and to translate these insights into specific product features. For example, the actors that contribute to generating this knowledge might be biased. In the supply chain, value gaps arise due to limited manufacturing capacity, material and color choice, and logistics. Here, FurnitureCO has experienced problems when suppliers were not able to deliver furniture of the right quality.
Table 4: Description of value gaps with examples from FurnitureCO

<table>
<thead>
<tr>
<th>Value gap</th>
<th>Description</th>
<th>Example from the case study</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Consumers’ expected value –</td>
<td>The interpreters’ abilities to understand the consumers affect the discovery of opportunities. They are also affected by the consumers’ inability to articulate needs. This is filtered by the company that needs to agree upon interpretation.</td>
<td>The team interpreting the opportunities might be biased and they might not detect all opportunities.</td>
</tr>
<tr>
<td>perceptions of consumer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>expectation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Perceptions of consumer</td>
<td>Product specifications are limited by manufacturing capabilities in the supply chain.</td>
<td>Product development manager limits material and color choice. Some factories do not have the capability to produce the desired quality.</td>
</tr>
<tr>
<td>expectations - specifications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Specifications - delivered</td>
<td>There are several ways in which the delivered product may deviate from the specifications of the same product. Manufacturing disruptions can result in stock outs, and problems in materials and manufacturing can produce an undesired quality.</td>
<td>One factory had problems with producing a desired pristine white finish. One table had a thick top, which was supposed to contain a honeycomb. To make production easier the factory instead made the top in solid wood, as a result the table was extremely heavy.</td>
</tr>
<tr>
<td>value</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Delivered value –</td>
<td>It is not easy to know what is, or should be, the</td>
<td>Big differences exist in how the retailers are able to</td>
</tr>
<tr>
<td>5</td>
<td>Delivered value – perceived value</td>
<td>The case company aims to understand tacit requirements. The tacit nature of value is also reflected in how it is perceived. Natural variations in materials can disappoint a consumer. Other factors, such as reception by the retailer, can also augment the experience of the consumer.</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>6</td>
<td>Perceived value – expected value</td>
<td>The gaps contribute to a difference between what is expected and what is perceived. These gaps span across the demand and supply chains, involving all actors. When the perceived value is higher than the expected value, it is reasonable to assume that the consumer is satisfied.</td>
</tr>
</tbody>
</table>
The paper demonstrates how the model by Parasuraman et al. (1985) can be developed further to identify value gaps in the development of physical products in collaboration with various actors. The study showed how value gaps may occur due to: (1) distorted information in the demand flow, (2) distorted information in the demand push, and (3) lacking manufacturing capabilities. Furthermore, the case study demonstrated how value creation is divided among different parts of the demand and supply chains and extends beyond organizational, geographical and cultural boundaries. The emphasis on the interactions between different actors, rather than focusing on one company, provides a more thorough understanding of where in the demand and supply chain value creation is enabled or hindered. The paper concludes by stressing the need to have a balanced view on demand and supply chains, since value creation does not occur in either one or the other. Instead, both processes contribute to increasing value creation. This calls for coordination between the processes to eliminate value gaps.

**Contribution:** Eriksson and Hilletofth co-initiated and wrote the paper. The paper describes a long-term case study initiated and conducted by Eriksson, in collaboration with Hilletofth. Tate contributed with comments, literature and improvements. De Goey contributed with additional data to the case study, additional literature and improvements.

### 4.5 Paper IV - Design-driven innovation: making meaning for whom?

Paper IV presents the results of Study III. The aim of this study was to explore how companies consider different stakeholders in knowledge generation to innovate product meanings. This study concentrated on companies in business-to-business and public contexts. The study focused on the three knowledge drivers in design-driven innovation, namely knowledge on product language, needs and technological development (Verganti, 2003). These knowledge drivers were explored in relation to three customer categories: buyers, users and influencers (den Ouden, 2012) (Table 5).
To address the aim a case study was conducted at two case companies, here referred to as ToolsCO and SoundCo. Diagrams were created to present how the companies prioritize the different knowledge drivers, and to which extend each stakeholder is considered for these knowledge drivers (Figure 14 and Figure 15). These diagrams are based on the relative frequency of the different combinations of knowledge drivers and stakeholder categories (e.g. needs-user or technology-buyer) which came up during the interviews. The figures are not based on quantitative data. Instead, based on qualitative data, they provide a representation of the case companies’ prioritizations. Figure 14 and Figure 15 show that both companies prioritize knowledge about needs. However, ToolsCO mainly considers the needs of the user, whereas SoundCO has a stronger focus on the buyer.

The cross-case synthesis of the two case studies shows that the companies have similar prioritization regarding the three knowledge drivers (Figure 16). However, focusing on how the companies prioritize each stakeholder for the different knowledge drivers, there is a clear difference between the companies. Here, ToolsCO has a similar pattern for each knowledge driver, whereas SoundCO shows a more diverse pattern.
Figure 14: Knowledge drivers and stakeholders at ToolsCO

Figure 15: Knowledge drivers and stakeholders at SoundCo
Figure 16: Cross-case synthesis ToolsCO and SoundCO
The study shows that the case companies make different prioritizations, although they both acknowledged the importance to consider multiple stakeholders and operate in similar contexts. A lack of consideration for certain stakeholders may hinder value creation. For example, ToolsCO struggled to actually reach their intended users, since buyers did not always understand the value of innovative products.

This study focused on exploring these prioritizations, not on assessing the quality and impact of these prioritizations. Therefore, it was not possible to assess if one approach is preferable. However, the results demonstrate that companies need to be aware of the perspectives from the different stakeholders. Furthermore, the study shows there is a need to consider multiple stakeholders in research on design-driven innovation in business-to-business and public contexts. As a consequence, it is of value for future research to consider the influence of the context in which the study is conducted. The practical implications are that companies first need to understand that multiple stakeholders encounter and aim to interpret their products. Second, they need to acquire the knowledge and skills to address how various stakeholders might have different interpretations of product meanings.

**Contribution:** De Goey initiated and wrote the paper. De Goey was responsible for planning the case study, data collection and analysis. Hiltetoft and Eriksson contributed with comments, literature and improvements.

### 4.6 Summary of the papers’ contributions

Table 6 provides an overview of the main contributions of each paper to the two research questions and the research aim.
Table 6: Main contribution of each paper to the research questions

<table>
<thead>
<tr>
<th>RQ1: How does design-driven innovation contribute to value creation?</th>
<th>RQ2: What enables and hinders value creation through design-driven innovation at SMEs in the Swedish wood products industry?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I</strong></td>
<td>Design-driven innovation creates value for consumers by addressing their tangible and intangible needs</td>
</tr>
<tr>
<td></td>
<td>It enables product differentiation and this enables companies to compete</td>
</tr>
<tr>
<td></td>
<td>Five facets of design-driven innovation have been identified which contribute to value creation</td>
</tr>
<tr>
<td><strong>II</strong></td>
<td>The case study provides empirical evidence of a company that increased value creation and remained competitive by focusing on the intangible, perceived values of furniture</td>
</tr>
<tr>
<td></td>
<td>The case study provides empirical evidence for enablers and barriers discussed in literature</td>
</tr>
<tr>
<td></td>
<td>Identification of enablers and barriers not previously discussed</td>
</tr>
<tr>
<td></td>
<td>Enablers and barriers occur in all phases of product development and are connected within and across these phases</td>
</tr>
<tr>
<td></td>
<td>Identification of internal and external enablers and barriers</td>
</tr>
<tr>
<td><strong>III</strong></td>
<td>Coordination across organizational, cultural and geographical boundaries of the demand and supply chains enables value creation</td>
</tr>
<tr>
<td></td>
<td>A lack of coordination between the demand and supply chain can cause value gaps which hinders value creation</td>
</tr>
<tr>
<td><strong>IV</strong></td>
<td>A consideration for multiple stakeholders enables value creation in design-driven innovation in business-to-business and public contexts</td>
</tr>
<tr>
<td></td>
<td>Overlooking key stakeholders in these contexts hinders value creation</td>
</tr>
</tbody>
</table>
5. Discussion

This chapter discusses the results presented in Chapter 4 and the research questions are addressed. Then, the theoretical and practical implications are discussed. Last, a discussion on the limitations of the research is provided.

5.1 The contribution of design-driven innovation to value creation

Addressing the first research question, “How does design-driven innovation contribute to value creation?”, only the expected value creation through design-driven innovation is discussed here. As described in 1.4 Aim and research questions, the assessment of the realized value falls out of the scope of this research. The discussion focuses both on value to the consumer and value to the company. These two concepts are closely related, since the latter is a consequence of the former.

Paper I demonstrates that previous research on design-driven innovation has stressed the importance of addressing consumers’ intangible needs in order to increase value creation. This in itself is nothing new, since Levy already argued in 1959 that people not only buy functionality, but meanings. He stated that consumers “try to satisfy many aims, feelings, wishes, and circumstances” (Levy, 1959, p. 119). Unlike other types of innovation, like market and technological innovation, design-driven innovation intentionally addresses intangible needs by changing product meanings. Here, emphasis is placed on the intention, since consumers also attach meanings to other types of innovations (Krippendorff, 1989; Monö, 1997). However, the difference is that these meanings did not incite the innovations.

In literature, the consideration for intangible needs is frequently discussed as an enabler of product differentiation. As markets mature and global competition increases, this understanding is becoming more significant (Aaker, 2010; Cooper, 2011). The argumentation is that while basic features and functionalities are easily copied by competitors, addressing intangible needs provides unique benefits which are more difficult to imitate. Whereas literature has a strong focus on the intangible needs, the participating case companies in Study II and III emphasized the importance of both tangible and
intangible needs. The case companies for example also stressed functionality, ergonomics and durability. Here, the role of design is to bring these tangible and intangible elements together in a cohesive product which communicates a new meaning (Beltagui et al., 2012). Since consumers aim to satisfy both their tangible and intangible needs, products that are able to convey these new meanings have a higher perceived value, and thus have a higher *value to the consumer*. This enables consumers to distinguish between varying products. As a result, this will generate *value to the company* as well.

The case study presented in Paper II provides empirical evidence to support this argument. Here, the case company made the decision to focus on the perceived value of their furniture. Afterwards, retailers confirmed the distinctiveness and higher value of the furniture. This supported the case company to remain competitive in a mature market. As stated above, the assessment if the expected value is realized falls out of the scope of this research. The fact that the case company was able to remain competitive indicates that some value creation was actually realized. Nevertheless, this was not studied in enough detail to further discuss here.

The answer to the “how” of the first research question is therefore “by focusing on product meanings, which intentionally addresses both tangible and intangible needs and therefore increases the perceived value of products.” However, given the definition of value applied in this research, where value is the quota between the perceived value and the exchange value, it is important to stress that this value is only created given that the exchange value remains the same or decreases (Bowman & Ambrosini, 2000; Lindstedt et al., 2003). This research has focused on how product meanings contribute to increasing the perceived value of products. The influence of the exchange value falls out of the scope of this research. Still, Paper II provides some insights into the challenges the company faced in trying to increase the perceived value, while simultaneously maintaining the costs of manufacturing within acceptable limits. Thus, Paper II demonstrates this is an issue within the field of design-driven innovation which could be explored further.
5.2 The required conditions for value creation through design-driven innovation

The second question, “What enables and hinders value creation through design-driven innovation, in the context of SMEs in the Swedish wood products industry?” is addressed by focusing on the required conditions for innovation. This section is divided between a discussion on the identified enablers and barriers, and on the contextual influences that either enable or hinder value creation.

5.2.1 Enablers and barriers to value creation

Papers II, III and IV brought up a broad variety of aspects that either enable or hinder value creation through design-driven innovation. Here, these aspects are structured in relation to the five facets of design-driven innovation, as identified in Paper I: (1) understanding new product meanings, (2) knowledge generation, (3) actors and collaborations, (4) capabilities, and (5) process (Appendix A).

Paper II, focusing on the enablers and barriers to value creation in the product development process, provides an extensive overview of enablers and barriers identified at the case company. The paper demonstrates how the enablers and barriers to value creation are linked in the product development process. Barriers to value creation occurred either because enablers were missing, or because enablers actually caused barriers in another phase of the product development process. The identified enablers and barriers relate to one of the five facets of design-driven innovation (Appendix A). This demonstrates that the different facets of design-driven innovation contribute to either enabling or hindering value creation. Whether or not value is created depends on how the facets are addressed and affect the development, communication and interpretation of product meanings. For example, focusing on “knowledge generation”, the case company was able to increase value creation through knowledge exchange with manufacturers on the required quality of different features. As discussed in theory, the product meaning is communicated through the quality of these features (Beltagui et al., 2012; Goode et al., 2013; Monö, 1997). Yet, at the same time, the case company hindered further value creation by preventing knowledge exchange between the external designers and the manufacturers. Especially the
designers considered this to be a lost opportunity, as they felt it hindered their experimentation and creativity to develop new product meanings. Table 7 provides a small selection of enablers and barriers described in Paper II to illustrate these connections.

Table 7: Selection of enablers and barriers in product development restructured according to the five facets of design-driven innovation

<table>
<thead>
<tr>
<th>Enablers</th>
<th>Barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student teams as interpreters</td>
<td>1. Development of new product meanings</td>
</tr>
<tr>
<td>Knowledge exchange with supply chain partners</td>
<td>Different visions on discovery and exploration</td>
</tr>
<tr>
<td>on quality, material and manufacturing</td>
<td>2. Knowledge generation</td>
</tr>
<tr>
<td>Collaboration with new actors, e.g. universities, students and trend watchers</td>
<td>Company hinders collaboration and knowledge exchange between designers and manufacturers</td>
</tr>
<tr>
<td>Affinity of individual employees with design-driven innovation</td>
<td>3. Actors and collaborations</td>
</tr>
<tr>
<td>Color and material matrix</td>
<td>Communication barriers between external designers and the rest of the product development team</td>
</tr>
<tr>
<td></td>
<td>4. Capabilities</td>
</tr>
<tr>
<td></td>
<td>Challenge to change company culture</td>
</tr>
<tr>
<td></td>
<td>5. Process</td>
</tr>
<tr>
<td></td>
<td>Designers are hindered in their creative process</td>
</tr>
</tbody>
</table>

Similarly, connections between what enables and hinders value creation through the development, communication and interpretation of product meanings are found in Paper III and IV. Here, the enablers and barriers also relate to the various facets of design-driven innovation (Table 8 and Appendix A).

Paper III demonstrates how adequate coordination between the demand and supply chains prevents the occurrence of value gaps. These could arise anywhere from the initial phases of product development to final delivery to the consumer. Previous research has demonstrated that design-driven innovation requires involvements from different actors (Ates et al., 2015). This study contributes to that knowledge by exemplifying how the quality of these collaborations either enables or hinders value creation. For example, the manufacturers influence value creation with the quality they deliver, which impacts the communication of product meanings. And retailers influence value creation with the presentation of the products, which either enables or
hinders consumers to interpret these new meanings. The coordination between actors in the demand and supply chain has a clear connection to (3) actors and collaborations. It also relates to (4) capabilities, since the prevention of value gaps is influenced by the company’s ability to interpret new product meanings and to manage their realization and presentation.

Paper IV shows the difficulty for the case companies to consider a variety of stakeholders. For example, at one case company not all stakeholders could interpret the new product meanings. Especially the buyers did not interpret a higher perceived value. As a consequence, the case company had difficulties to reach the intended user. This hindered value creation for both the stakeholders and the case company. At the same time, both case companies acknowledged the importance to consider all stakeholders in order to enable value creation. The ability to innovate product meanings which are perceived as valuable by multiple stakeholders relates first of all to (1) development of new product meanings. Different stakeholders do not encounter products in the same contexts. Therefore, they may interpret a product differently, considering the model on communicating product meanings adapted from Rosen et al. (2016) (Figure 7 in 2.2.2 Design and meaning-making). This needs to be considered when developing product meanings for multiple stakeholders. Second, this closely relates to (2) knowledge generation, especially concerning knowledge on how various stakeholders interpret product meanings (Table 8).

Table 8: Main enablers and barriers to value creation identified in Paper III and IV

<table>
<thead>
<tr>
<th>Paper</th>
<th>Enabler</th>
<th>Barrier</th>
<th>Facet of design-driven innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td>III</td>
<td>Coordination across organizational, cultural and geographical boundaries of the demand and supply chain</td>
<td>Lack of coordination between demand and supply chain</td>
<td>(3) actors and collaborations; (4) capabilities</td>
</tr>
<tr>
<td>IV</td>
<td>Addressing multiple stakeholders</td>
<td>Overlooking key stakeholders</td>
<td>(1) development of new product meanings; (2) knowledge generation</td>
</tr>
</tbody>
</table>
Paper II, III and IV demonstrate how the five facets of design-driven innovation provide a structure to organize a broad range of issues that impact the development, communication and interpretation of product meanings. As a result, these issues either enable or hinder value creation. The papers show that whether or not value creation is actually enabled or hindered depends on how well these different facets are addressed. Furthermore, in line with previous research on innovation (Hadjimanolis, 2003), these papers demonstrate the links between enablers and barriers to value creation through design-driven innovation.

5.2.2 Contextual influences

The required conditions for innovation are influenced at different levels, ranging from individuals and companies to networks and society (Hansen et al., 2010 in Trantow et al., 2011). Paper II, III and IV demonstrate how value creation through design-driven innovation is influenced by the companies, their networks and the contexts in which they operate. To understand the identification of these levels it is important to consider the research context of SMEs in the Swedish wood products industry (Pehrsson, 2016).

The case company discussed in Paper II presents the influence of the company. This company intentionally switched their focus from decreasing costs to increasing perceived value. Although they met multiple barriers throughout this transition, the case company demonstrates there is a potential for companies in this context to increase value creation by developing a focus on design-driven innovation. The paper focused on the enablers and barriers that occur within a company. The case study indicated that value creation is influenced further by the individuals in the company, through personal opinions and attitudes towards design-driven innovation. Previous research has also demonstrated the role of individuals (Jahnke & Johansson-Skoldberg, 2014; Sauer, 2011). However, this topic was not explored in enough detail to discuss here how individuals enable or hinder value creation through design-driven innovation.

Paper II and III demonstrate the influence of the partner network. SMEs in the Swedish wood products industry commonly do not control the complete product development process from raw material to end user. First of all, this distinguishes these SMEs from larger companies within this context (Hilletofth et al., 2010). Second, it sets them apart from other companies in
Italy that do control, or at least strongly influence, retail (Verganti, 2006). This makes the companies studied in this research more dependent on their partners compared to companies discussed in previous research. As discussed in 5.2.1 Enablers and barriers to value creation, these partners either enable or hinder value creation. Especially the enabling role of collaborations with different actors to value creation has been emphasized in previous research (Bertola & Colombi, 2014; Dell’Era et al., 2010). In contrast, this research also illustrates how partners might actually hinder value creation instead, for example through delivery of poor quality, poor presentation of products, or lacking skills to develop new product meanings.

Last, Paper IV shows the influence of the context in which the companies innovate. It is specific to this research context that SMEs in the Swedish wood products industry often work in public or business-to-business contexts (Brege et al., 2004). In these contexts various stakeholders may interpret product meanings differently (Jonsson et al., 2014). Previous research has mainly focused on products intended for the consumer market, as identified in Paper I. Here, fewer stakeholders need to be considered and the products are commonly interpreted within the same context. This research presents how value creation through design-driven innovation is complicated further when more stakeholders need to be considered, since all stakeholders need to be able to interpret the product meaning. Paper IV shows how SMEs prioritize stakeholders differently in the innovation of product meanings, which hinders value creation for both stakeholders and case companies.

5.3 Summary of fulfillment of research questions

The interpretation of the research findings is summarized in Figure 17. The figure presents that there is a potential to increase value creation by innovating product meanings, which address both tangible and intangible needs. This provides value to both the consumer and the company. However, whether are not this potential value creation is actually realized depends on the conditions for innovation. This research presents five facets of design-driven innovation that provide a structure to discuss what enables and hinders value creation. Paper II, III and IV demonstrate that these facets impact the development, communication and interpretation of product meanings. Thus, they either enable or hinder value creation, depending on how they are addressed. Furthermore, these papers demonstrate the different influences from the
company, its network and its context that either enable or hinder value creation.

Figure 17: Summary of interpretation of the results

5.4 Theoretical implications

This research provides new insights on what enables and hinders value creation through design-driven innovation. Five facets of design-driven innovation that contribute to value creation have been identified in previous literature. However, this research demonstrates how these facets could both enable or hinder value creation. Depending on how they are addressed, these facets affect the development, communication and interpretation of product meanings. The facets are linked and reinforce each other. Therefore, research on value creation through design-driven innovation should consider the impact these interactions have on the product meaning. The product meaning influences the perceived value of the product, this consequently influences value creation.

Second, previous research on design-driven innovation has had limited focus on contextual factors as presented in Paper I. However, this research demonstrates that the context strongly influences whether or not value creation could be expected. The influential role of the context in innovation
research has been highlighted before (Pehrsson, 2016). In this research, value creation through design-driven innovation could not have been understood as well with a single focus on the company, excluding networks and contexts. Therefore, in knowledge generation on design-driven innovation more attention needs to be given to the required conditions for value creation, within and beyond the influence of the company.

Last, this research demonstrates that conditions for innovation in design-driven innovation are dynamic. This is in line with previous research on innovation in general (Koberg et al., 1996). Especially Paper II demonstrates how enablers and barriers change over time. Consequently, value creation through design-driven innovation evolves as well. Therefore, it would be beneficial if research on value creation through design-driven innovation would include more long-term studies. This would provide a more detailed understanding on the changes in the conditions for innovation and the dynamic links between enablers and barriers.

5.5 Practical implications

Previous research has shown that although product meanings can always be innovated, this does not always lead to value creation (Öberg, 2012). This research demonstrates the need for companies to understand what enables and hinders value creation through design-driven innovation in their specific context. This includes gaining an understanding of what lies within and beyond the influence of the company. As explained in Chapter 2: Frame of reference, both design and innovation entail a certain level of uncertainty. When companies are able to map the required conditions for innovation, this will allow them to better address this uncertainty and it increases the chances of realizing the expected value.

Second, this research shows that it is important that companies do not create a single focus on the development of new product meanings in design-driven innovation. Instead, they need to be aware of all facets of design-driven innovation and address them adequately to increase value creation. From initial stages to final delivery to consumers, there are various decisions the company must take which influence the development, communication and interpretation of product meanings. Therefore, companies need to take a holistic perspective and consider how their decisions influence the product meanings, and consequently, value creation.
Last, this research indicates that companies need to take on new roles to create value through design-driven innovation. Especially in Paper II and III it is highlighted how the companies need to take on a coordinating, and sometimes even mediating role, in design-driven innovation. For example, conflicting views may occur between designers and manufacturers. Here, the company needs to address these issues with the influence on the development, communication and interpretation of the product meaning in mind.

5.6 Limitations

First of all, the selected research strategy and methods were chosen and developed with the aim to develop credible results, contributing with knowledge to a certain phenomenon. The aim here has not been to make generalizations on value creation through design-driven innovation. This choice is not free from debate or criticism (Flyvbjerg, 2006). However, this aim needs to be taken in consideration in understanding this research. For example, Paper II and III build on a single case study, which limits the transferability of the results. However, this decision was justified due to the uniqueness of the case and the availability of data collected over a longer time period.

Second, this research has focused on value creation through design-driven innovation and the innovation of product meanings. At a later stage in the research process the term “meaning innovation” was identified, which refers to a similar concept. Meaning innovation was not included in the systematic literature review presented in Paper I. Apart from meaning innovation, other terms referring to similar concepts are potentially overlooked as well. Furthermore, the author is aware of the fact that not all published, peer-reviewed research on design-driven innovation was identified in the systematic literature review. This is a limitation of the research, as it prevents to give a complete overview of previous knowledge. The decision was made to follow a structured method for the systematic literature review presented in Paper I. A broader range of literature, including literature on e.g. meaning innovation, was included in the development of the frame of reference of this licentiate thesis.

Third, this research discusses consumers’ interpretations of product meanings and perceived value. However, the consumers themselves did not participate in the case studies, due to restricted access to these consumers.
Therefore, only the companies’ accounts of consumers’ interpretations and perceptions could be included. Some of this information was confirmed by other actors, such as external designers and retailers. Still, this limits the quality of the findings presented in this licentiate thesis. Companies, retailers and designers all have a different role in increasing the perceived value of products, which might hinder them to objectively discuss how consumers perceive and interpret products. If possible, more effort would have been given to directly include consumers in the research. This would have ensured a more thorough understanding of value creation, covering the process from proposed to interpreted product meanings.
6. Conclusion

This chapter first presents the main contributions of the research. Second, suggestions for future research are provided.

6.1 Contribution

This research contributes with knowledge by connecting theory on product meanings and design-driven innovation with theory on value creation. This research has specifically explored value creation through design-driven innovation in the context of SMEs in the Swedish wood products industry. In this mature market, there is a need to find new ways to increase value creation. Based on both literature and empirical findings, this research presents how focusing on product meanings, which address both tangible and intangible needs, contributes to increasing the perceived value of products. Although a focus on design-driven innovation is still rare, this research demonstrates the potential for SMEs in this context to create value by increasing the perceived value of products through the innovation of product meanings. However, whether or not this value is actually created depends on the SMEs’ abilities to establish required conditions for innovation. Five facets of design-driven innovation have been identified which provide a structure to review these required conditions: (1) understanding new product meanings, (2) knowledge generation, (3) actors and collaborations, (4) capabilities, and (5) process.

This research demonstrates the complex interactions between the different facets that influence the development, communication and interpretation of product meanings. The different facets either enable or hinder value creation, depending how well they are addressed and influence the product meaning. Although there might be an inclination to establish enablers and eliminate barriers, this research shows that enablers might actually cause barriers and vice versa. The impact on the product meaning needs to be considered when researching and addressing these enablers and barriers. Furthermore, this research illustrates how enablers and barriers occur on different levels, both within and outside the influence of the SMEs. However, the enablers and barriers are not necessarily linked within the same level. Therefore, this research presents the need for both researchers and practitioners to gain a
thorough understanding of the diverse influences that affect the product meaning, and consequently either enable or hinder value creation. A comprehensive overview of these interactions between enablers and barriers to value creation needs to be created, distinguishing between the different levels at which they occur. This overview would enable companies to take suitable measures to strengthen value creation through design-driven innovation.

6.2 Future research

This research has focused on the expected value creation through design-driven innovation and on exploring the required conditions to create this value. However, whether or not this value is actually realized has not been studied. Future research could focus more on the establishment of the required conditions for innovation and on the assessment of realized value creation. This would complement the research presented in this licentiate thesis.

As discussed above, in 5.1 The contribution of design-driven innovation to value creation, Paper II provides insights into the challenges the company faced to keep the costs of production within acceptable limits, while aiming to innovate product meanings. The balance between increasing the perceived value, while maintaining or decreasing costs is key to the definition of value creation applied in this research. Still, the impact of innovating product meanings on costs has received little attention in previous research. Future research could first study if other companies face similar challenges, before focusing on how this issue might be addressed.

The interpretation of product meanings by multiple stakeholders has not been described in detail in previous research. Only initial explorations in design-driven innovation for multiple stakeholders are provided in this research. However, Paper IV does demonstrate that there are specific challenges to design-driven innovation for multiple stakeholders. This provides grounds for future research, which could study the role of context and individual interpretations of product meanings more in depth.

The influence of the individuals within a company has been brought up by previous research on innovation and design-driven innovation. However, how these individuals either enable or hinder value creation has received less attention. This research indicates that individuals, both within and outside the SMEs, also influence value creation by influencing the development,
communication and interpretation of product meanings. Yet, why and how this happens has not been explored in depth here. Future research could focus on creating a better understanding on the individual attitudes and competencies that either enable or hinder value creation through design-driven innovation.

Last, this research has had a specific focus in SMEs in the Swedish wood products industry. However, it is not unlikely that similar results could be found for SMEs, working in comparable circumstances, albeit in other industries. Furthermore, to better understand value creation through design-driven innovation, it would also be of value to study larger companies in this context. These are two areas where future research could make new contributions.

Overall, addressing these research gaps could contribute to developing knowledge and methods to support companies to better assess if and how they could increase value creation through design-driven innovation. This enables clearer communication about the value of integrating design and could provide evidence-based motivation for design-driven innovation.
References


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Öberg, Å. (2012). *Innovation by meaning*. School of Innovation, Design and Engineering, Mälardalen University, Västerås.


### Appendix A: Overview of identified aspects that either enable or hinder value creation

<table>
<thead>
<tr>
<th>Paper</th>
<th>Facet</th>
<th>Enabling value creation</th>
<th>Hindering value creation</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>Understanding new product meanings</td>
<td>Interpreters; “red thread” in collections; design “with its own story” generates interest over longer period of time</td>
<td>Innovation of product meaning takes time to diffuse in society; limited control over interpretation of product meaning by others; lack of art director who could create a “red thread” in the collections; challenge to define the “next big thing”</td>
</tr>
<tr>
<td></td>
<td>Knowledge generation</td>
<td>Knowledge about technology, user needs and product language; experience with material and production processes allows designers to contribute to improved production</td>
<td>Retailers lack adequate knowledge on how to display and sell the furniture</td>
</tr>
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<td></td>
<td>Actors and collaborations</td>
<td>Broad network of collaborating actors; flexible supply networks; collaboration with a variety of designers; increased collaboration between all departments and external designers; cross-functional meetings; long-term collaboration allows designers to make something which fits the company; collaboration with</td>
<td>Communication barriers between designers and the rest of the product development team; different expectations between designers and management on design changes; company’s old reputation hinders collaborations with new designers and retailers; collaboration with too many actors (“too many cooks in the kitchen”); lack of flexibility at some suppliers; company</td>
</tr>
<tr>
<td>Capabilities</td>
<td>Process</td>
<td>Challenges</td>
<td></td>
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<tr>
<td>retailers in the right segment; showrooms organized around different brands; publications in magazines on interior design</td>
<td>Management capabilities for design-driven innovation; own production of certain components enables higher quality of details</td>
<td>Challenge to change company culture; challenge to ensure quality for smaller series; limited options to include details and manufacture more complex designs</td>
<td></td>
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<td></td>
<td>Methods from emphatic design; employees’ affinity with design-driven innovation; early attention to details saves costs later in the process; company works with a color and material matrix</td>
<td>Unfamiliarity with non-linear process; misunderstanding on the role of design in product development process; no continuity in exploration and discovery; different visions on exploration and discovery; narrow design brief limits designers’ creativity; pre-defined color and material choice and production hinders designers’ creativity</td>
<td></td>
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</tbody>
</table>

<p>| III | Understanding new product meanings | - | Interpreters could make biased interpretations |
| Knowledge generation | - | No knowledge on consumers’ interpretations of product meanings |
| Actors and collaborations | Serving team in China works to ensure quality; retailers need to display and communicate products correctly | Challenge to communicate required quality to partners in supply network |
| Capabilities | - | Partners in supply network struggle to |</p>
<table>
<thead>
<tr>
<th>IV</th>
<th>Understanding new product meanings</th>
<th>-</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Challenge to address how varying stakeholders interpret product meanings in different contexts</td>
<td></td>
</tr>
<tr>
<td>Required knowledge</td>
<td>Knowledge generation on new materials</td>
<td>Overreliance on one specific type of knowledge, for example regarding user needs; a lack of focus on product language</td>
</tr>
<tr>
<td>Actors and collaborations</td>
<td>The collaboration with a design council has increased the quality of product language</td>
<td>Challenge to reach all stakeholders due to a narrow focus on end users; lack of own resellers limits options to reach consumers</td>
</tr>
<tr>
<td>Capabilities</td>
<td>Use of product language to communicate product meaning</td>
<td>Challenge to communicate value of innovative products</td>
</tr>
<tr>
<td>Process</td>
<td>-</td>
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