The influence of environmental commitment and trust on the demand and supply integration

*A study in the German textile manufacturing industry*

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Växjö 2015

___________________          ___________________          ___________________
Christopher Damm          Phichapon Sombat          Sandra Trenz
Abstract

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Title: The influence of environmental commitment and trust on the demand and supply integration - A study in the German textile manufacturing industry

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Tutor: Peter Berling

Background: Pressures from stakeholders drive manufacturers to be more environmental committed. The demand and supply integration (DSI) aims at balancing the demand and supply in order to stay competitive and reduce costs which can help manufacturers decreasing production costs for environmental-friendly products. When a company is integrating and disseminating information, trust is expected to play an important role between the supply chain partners.

Purpose: The purpose of this study is to investigate, theoretically and empirically, of how environmental commitment and trust can influence DSI within the German textile manufacturing industry.

Methodology: The primary data, in this thesis, was conducted using a structured web survey sent out to 982 German textile manufacturers via email, based on the database Orbis. The response rate was 5.6 per cent. The simple linear regression analysis was used in order to investigate the relation of environmental commitment and trust on the extent of DSI.

Findings, conclusions: In the German textile manufacturing industry, on the one hand, the results indicated that there is a positive linear relation of environmental commitment on the extent of DSI. Due to the low response rate and the lack of previous studies, further research should be conducted to confirm this relation. On the other hand, trust somewhat influences the extent of DSI, however, no linear relationship is found between them. The result is not in coherence with previous research. Hence, further studies are needed to clarify this relation.

Key words: Environmental commitment, trust, demand and supply integration
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<td>ATCA</td>
<td>Agreement on Textiles and, Clothing</td>
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<td>CPFR</td>
<td>Collaborative planning, forecasting, and replenishment</td>
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<td>DSI</td>
<td>Demand and Supply Integration</td>
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<td>EMAS</td>
<td>Eco-Management and Audit Scheme</td>
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<td>GOTS</td>
<td>Global Organic Textile Standards</td>
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<td>GSCM</td>
<td>Green supply chain management</td>
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<td>ISO</td>
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<td>MFA</td>
<td>Multifibre Arrangement</td>
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<td>MLR</td>
<td>Multiple linear regression</td>
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<td>SCI</td>
<td>Supply chain integration</td>
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<td>SCM</td>
<td>Supply chain management</td>
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<td>WTO</td>
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1. Introduction

This chapter provides the background description of the studied area by presenting an overview regarding demand and supply integration (DSI), environmental commitment, trust and the development of the textile manufacturing industry over the years. The chapter continues with a problem discussion. Based on the problem discussion, and the scope of this thesis, several research questions and delimitations are developed in order to grasp the reader.

1.1 Background

1.1.1 Demand and supply integration (DSI)

Competition and internationalisation have reached companies' attention and become driving forces for companies to integrate across the whole supply chain in order to increase the customers’ satisfaction, and the companies' efficiency and performance (Danese & Bortolotti, 2014). To get an overall idea of supply chain integration (SCI): APICS\(^1\) (2013, p. 172) defines SCI as the point when “supply chain partners interact at all levels to maximize mutual benefit”. Furthermore, there have been many studies on the importance and impact of SCI on companies. SCI benefits in enhancing the performances of a company, in improving the decision-making process, and in helping the value creation process. These benefits eventually result in increased competitive advantages for the company (Mackelprang et al., 2014; Childerhouse & Towill, 2011; Bowersox et al., 2002).

In accordance with the previous paragraph about supply chain integration, there is an integration framework that emphasises on the integration between demand management and supply management in a strategic level. The aforementioned framework refers to the demand and supply integration (DSI) framework proposed by Esper et al. (2010). The framework was established through the combination of different disciplines,

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\(^1\) For more information about APICS, it is the professional association for supply chain and operations management and also the provider for research, education and courses within the particular field (APICS, 2014).
namely supply chain management, marketing, and strategic management (Ibid). Esper et al. (2010, p. 7) define DSI as "the balancing of demand and supply market information and business intelligence through integrated knowledge management processes to strategically manage demand and supply activities for the creation of superior customer value". Characteristics of DSI, mentioned by Hilletofth (2011) and Esper et al. (2010), are, for example, that a firm has to be customer-oriented and has to consider the demand management and supply management as equally important. In this thesis, we posit the demand management and the supply management as they cover the two areas that Esper et al. (2010) focus on in their DSI framework; which are the demand-focused processes and the supply-focused processes.

1.1.2 Environmental commitment

Due to environmental pressures and concerns from stakeholders (Vachon, 2007; Vachon & Klassen, 2006), markets, science, social systems, and political systems (Lynes & Dredge, 2006), manufacturers are urged to be aware of the environment (e.g. Dewey, 2014). As a result, manufacturers started to adapt more environmental approaches, for example, the adoption of pollution prevention technologies (Vachon & Klassen, 2006). Bill Ford once said that "a good company delivers excellent products and services, and a great company does all that and strives to make the world a better place." (Pearce & Doh, 2005, p. 30). The act which companies attempt to enhance environmental management can be simply described as environmental commitment (Chang & Lin, 2010; Roy & Thérin, 2008). In other words, environmental commitment is a way for manufacturers to show involvement in environmental concerns (Chang, 2012; Henriques & Sadorsky, 1999). Manufacturers’ commitment towards environmental aspects has increased because they can gain competitive advantages (Chang, 2012; Porter & Van der Linde, 1995). Moreover, environmental commitment needs to be considered in order to solve existing environmental problems (Ibid). There is a study about the impact of environmental commitment on a company’s economic short-term and long-term performance by Teng et al. (2014). The study shows that environmental commitment has a long-term effect in form of intangible assets such as reputation (Ibid).
1.1.3 Trust

Trust is defined as “the extent of expectation held by one party that can rely on the word, promise, or statement of another party” (Chen & Chang, 2013a, p. 67). Trust is also “a willingness to rely on an exchange partner in whom one has confidence” (Moorman et al., 1992, p. 315). Consequently, all things that matter are about emotion and experience which, according to Pulido et al. (2014), embraces in and leads to a feeling of trust. Trust can exist between individuals, groups, organizations, and institutions (Brattström & Richtnér, 2014; Nooteboom, 2011). The importance of trust between organisations has been pointed out by several studies. Trust is a key mechanism to ease supply chain with successful collaboration to function properly (Panayides & Venus Lun, 2009; Fang et al., 2008; Li et al., 2007; Eng, 2006). In addition to this statement, Zhang and Huo (2013) state that trust in one’s ability is an accelerator to start integration.

1.1.4 Textile manufacturing industry

The textile manufacturing industry is a diversified industry which, according to the European Commission (2013a), includes a vital amount of activities "from the transformation of fibres to yarns and fabrics to the production of a wide variety of products such as hi-tech synthetic yarns, wools, bed-linen, industrial filters, geotextiles, clothing etc.". In the last couple of decades, the textile manufacturing industry was undergoing various changes and challenges (Antoshak, 2014; Schindler, 2014). After China joined the World Trade Organization (WTO) in 2001, the country became a big competitor in the global textile trade market (Schindler, 2014). In addition to this change, in 2004 the quota system2 for textiles and clothing was disposed. The disposal lead to new opportunities for those countries that have been limited through the quota system so far and to new challenges for those countries that could gain advantages through the quota system (Ibid). Moreover, the economic crisis in 2008/2009 had negative impacts especially on the global textile manufacturing industry so that the prices of cotton started to increase in 2010 up to the historic record level of 2.40 US dollar per pound in 2011 (Ibid). In the coming years, the demand for textile products

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2 The quota system has been established by WTO which introduced in 1974 the Multifibre Arrangement (MFA) - later taken over by the WTO’s Agreement on Textiles and Clothing (ATC) - which is a framework for quotas limiting the import to countries that suffer from rapidly increased imports (Nordás, 2004).
will increase due to the rise of the world population and the economic growth (Ibid). However, there already started to be a huge change in terms of the world leadership in the textile market (Antoshak, 2014). While 25 years ago the United States and Europe were the dominating textile producers worldwide, the domination shifted to the Asian countries with China as the leader nowadays (Ibid). On the other hand, China is experiencing stagnation in its textile production which means that India and Bangladesh are most likely to be the world-leaders in the future (Ibid). In the European textile manufacturing industry, Germany is the second biggest exporter after Italy (BMWI, 2015).

1.2 Problem discussion

The problem discussion is structured as follows: Our first aim is to link environmental commitment to the demand and supply integration (DSI). Our second goal is to link trust to DSI. This structure is in coherence with the in chapter 1.5 formulated research questions.

1.2.1 Linking environmental commitment to DSI

Due to many reasons, e.g. pressures from society and stakeholders, regulations, and law, it is essential for manufacturers to be committed to environment. Recently, the well-known company Kellogg Co. adopted a new environmental commitment (Dewey, 2014). It is reported that Kellogg Co. has set the policy to cooperate with the palm oil suppliers that provide a traceable source of the material (Ibid). This development reinforces the significance of having environmental commitment. Moreover, it entails that the processes of sourcing are significant in showing environmental commitment; it is not only about the product, but also the process behind it. This is supported by the following story that is illustrating an issue regarding customer-perceived value. Apparel companies in the United States were selling clothing made of bamboo (Bingkley, 2009 cited in Kirchoff et al., 2011, p. 684). The products themselves looked green and environmentally concerned; however, its supply chain is flawed by causing intensive pollution (Ibid). The story implies that customer value can be delivered not only through products, especially when customers do concern not just about the product alone. Obviously, the awareness for environment has increased.

Germany has struggles regarding the environment (Umweltbundesamt, 2014). Especially the textile finishing belongs to Germany’s industry with the highest resultant
wastewater. Reasons for the polluted wastewater are chemicals from the production of fibres and yarn, or chemicals from the colouring process of the textiles (Ibid). Another issue of manufactures, who produce environmental-friendly textile products, is that those products are more expensive (Dawson, 2012). The cause of the high price is the development of new environmental products where manufacturers need to consider factors such as carbon and waste reduction (Dangelico et al., 2013). Not to mention the environmental product development, the manufacturing of such products also causes economic issues in terms of additional costs to ensure the ecological sustainability (Barari et al., 2012). However, it is likely that customers are willing to pay 10 – 15 per cent extra to buy those products (Ibid).

We are turning now to the DSI framework which regards the idea of balancing demand and supply and includes the management of the related processes (Esper et al., 2010). The framework draws attention from several authors (e.g. Gligor, 2014; Madhani, 2012; Hilletofth, 2011). A case study on the integration of the processes of demand and supply, conducted by Hilletofth (2011), has revealed that integration of demand and supply helps enhancing competitiveness. In similar way, the conceptual research shows that the combination of two disciplines, SCM and marketing, can answer to companies' desire which is to gain competitive advantages in a distinct way (Madhani, 2012). Recently, the research paper of Gligor (2014) presents a proposal model in achieving supply chain agility which is taking DSI into account. Gligor (2014) implicitly points out that in order to accomplish agility in supply chains, companies should adopt the DSI framework. The aim of the DSI framework is to make a balance between demand and supply at the strategic level (Esper et al., 2010). The framework also concerns about the demand-side and supply-side processes and activities (Ibid). With the framework’s basic requirement that a company that implements the framework is customer-oriented, it is proposed to create and deliver customer value through the process of demand management backwards to supply management (Ibid). One of the advantages of DSI, hereby, is that the costs can be reduced throughout the supply chain (Heikkilä, 2002).

Collectively, environmental commitment is promising to be expressed through products and processes, and the DSI framework can serve as a management practice towards environmental aspects. Therefore, we are exploring the impact of environmental commitment of German textile manufacturers on the DSI framework.
1.2.2 Linking trust to DSI

Information sharing and coordination within the supply chain increase the efficiencies of collaborative relations (Corbett et al., 1999). For the dissemination of information, it is necessary that partner firms have trust in each other (Ibid). Thus, planning and managing the supply is positively linked to trust which has impact on the integration process within a supply chain (Laureano Paiva et al., 2014). However, it is vital that trust has several levels in order to achieve a successful collaboration in inter-organisations (Fang et al., 2008). The study, about the measurement for a good relationship between companies of Naudé and Buttle (2000), supports that trust is one of the factors that determines the quality of a relationship. Another research, regarding trust by Panayides and Venus Lun (2009), shows that trust is a basic key mechanism that shapes the supply chain systems in order to function properly. Moreover, it has been pointed out by several studies that the importance of trust and a good comprehension on supply chain partners are the keys to successfully develop a supply chain and a cross-functional and inter-organisational collaboration (e.g. Li et al., 2007; Eng, 2006). Zhang and Huo (2013) indicate that trust on supply chain partners’ abilities is a reason for manufacturers to integrate. Furthermore, honesty and openness of manufacturers influence the integration and its effectiveness (Ibid). The study about lack of trust between partners by Handfield et al. (2000) results in impeding the share of costs, processes, sensitive and confidential information. Therefore, trust is playing a key role in the relation to the integration between supply chain partners.

DSI is a framework that benefits on a strategic decision level (Esper et al., 2010). The framework emphasises on both, cross-functional and inter-organisational, integration (Ibid). In order to be effectively integrated using the DSI framework, manufacturers must share interpretation to their partners and vice versa (Ibid). Moreover, one of the characteristics of DSI is that the processes in demand-side and supply-side are seen as equally important (Hilletofth, 2011). Although trust is a significant fundament for the collaboration within a supply chain and various investigations show the importance of trust on supply chain integration, there has not been any study so far on the triadic scope of the DSI framework. Therefore, we propose to investigate on how trust influences the DSI framework.
1.3 Scope

One critical question often discussed in previous studies is the relationship between performance and SCI (Flynn et al., 2010). Thereby, three different dimensions can be considered: the internal (the manufacturer) and two externals (the suppliers and customers) (Mackelprang et al., 2014; Danese & Romano, 2011; Flynn et al., 2010). Considering the external dimension of SCI, Danese and Romano (2011) state that it is important not only to concentrate on the customer integration, but also to include the supplier integration. Customer integration can lead to an increase in costs which can be reduced by improving the supply integration (Ibid). One example, Danese and Romano (2011) point out in their paper, is the uncertainty of demand schedule plans when it comes to customer integration and that the supplier integration works against this uncertainty. More important, Flynn et al. (2010) highlight that it is crucial to study all three dimensions together in order to get a clear picture of the effects of SCI on the performance. In addition to that, it is essential to start with the internal integration since the customer and supplier integration are built upon this dimension (Ibid).

Fabbe-Costes and Jahre (2007) also stress the importance of defining the layers and the scope of integration before performing a study. First of all, there are four different layers of integration which are the integration of flows, of processes and activities, of technologies and systems, and of actors (Ibid). In this paper, several actors including suppliers, customers, and manufacturers are involved in the integration process so that there is an integration of actors. Moreover, the integration of flows in terms of information flow among the supply chain is given attention to. The integration of processes and activities are also covered because closer looks to the process of demand management and to the activities in the supply chain are taken into consideration. Secondly, the scope of integration needs to be identified (Fabbe-Costes & Jahre, 2007). The scope can be, for example, dyadic integration, which means that two dimensions are considered, or triadic integration, which means that all three dimensions are considered (Ibid). Based on the study by Fabbe-Costes and Jahre (2007) about the scope of integration, this paper has a limited triadic scope of integration between demand and supply processes (Figure 1) since it includes the integration of the main first-tier suppliers, the manufacturer and the main first-tier customers (Ibid).
1.4 Purpose

Regarding the aforementioned problem discussion, environmental commitment and trust have been nailed down, and the concept of DSI has brought into consideration towards their causal relationship. The purpose of this study is to investigate, theoretically and empirically, of how environmental commitment and trust can influence DSI of German textile manufacturers.

1.5 Research questions

1. How does environmental commitment influence the demand and supply integration of textile manufacturers in Germany?
2. How does trust influence the demand and supply integration of textile manufacturers in Germany?
Figure 2 above illustrates our research model of this paper. As it can be seen, the aim is to see the influence of environmental commitment and trust on DSI. Moreover, this figure is used in order to answer the first and the second research question.

1.6 Delimitations

This study has several delimitations. In the first place, due to lack of studies in the textile manufacturing industry regarding DSI and environmental commitment, the focus of this thesis lays on this specific industry. Moreover, the study has geographical delimitations; this means that the empirical findings will be based on research in Germany. The last delimitation is that only those manufacturers that have provided an email address on the database Orbis are taken into account in this thesis. Moreover, the manufacturers need to have the status active, excluding active with insolvency proceedings and dormant status. Adjustments have been made to this population in terms of deleting duplicated email addresses of manufacturers.

1.7 Disposition

Figure 3 shows the distribution of this thesis. Every main chapter is split up into subsections which is not shown in the figure on page 10. The section introduction, for example, contains parts about background, problem discussion, scope, purpose, research questions, delimitations, and disposition.
Figure 3: Disposition of this thesis
2. Methodology

In this chapter, the reader gains knowledge about which methodological approaches the researchers follow in this thesis. The methodology part is mainly based on Saunders et al.’s (2012) research ‘onion’ (Figure 4) and includes research philosophy, approach, methods, and designs of research questions. Moreover, the time horizon, data collection strategies, sources of data, information about the population, and missing data of respondents are presented. Finally, the data analysis method, quality criteria in business research, and ethical considerations are described.

![Figure 4: The research 'onion', Saunders et al., 2012, p. 160](image)

2.1 Research philosophy

In social science research, there are four assumptions that have to be concerned regarding the nature of the social world and the means in which it may be inquired (Punch 2014; Burrell & Morgan, 1979). These assumptions are about ontology,
epistemology, human nature, and methodology (Burrell & Morgan, 1979). Ontological assumptions are concerning the very nature of phenomena about social entities being viewed (Ibid), i.e. the nature of reality (Saunders et al., 2012). To clarify, there are two views on reality: First, the reality can be viewed from the external, and second, the reality can only be investigated from the internal viewpoint (Punch, 2014; Bryman & Bell, 2011; Burrell & Morgan, 1979). Epistemological assumptions are about “the ground of knowledge” (Burrell & Morgan, 1979, p. 1). Thus, these assumptions carry out possible questions, for instance, “what forms of knowledge can be obtained” (Burrell & Morgan, 1979, p. 1). Assumptions about human nature are specifically about the relationship of humans and their surroundings (Ibid). These assumptions are particularly concerned within ontological and epistemological assumptions as well (Ibid). Finally, the methodological assumptions are expressed in the way as how the study is conducted and which methods are used for studying the reality (Punch, 2014; Burrell & Morgan, 1979).

Not all assumptions are commonly considered in social science studies (e.g. Punch, 2014; Bryman, 2012; Bryman & Bell, 2011). Social science researchers have to deal with three assumptions, according to Punch (2014). It regards epistemology, ontology, and methodology (Ibid). On the other hand, Bryman (2012) and Bryman and Bell (2011) emphasise only on two assumptions regarding epistemology and ontology. These assumptions are important to social science research because they help to guide lining in which approach the researchers should take and what method should be used to collect data (Punch, 2014; Bryman & Bell, 2011). Thereby, the assumptions of the nature of social science, that the researchers make, have impact on the research design (Ibid). Assumptions of human nature are implicitly associated with ontological and epistemological assumptions (Guba & Lincoln, 1994). Therefore, the human nature assumptions have already been included in the research paradigms which constitute of different beliefs/assumptions about the nature of the world and research (Ibid); in this context it is social science. According to Punch (2014), the most common paradigms within the social science realm are positivism and interpretivism or constructivism which both are explained in the following two sections.
2.1.1 Positivism

Guba and Lincoln (1994) explain the basic beliefs which form a research design for each study regarding ontology, epistemology, and methodology in the positivism paradigm (cf. Punch, 2014; Bryman & Bell, 2011). The ontological assumption is realism which reflects the kind of thoughts that reality is apprehendable, measureable, and changeless (Guba & Lincoln, 1994). The epistemological assumption is that the researcher and the research object are independent (Ibid). The assumption on methodology is experimental and manipulative, i.e. the reality can be verified and carefully controlled (Ibid). In summary, positivism constitutes of beliefs that reality can be objectively observed, investigated and an account of the investigated object can be given (Punch, 2014; Saunders et al., 2012). In addition to that, positivism develops the kind of descriptions and explanations to form a nomothetic knowledge (Ibid).

2.1.2 Interpretivism or constructivism

Creswell (2014) states that interpretivism is often combined with the constructivism paradigm; therefore, the two paradigms will be explained together in this section. Blaikie (2009) sees interpretivism as a branch of classical hermeneutics which is a philosophy that seeks to understand or interpret through meanings of language (cf. Schmidt, 2006). Interpretivism aims at understanding the social world that consists of the meanings that can be evincible (Blaikie, 2009). An ontological assumption in interpretivism is that social reality is shaped by social actors through the meaningfulness of social actions (Ibid). Blaikie (2009) explains that “social regularities can be understood, perhaps explained, by constructing models of typical meanings used by typical social actors engaged in typical courses of action in typical situations.” (p. 99). As a result, social regularities or behaviour become the ground of knowledge that can be obtained through understanding the meanings (Punch, 2014; Blaikie, 2009). Thus, the point of focus is the meaningful social action performed by social actors and in which way these meanings can be assessed (Punch, 2014; Blaikie, 2009).

Constructivism, or as Creswell (2014) calls it social constructivism, is built upon the ontological assumption that the nature of reality is local, apprehendable, specific, and socially and experimentally constructed (Guba & Lincoln, 1994). The aforementioned explanation is a result of the fact that individuals (social actors) in
the social world try to understand the world they live in and thus create the meanings based upon their experiences (Creswell, 2014). This notion is the nature of reality that is subjective (Creswell, 2014; Guba & Lincoln, 1994). It is epistemologically assumed that findings are arisen under the time when the researcher and the researched object interact during the investigation process (Guba & Lincoln, 1994). Furthermore, the researchers rely on participants’ views of the investigated situations (Creswell, 2014). Constructivists use hermeneutic as a tool for interpreting the subjective meanings created by the particular social actors in the particular social world, therefore, they get to understand what they keen to know (Creswell, 2014; Guba & Lincoln, 1994).

2.1.3 Research philosophy of the thesis

This thesis is conducted in the paradigm of positivism. The reality in this thesis is apprehendable and measurable. We and the objects being studied are not influenced by each other. Therefore, the theories of this study which are about the influence of environmental commitment and trust on demand and supply integration (DSI) can be objectively and independently investigated.

2.2 Research approach

The research approach is a way to provide “a logic, or a set of procedures, for answering research questions, particularly ‘what’ and ‘why’ questions” (Blaikie, 2009, p. 18). There are several ways of answering the research questions, using approaches such as deductive and inductive (Ibid).

2.2.1 Deductive

The deductive approach is based on an existing theoretical framework which is tested using hypotheses (Björklund & Paulsson, 2012; Bryman & Bell, 2011). These hypotheses need to be measurable to enable the next step which is data collection (Saunders et al., 2012). When the data is collected, the chosen hypotheses need to be either confirmed or falsified in order to find the revision of theory (Björklund & Paulsson, 2012; Saunders et al., 2012; Blaikie, 2009). The revision of theory needs to be generalised with caution when samples are sorted (Graziano & Raulin, 2013; Saunders et al., 2012). The deductive research is known as a logical reasoning (Ghauri & Grønhaug, 2010; Thurén, 2007) and it is known to find a relation between concepts and variables (Saunders et al., 2012).
2.2.2 Inductive

The inductive approach, on the other hand, starts from the observations/findings and the researcher adds afterwards relevant theories regarding the empirical findings (Björklund & Paulsson, 2012; Bryman & Bell, 2011; Ghauri & Grønhaug, 2010). The inductive research is mainly used together with the qualitative approach (Ghauri & Grønhaug, 2010), but can also be used with the quantitative approach (Blaikie, 2009). Since the inductive approach is based on empirical findings, the observations might not be absolutely true and therefore, become more subjective (Ghauri & Grønhaug, 2010). Alvesson and Sköldberg (2008) explain the subjectivity by saying that the inductive approach bases its findings on a few individual cases and then tries to generalise it as, more or less, the truth. Therefore, the inductive research is based more on descriptions of limited generalisations, characteristics and different patterns (Ibid).

2.2.3 Summary of the deductive and the inductive approach

The characteristics of both, the deductive and the inductive approach, are summarised in Table 1. As it can be seen, the deductive approach, for example, starts from theories, while the inductive approach has its start from observations and findings.

<table>
<thead>
<tr>
<th></th>
<th>Deductive</th>
<th>Inductive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starts from</td>
<td>theories</td>
<td>observations/findings</td>
</tr>
<tr>
<td>Confirm and falsify hypothesis</td>
<td>Logical</td>
<td>Build theory</td>
</tr>
<tr>
<td>Logical</td>
<td>Based on limited generalisations and characteristics</td>
<td></td>
</tr>
<tr>
<td>Usually quantitative data</td>
<td>Usually qualitative data</td>
<td></td>
</tr>
<tr>
<td>Evaluate hypothesis</td>
<td>Explore characteristics or patterns</td>
<td></td>
</tr>
</tbody>
</table>

2.2.4 Motivation for using the deductive approach

Since this research is grounded from an existing theoretical framework where hypotheses will be tested, the chosen approach is the deductive approach. The aim of this thesis is to test theories about DSI, environmental commitment, and trust using
different hypotheses. Hereby, we neither depend on a few individual cases nor build a new theory out of findings.

2.3 Research methods

There are two research methods which are qualitative and quantitative (Bordens & Abbott, 2014; Saunders et al., 2012; Bryman & Bell, 2011). The selection of the research method has a vital impact on how the data will be collected and analysed (Saunders et al., 2012; Bryman & Bell, 2011). Depending on the purpose of the paper, the qualitative and quantitative approach can be chosen; either one of them or a mix of them (Saunders et al., 2012). The qualitative method is often used together with the inductive approach and the quantitative method with the deductive approach (Bryman & Bell, 2011).

2.3.1 Quantitative

Ghauri and Grønhaug (2010) clarify that quantitative studies do not have a lower quality level compared to the qualitative ones. It is more about the procedure of how the data is collected (Ibid). The study conducted with the quantitative method is analysed and measured using numerical inputs (Bordens & Abbott, 2014). These numerical inputs will generate numerical outputs (Ibid), e.g. standard deviation, mean and average (Kothari & Garg, 2014; Denscombe, 2009). Surveys, experiments and mathematical models are mainly used within the quantitative method (Bordens & Abbott, 2014; Björklund & Paulsson, 2012; Denscombe, 2009). Moreover, highly structured interviews, using closed questions, are also possible within the quantitative method (Björklund & Paulsson, 2012; Saunders et al., 2012; Denscombe, 2009).

The quantitative method is more about verifying and testing, rather than emphasising on understanding (Ghauri & Grønhaug, 2010). Furthermore, the quantitative method can generate a higher generalisation and a more objective perspective based on facts (Ibid). Only the numerical and mathematical data the researcher collects and its relation to the chosen theory are relevant, not the researcher’s opinion or interpretation (Ibid). Although the researcher’s opinion might not be included, Bryman and Bell (2011) argue that it is the researcher who decides which data should be included. When the objective perspective is considered within the quantitative method, the researcher keeps a distance between himself/herself and the
studied subject (Ibid). Furthermore, the quantitative method is often used together with deduction and covers a broader audience because of certain factors such as the amount of respondents (Saunders et al., 2012; Denscombe, 2009).

### 2.3.2 Qualitative

The qualitative method, also called non-numerical method, is about words, images and videos, rather than numbers (Björklund & Paulsson, 2012; Saunders et al., 2012). Interviews, observations and case studies are often used within this method to express and understand the subjects’ point of view (Bordens & Abbott, 2014; Björklund & Paulsson, 2012; Saunders et al., 2012; Bryman & Bell. 2011; Ghauri & Grønhaug, 2010). Denscombe (2009) mentions that questionnaires can also be used as long as they include open questions. Also documents such as diaries can be used (Ibid). When adapting the qualitative method, the researcher is closer distance to his/her subject in order to find deep and rich data (Bryman & Bell, 2011). Considering the number of cases, the qualitative approach has a narrowed audience (Saunders et al., 2012; Denscombe, 2009).

### 2.3.3 Summary of the quantitative and the qualitative method

The characteristics of both, the quantitative and the qualitative method, are summarised in Table 2. As it can be seen, the quantitative method, for example, is more a numerical device, while the qualitative method works more with words, images, and videos.

<table>
<thead>
<tr>
<th><strong>Table 2: Quantitative and Qualitative characteristics</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quantitative</strong></td>
</tr>
<tr>
<td>Numerical</td>
</tr>
<tr>
<td>Usually surveys and questionnaires</td>
</tr>
<tr>
<td>Objective point of view</td>
</tr>
<tr>
<td>Distance towards the subject</td>
</tr>
<tr>
<td>Often used in a deductive approach</td>
</tr>
<tr>
<td>Broad audience</td>
</tr>
</tbody>
</table>

### 2.3.4 Motivation for using the quantitative method

The chosen method in this paper is the quantitative one. First of all, the main aim is to explain and the influence of different variables using numerical measures. These
numerical measures are used to test the hypotheses regarding the relation among DSI, environmental commitment, and trust.

2.4 Designs of research questions

In general, there exist different types of research questions which are, for example, exploratory, descriptive, and explanatory designs (Aaker et al., 2011; Robson, 2011; Ghauri & Grønhaug, 2010; Zikmund et al., 2010). The designs, explained in the following, have differences regarding the purpose and questions of the study, the formulation of the hypotheses, and the decision on the data collection method (Aaker et al., 2011).

The exploratory research design aims to either solve dubious situations or to find new potential opportunities for businesses, which means that it either aims to clarify the nature of a problem or to detect business alternatives (Aaker et al., 2011; Zikmund et al., 2010). The problem of the situation in exploratory research designs is not well understood due to lack of research of the problem (Saunders et al., 2012; Aaker et al., 2011; Ghauri & Grønhaug, 2010). Saunders et al. (2012) point out various ways for conducting an exploratory research which can be literature review, interviews of experts, and in-depth interviews on single persons or on a focus group. Exploratory research can be seen as the first step in order to highlight that further studies on that subject is necessary based on the new conducted data (Saunders et al., 2012; Zikmund et al., 2010). The benefit of this design lays in its flexibility and its adaption to be changed (Saunders et al., 2012).

The descriptive research design aims at describing the characteristics of situations, people, groups, or environments by asking questions regarding ‘who’, ‘what’, ‘when’, ‘where’, and ‘how’ (Saunders et al., 2012; Blumberg et al., 2011; Zikmund et al., 2010). Thereby, the problem of the examined situation needs to be well understood by the researcher before he/she collects the required data for his/her study (Saunders et al., 2012; Ghauri & Grønhaug, 2010). The main critic of the descriptive research design lays in its character to only describe without drawing conclusions so that it cannot be explained why the situation occurred or why the variables correlate in the respective way (Saunders et al., 2012; Aaker et al., 2011; Blumberg et al., 2011).
The explanatory research design aims at examining and creating causal relationships and thus, tries to explain the situation that has been described by the descriptive research design (Saunders et al., 2012; Blumberg et al., 2011; Zikmund et al., 2010). In other words, in this design the cause is isolated and its influence on other variables is determined (Aaker et al., 2011; Ghauri & Grønhaug, 2010). The problems of the situation in the explanatory design are well structured and the design seeks to answer questions regarding ‘why’ and ‘how’ (Blumberg et al., 2011; Ghauri & Grønhaug, 2010). The existence of causal relationships can be examined by conducting statistical numbers such as correlations of the collected data (Saunders et al., 2012).

In this thesis, explanatory research questions are examined. The first research question regarding the influence of the environmental commitment on DSI is an explanatory research question because we try to find out if the environmental commitment has an impact on DSI or not. The second research question, in coherence with the first one, is also an explanatory research question. We are keen to find out if trust has an impact on DSI or not.

2.5 Time horizon

Bryman and Bell (2011) in similarity to Ghauri and Grønhaug (2010) mention two research designs regarding the time horizon of research: cross-sectional and longitudinal. The cross-sectional research design is used when a comparison between variables and their relationship with each other is desired to be established (Saunders et al., 2012; Ghauri & Grønhaug, 2010). This design has a strong relation towards the quantitative method (Bryman & Bell, 2011). The longitudinal design is an investigation where the same target group is observed during different time intervals where the measured variables are either intact or changed (Jeličić et al., 2010). The longitudinal design highlights these changes over a longer time, while the cross-sectional design can be done simultaneously (Bryman & Bell, 2011; Ghauri & Grønhaug, 2010). The main differences between the cross-sectional and longitudinal designs are that the cross-sectional research design is not measured over a longer time frame, and is at the same time cost efficient (Bryman & Bell, 2011). The chosen research design is cross-sectional because of the independence of time. Furthermore, this paper has no intention to investigate a phenomenon over a longer time.
2.6 Data collection strategies

Many authors mention different strategies to collect data whereby experiment, case study, observation, and survey are the most common ones (Saunders et al., 2012; Bryman & Bell, 2011; Denscombe, 2009; Bell, 2006). Experiment is a way to identify the cause of a problem by manipulating the variables to investigate how much influence an independent variable has (Bryman & Bell, 2011; Denscombe, 2009). Under the experimental strategy, the studied subject is observed over a longer time frame (Bell, 2006). In the case study, another data collection strategy, the researcher investigates in a specific area, rather than in the general (Ibid). This strategy is widely connected to the inductive approach. Observation, on the other hand, is often related to ethnography where the aim is to emphasize on understanding a group (Denscombe, 2009; Bell, 2006). Observation, according to Bryman and Bell (2011), studies the behaviour and works as a counterpart to surveys. While the focus of observations is narrow because of the small sample size (Ibid), surveys cover a broader perspective and have a short time frame (Denscombe, 2009). Surveys with closed questions are sent out to the recipients so that the researcher is able to receive data from respondents that are comparable to each other (Ibid). Negative aspects that need to be concerned using this survey strategy are the lack of validity (Bryman & Bell, 2011) and also the possibility of a low response rate (Bryman & Bell, 2011; Denscombe, 2009). There are different ways to collect data from a survey such as telephone, email and personal (Ghauri & Grønhaug, 2010).

The data collection strategy in this thesis is the survey because a broader perspective of the studied objects is desired. The other vital condition that impacts on the consideration to choose the survey strategy is the short research time frame. Regarding surveys, there are many different data collection methods to adapt, but considering the country Germany as the target group, we decide to send out the invitation of a structured questionnaire to the manufacturers via email, supported by Artologik’s software named Survey&Report. This is a fast and economical way to reach many recipients (Denscombe, 2009; Bell, 2006) within the given time frame.
2.6.1 Surveys

A survey is used to measure attitudes and values in order to receive data in a specific area (Dahmström, 2011). The survey can be answered in either a dynamic or a static form (Ibid). In a dynamic survey a respondent has first to answer one question on the screen to gain access to the following question on the next screen shot and so on until the survey is completed (Ibid). In a static survey, the respondent is able to scroll through all the questions and answer them in an individual order. Moreover, the respondent can easily change his/her answers before submitting his/her completed survey (Ibid). When creating a survey, it is important to have in mind to formulate the questions as neutral as possible and to be easy to understand (Dahmström, 2011; Robson, 2011). Further, not to build negations and not to ask two different questions in the same question/sentence are vital in the formulation of questionnaires (Ibid).

Due to the development of the Internet, web surveys are now used more often to accumulate data (Bordens & Abbott, 2014; Dahmström, 2011). A respondent receives a survey through, for example, email (Ibid). This respondent fills in the required information, presses send and the information is sent back to the researchers to be compiled with other surveys of the same nature (Dahmström, 2011). Web surveys have the advantage that the researchers can quickly send and retrieve direct data registration (Bordens & Abbott, 2014). Disadvantages include factors such as technical problems and targeted respondents’ limited access to the Internet (Dahmström, 2011).

2.6.2 Scales of measurements

Likert scale is a well-used scale when “the item is presented as a declarative sentence” (DeVellis, 2012, p. 93). This scale shows alternatives for different scale response anchors, e.g. agreement, towards a given question (Ibid). The researcher can choose odd or even numbers of options (Ibid). The scale can differ in the amount of points, often in a range between three points and nine points (Fink, 2012). The most common words to clarify the numbers are strongly disagree, disagree, neither agree nor disagree, agree, strongly agree (DeVellis, 2012; Fink, 2012). According to DeVellis (2012), the Likert scale can include opinions, believes, and attitudes.
Table 3: Example of 5 point Likert scale, cited in Fink, 2012, p. 45

<table>
<thead>
<tr>
<th>How important do you think standardized test scores are to the fifth grader's education?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not very important</td>
</tr>
</tbody>
</table>

Table 3 shows an example of a Likert scale, where five options are presented. The example illustrates how important the test scores are to fifth grader's education with the scale going from not very important towards extremely important (Fink, 2012). When conducting a Likert scale, it is not necessary to label all points as long as the first and last number have an understandable label (see Table 3) (Ibid). When using an odd number of options, the middle alternative can also be formed like a neither this nor that alternative (DeVellis, 2012; Fink, 2012). If using an even point scale, the respondent cannot choose the middle option and the researcher, therefore, forces the respondent to choose a side (Fink, 2012). The Likert style is normally used together with ordinal data (Fowler, 2014). Ordinal data, together with nominal data, interval data, and ratio data, are the four different measurements for analysing data (Fowler, 2014; Zikmund et al., 2010; Buckingham & Saunders, 2004). The nominal data is the most simplified of the four, where the numbers are labelled as a name, e.g. codes 0 and 1 for female and male (Buckingham & Saunders, 2004). Ordinal data is one step further and the difference is that the ordinal data aims to rank the order of a greater or less amount, like rating between good or bad (Fink, 2012; Buckingham & Saunders, 2004). The interval data represents a rank order as well, but the intervals are more equal (Buckingham & Saunders, 2004), e.g. Fahrenheit, distance between ordered stimuli and classes (Fink, 2012). The ratio data is, according to Buckingham and Saunders (2004), the highest level of measurement where the numbers create a scale between values and given intervals, e.g. weight, time or distance (Fink, 2012).

2.6.3 Data collection strategies in this thesis

The chosen data collection strategy is the survey. The type of survey that is chosen in this thesis is a detailed dynamic web survey that is sent out via email. The email addresses are gathered from Orbis and the websites of the manufacturers that exists in the Orbis. The main reasons for conducting the web survey are that it can be
quickly sent out and retrieved (Bordens & Abbott, 2014) and that it is easier to reach the German participants due to geographical concerns.

Regarding this survey, the opening questions include general questions such as location, position, segment and number of employees. The main questions that are highly related to our research questions are based on ordinal questions using the Likert scale. We use the Likert scale with seven points because we want the respondent to be able to choose the middle option. In addition, the questionnaire is operationalised based on existing questions from several studies (i.e. Whipple et al., 2013; Chang, 2012; Whitelaw, 2011; Hosseini Baharanchi, 2009; Paine, 2003; Henriques & Sadorsky, 1999). Some questions are created by us based on the study of Esper et al. (2010). The operationalisation of the questions is presented in Appendix C. The same survey is sent out to all respondents of the same nature; more exactly the textile manufacturers in the German textile industry.

### 2.7 Sources of data

There are two different types of data which are primary and secondary data (Kothari & Garg, 2014; Dahmström, 2011; Bell, 2006). The primary data refers to the data that has been collected by the researcher for the corresponding study, that is used for the first time, and which, in coherence with that, is a quite updated or a new data set (Kothari & Garg, 2014; Vartanian, 2011). The secondary data, in contrary, has been collected by other researchers and therefore, was already used in other papers with all its statistical processes (Kothari & Garg, 2014).

#### 2.7.1 Primary Data

Primary data is not available before and thus, has to be collected by the researchers themselves (Dahmström, 2011). Usually the primary data is conducted for the specific purpose of the study (Saunders et al., 2012). Typical ways for conducting primary data are experiments, observations, and communications (Bryman & Bell, 2011; Dahmström, 2011; Vartanian, 2011; Ghauri & Grønhaug, 2010). As it can be seen in Figure 5, the survey belongs to the field of communication, in the same level as interviews, which can be conducted through email, phone or in person. In communications, three different questionnaires can be distinguished which are structured, unstructured, and semi-structured questionnaires (Bryman & Bell, 2011; Ghauri & Grønhaug, 2010; Bell, 2006). Structured questionnaires have
predetermined questions which means that the investigator asks a question and the participant has a predetermined set of answers from which he/she can select (Bryman & Bell, 2011; Ghauri & Grønhaug, 2010). Semi-structured questionnaires are the ones where the researcher has pre-set questions, and also has room for the participant to answer with his/her own words which means that open questions are also asked (Saunders et al., 2012; Ghauri & Gronhaug, 2010). Unlike the first two types of questionnaires, the unstructured questionnaires are those where the researcher has hardly any predetermined questions (Ghauri & Grønhaug, 2010). Nevertheless, primary data can be conducted not only through the aforementioned techniques, but also through protocols, salary lists, internal reports, websites, daily newspapers, letters, focus groups, speeches, and so on (Vartanian, 2011; Bell, 2006).

Figure 5: Primary data, Ghauri and Grønhaug, 2010, p. 99

The main reason that the researchers would like to collect primary data lies in its up-to-date character which means that primary data is updated and renewed as much as possible (Dahmström, 2011). Moreover, primary data collection has the advantage that the researcher can conduct the data so that his/her research question(s) can be answered in the most appropriate way including his/her own definitions and delimitations (Dahmström, 2011; Ghauri & Grønhaug, 2010). On the other hand, there is also a huge drawback (Vartanian, 2011). The researcher might face the
problem that he/she will gain only a limited amount of data from participants or other sources which leads to difficulties when it comes to the application of advanced analysis techniques (Ibid).

2.7.2 Secondary Data

Secondary data is already available since it has been collected from previous research (Kothari & Garg, 2014; Saunders et al., 2012; Dahmström, 2011). It can be collected from both, unpublished information in form of raw data and published summaries (Kothari & Garg, 2014; Saunders et al., 2012). The published data can be found in, for example, magazines, newspapers, publications from universities, reports, databases, books or scientific journals as technical and trade journals (Kothari & Garg, 2014; Bell, 2006). The unpublished data can be, e.g. not published biographies, letters, emails, or diaries (Kothari & Garg, 2014).

The character of secondary data provides some benefits in terms of fast access without performing a study and the low costs in comparison with the collection of the primary data (Dahmström, 2011; Vartanian, 2011). Moreover, the sample sizes are usually larger than the ones conducted by primary collection and the researcher can gain access to a lot of data sets (Vartanian, 2011). However, there are also some disadvantages which should be taken into consideration (Kothari & Garg, 2014; Dahmström, 2011; Vartanian, 2011). First of all, the researcher might spend a lot of time to understand the data set conducted by another investigator due to its complexity (Dahmström, 2011). In addition to this problem, using secondary data might be inadequate for own research because the range of the topic might be too broad or too specific and thus, inappropriate for the own research question(s) (Kothari & Garg, 2014; Vartanian, 2011). The data might also be biased by the opinions and perspectives that the pervious investigator had (Vartanian, 2011). Another important consideration, according to Kothari and Garg (2014), is that the secondary data has to fulfil the aspects of credibility, validity, and reliability.

2.7.3 Sources of data in this thesis

In this thesis, primary and secondary data are collected. The primary data is conducted through a survey send out through emails which are spread out to manufacturers related to the textile industry in Germany. The questionnaire used for the survey has a structured character since we only use closed questions that are
predetermined. Moreover, the theoretical chapters in this thesis include the use of secondary data. These are mainly collected through databases such as Google Scholar and the OneSearch function of Linnaeus University. The area of secondary data covers a broad range including not only books and articles, but also reports from companies, statistics and so on.

2.8 Population

First of all it is important to define the population of the study (Cohen et al., 2011; Ghauri & Grønhaug, 2010). In this thesis, the population is limited to companies that belong to the textile manufacturing industry in Germany. The textile manufacturing industry has the code 13 with the selection for industrial classification NACE Rev. 2 in the database Orbis (2015). The industry includes companies that prepare and spin textile fibres, weave or finish textiles, and companies that manufacture other textiles such as knitted and crocheted fabrics, carpets and rugs, or technical and industrial textiles. Moreover, only companies with the active status, excluding active with insolvency proceedings and dormant status, that have provided an email address in the database Orbis, are considered in this study. Following the database Orbis (2015), 982 manufacturers from Germany are contacted.

After the definition of the population, the question about whom to include in the study arises (Cohen et al., 2011; Ghauri & Grønhaug, 2010). The study can include the whole population or a sample of the population (Ibid). Thereby, the sample is defined as a sub-group of the population that has been selected in order to do investigations on and to make estimations of the whole population (Kumar, 2014; Bryman & Bell, 2011). While samples have the advantage that they require less time and resources than the examination of the whole population, they also have an impact on the degree of accuracy and impact of the study because the whole population is based on estimations drawn from the sample (Kumar, 2014). Due to this huge drawback and the fact that it is quite easy to send emails to a high number of manufacturers, the whole defined population is selected as research objects in this study.

A problem that is strongly connected to collecting data from a certain population is the risk of low response rate (Ghauri & Grønhaug, 2010). There usually is a difference between the respondents and those that do not respond which makes it
difficult to guarantee that the collected data is representative for the whole population (Ibid). In this thesis, the response rate is expected to be quite low because most of the contacted manufacturers mainly provide a general email address. Thus, we cannot expect to address the right person (managers, CEOs, directors) directly and depend on the email transfer inside the manufacturing company to the desired department. This issue supports our decision of investigating the whole population instead of a sample in order to increase the number of responses.

2.9 Missing data of the respondents

Nonresponse is one of the problems that arises when conducting survey research (Wagner & Kemmerling, 2010). Nonresponse occurs when the participants are not able to answer a question or refuse to take part in the survey (Saunders et al, 2012; Bryman & Bell, 2011). The reasons for nonresponse might be that the question is too sensitive and the respondent does not want to give information about that (Bryman & Bell, 2011). Nonresponse can happen at two levels; item-nonresponse and unit nonresponse (Wagner & Kemmerling, 2010).

2.9.1 Item nonresponse

The first level of nonresponse refers to item nonresponse, so-called missing data or missing value. Item nonresponse is concerned when the respondents do not answer the entire survey (Wagner & Kemmerling, 2010). Unfortunately, there is not really a strategy for dealing with this issue that satisfies everyone (Robson, 2011). It might be that the participants that did not fill in a certain question have a different opinion than the ones that answered this part (Ibid). Because of that, it is recommended to spend some time and effort into the investigation of why some participants did not respond to everything which is also questioned by the researchers of this thesis (Ibid).

One option how to deal with missing data is to code it (Saunders et al., 2012; Bryman & Bell, 2011; Robson, 2011). Therefore, it is necessary to code each variable for every observation in the data set (Saunders et al., 2012). The missing data should get its own code; one that has not been used in the data set for another variable or case (Saunders et al., 2012; Bryman & Bell, 2011; Robson, 2011). Even though some authors suggest to code missing values with 0 (zero) (Bryman & Bell, 2011), Robson (2011) recommends to be careful in following this approach since zero could be a value of another observation for one of the variables. After coding,
the software package, in this case IBM SPSS Statistics 22, has the ability to deal with the missing data, for example, in form of replacing the missing data by averages of the other values (Robson, 2011). However, we need to make sure that the software is aware of the code for the missing data so that the missing values can be handled in the right way without affecting the analysis negatively (Bryman & Bell, 2011). In spite of dealing with missing values in this study, we set the questions in the questionnaire to be obligatory to answer; therefore, missing data does not occur.

2.9.2 Unit nonresponse

The second level of nonresponse is unit nonresponse (Wagner & Kemmerling, 2010). Unit nonresponse occurs when a researcher fails to collect the answers from approached participants (Ibid). The causes of unit nonresponse might be the incorrect contact information or that respondents are unwilling or unable to participate (Wagner & Kemmerling, 2010). The absence of participants leads to the risk of having low response rate which, in turn, is likely to cause bias in findings (Saunders et al., 2012; Bryman & Bell, 2011). The nonresponse bias occurs if the nonrespondents differ from the respondents (Bryman & Bell, 2011).

Nonresponse bias affects the generalisation of survey findings (Wagner & Kemmerling, 2010). To avoid the consequence of nonresponse bias, a researcher needs to check that there is no significant difference between those who respond and those who do not respond in order to draw generalised conclusions. There are several methods to detect whether there exists nonresponse bias or not. According to Wagner and Kemmerling (2010), there are four common methods which researchers can apply: extrapolation, comparison between respondents and characterised population, comparison between respondents and nonrespondents, and sampling nonrespondent. In this study, the comparison between respondents and nonrespondents is employed.

In this thesis, the test procedure applied for nonresponse bias test is the chi square of independence test which is the most common use for the comparison between respondents and nonrespondents, according to Wagner and Kemmerling (2010). When comparing respondents to nonrespondents, information about characteristics, which exists for both of them, are required (Ibid). The characteristic can be, for instance, company size, industry type, or turnover (Wagner & Kemmerling, 2010; Forslund & Jonsson, 2009). The characteristics of the objects can be transformed to
variables with at least two parameters. Variables with only two different extents such as gender (male and female) can be seen as a 2 by 2 table which means that there are two parameters of response and two of the other variable (Pallant, 2013). For these cases, the value of ‘Yates’ Correction for Continuity should be used, and in the cases with at least three parameters for at least one of the variables, the Pearson Chi-Square value should be checked (Ibid). If the chi square value is significant, which means that the significance value of the column ‘Asymp. Sig.’ is 0.05 or smaller, the investigated groups are significantly different from each other (Ibid). Vice versa, the respondents do not differ from the nonrespondents if the chi square value is not significant.

2.10 Data analysis

There are different ways of analysing the quantitative data. Punch (2014) defines regression as a statistical technique to organise the quantitative data. There exist different regressions; simple linear regression and multiple linear regression (Graziano & Raulin, 2013). A simple linear regression is used to predict a significant relationship between the outcome (y) and the variable (x) and depending on the relation, it can result in a linear- or a non-linear regression (Ghauri & Grønhaug, 2010). With a multiple linear regression (MLR), multiple independent variables are tested (Robson, 2011). The main purpose with MLR is to sort the importance of the variance and impact between the independent variables and the dependent variable (Punch, 2014). Since we investigate the influence of two independent variables on the dependent variable separately, and are not interested in which independent variable has a greater influence on the extent of the dependent variable (DSI), the chosen analysis technique in this thesis is the simple linear regression analysis.

In order to use the simple linear regression technique, several assumptions need to be fulfilled (Laerd statistics, 2013). In this thesis, we have two independent variables, which are environmental commitment and trust, and one dependent variable, which is the demand and supply integration. Therefore, the following assumptions need to be proved twice, once for the independent variable environmental commitment and once for the independent variable trust.

The first assumption regards the linear relationship between the independent variable and the dependent variable (Laerd statistics, 2013). This assumption can be proved
through the test of linear relationship between the independent variable and the dependent variable, i.e. through a scatterplot (Ibid). There is a linear relationship between the variables if the scores are plotted straight-lined (Pallant, 2013). Also an indication for the direction of the relationship between the variables can be seen through the scatterplot (Ibid): a positive relationship is existent if “high scores on one variable are associated with high scores on the other” (Pallant, 2013, p. 77), whilst a negative relationship is existent if the high scores are linked to lower scores of the other variable.

Homoscedasticity of residuals is the second assumption that needs to be proved (Laerd statistics, 2013). This assumption is tested after running the simple linear regression analysis (Ibid). To see if there is any homoscedasticity between the independent variable and dependent variable, the variables should have approximately the same values (Pallant, 2013). This assumption is proved with the help of a residual scatterplot where the regression standardised residual scores should be spread horizontally (Laerd statistics, 2013; Pallant, 2013).

Finally, the assumption that the regression standardised residuals are normally distributed needs to be tested through a Normal P-P plot (Laerd statistics, 2013). In a Normal P-P Plot, the aim is that the values should be close to the diagonal straight line within the plot (Laerd statistics, 2013; Pallant, 2013). If the values are close to the line, there are fairly no variations from normality (Pallant, 2013).

The last steps of the simple regression analysis are to interpret the output of the analysis. The simple linear regression analysis is built upon a null hypothesis and its alternative hypothesis (Laerd statistics, 2013). With the null hypothesis, the independent variable has no explanatory power on the dependent variable which can either be accepted or rejected (Chatterjee & Hadi, 2006). The hypotheses can be tested through the $F$-statistic (Ibid). The null hypothesis is rejected if the $F$-statistic value is significant (Ibid). Through the $R^2$ squared value, the extent of linear relationship can be interpreted (Ibid). The range of $R^2$ squared value is from 0 to 1 (Ibid). The closer the $R^2$ squared value to 1, the stronger the linear relationship is, while the closer the $R^2$ squared value to 0, the weaker the linear relationship is (Ibid).
2.11 Quality criteria in business research

Reliability and validity are the two main criteria in the evaluation of quality in business and management research (Punch, 2014; Bryman & Bell, 2011). In order to ensure the quality of research, the study has to meet those criteria (Saunders et al., 2012).

2.11.1 Reliability

Reliability is concerned with the question of whether the data collection techniques or the measures derived from the concepts of the study, and analytical procedures bring about consistency in the findings (Bryman & Bell, 2011). The findings might be replicated by other researchers under different occasions (Saunders et al., 2012; Bryman & Bell 2011). To simplify: reliability is about issues of consistency of measures used in research (Punch, 2014; Saunders et al., 2012; Bryman & Bell, 2011). There are three aspects of consistency that researchers have to deal with when working with the quantitative method: (1) consistency over time or stability, (2) internal reliability or internal consistency, and (3) inter-observer consistency (Punch, 2014; Bryman & Bell, 2011).

Consistency over time or stability: In order to make the questionnaire valid, it is necessary that the instrument or questions asked in the questionnaire are stable and consistent over time (Saunders et al., 2012). The study that is stable shows the sign of robustness of a measure (Ibid), which in this thesis is the questionnaire. Thus, it is a criterion that respondents have to understand the questions in the same way (Ibid). The next question that needs to be answered is whether the same questions, which are asked to the same or a different sample under the different points of time, produces consistency in the findings. (Punch, 2014; Saunders et al., 2012; Bryman & Bell, 2011). The consistency over time can be tested by using the test-retest method with a requirement of two administrations (Punch, 2014; Saunders et al., 2012; Bryman & Bell, 2011). Correlations between the results of two different administrations tell the researchers whether the questions are stable or not (Bryman & Bell, 2011). However, the consistency over time does not concern this research since the time horizon is cross-sectional, not longitudinal. Therefore, we do not prove it later on.
**Internal reliability or internal consistency:** Internal consistency can be called internal reliability and internal consistency reliability (Punch, 2014; Saunders et al., 2012; Bryman & Bell, 2011). This criterion is applied when the study has a multiple-indicator measure (Punch, 2014; Bryman & Bell, 2011). To clarify: there might be twelve statements, i.e. indicators, asked in the questionnaire, and these indicators are supposed to lead to one conclusion that the researchers would like to investigate (Ibid). Therefore, it is important that the indicators are coherent and related to each other (Ibid). There are different techniques for calculating internal consistency, e.g. the split-half technique and Cronbach’s alpha (Saunders et al., 2012; Bryman & Bell, 2011). The most well-known and used one is Cronbach’s alpha (Ibid), which is also applied in this thesis. Cronbach’s alpha is a statistical method that consists of an alpha coefficient value range from 0 to 1 where 1 indicates that the questions are very highly reliable and 0 that the questions are not reliable at all (Pallant, 2013; Saunders et al., 2012). In IBM SPSS 22, it is possible to choose the option that investigates if the overall alpha could be increased by deleting one of the variables (Pallant, 2013). The suggestion of Pallant (2013) is to check the Corrected-Item-Total Correlation before deleting variables. If Cronbach’s alpha has already a value of 0.7 or higher and the Correct-Item-Total Correlation values for the variables are higher than 0.3, no removals are necessary.

**Inter-observer consistency:** In the case when there is more than one observer involved in the activities such as recording of observations or translating of data, there is a possibility that there might be issues regarding the lack of consistency of the observers’ judgement and decision (Bryman & Bell, 2011). In this research, the consistency among the researchers is dealt by constant sharing of information and thoughts, and discussing and considering significant issues together.

2.11.2 Validity

Validity is concerned with the unity and completeness of the conclusions which are yielded from a study process (Bryman & Bell, 2011). In addition, validity is about the quality of measurement, i.e. the inference of the indicators and the concepts aimed at measuring (Punch, 2014). There are two main types of validity that the researchers should consider; namely, (1) internal validity and (2) external validity (Punch, 2014; Saunders et al., 2012; Bryman & Bell, 2011).
**Internal validity**

This type of validity is mainly focused on the issue of causality between two or more variables (Saunders et al., 2012; Bryman & Bell, 2011). This will affect the question whether the conclusions drawn from those causalities hold water (Bryman & Bell, 2011). These causality issues are associated with the causes represented as independent variables which have impacts on the dependent variables (Ibid). Internal validity is connected to positivism and quantitative research, and can also be applied in causal and explanatory studies (Saunders et al., 2012). In order to internally validate a measure of a study concept, five different types of internal validity have to be deemed (Punch, 2014; Saunders et al., 2012; Bryman & Bell, 2011).

**Content validity** or face validity (Bryman & Bell 2011) focuses on whether the measures, in this study it refers to the questions in the questionnaire, can reflect, represent, and cover the content of the investigative concept (Punch, 2014; Saunders et al., 2012; Bryman & Bell 2011). There are different ways to achieve content validity. As suggested by Bryman & Bell (2011), the researcher can ask for a judge from people who have experience and are an expertise in the field. In addition to that, Saunders et al. (2012) specifically suggest making an assessment whether the measurement questions are “‘essential’ ‘useful but not essential’ or ‘not necessary’” (p. 429). Another option is to make a clear definition and develop indicators that represent the whole content in the definition; this can be done through literature review (Punch, 2014; Saunders et al., 2012). Considering all things together, this type of validation is an important first step (Bryman & Bell, 2011). In this thesis, the questions in the survey are gathered from various literature. Moreover, the concept which the questions intend to measure is operationalised and defined based on previous research. Therefore, the content validity is applied and supported by the Cronbach’s alpha value for internal reliability.

Regarding the criterion-related validity; the website Laerd dissertation (2012) highlights that either the concurrent or the predictive validity needs to be tested. The **concurrent validity** is about the question of whether a measure is concurrent or not (Punch, 2014; Bryman & Bell, 2011). This validity can be assessed by carrying out two different measurement procedures simultaneously (Laerd dissertation, 2012). When researchers come up with their own measurement construct, they should conduct half of their primary data by using their new developed construct and the
other half by using a traditional developed construct which is already tested to have concurrent validity (Ibid). Later on, the coded data can be compared through correlation analysis in order to check whether the new developed construct leads to the same results (Ibid). In this research, however, concurrent validity is not taken into account because we do not have access to the raw data of the specific previous research that could provide us with the traditional developed construct. **Predictive validity**, on the other hand, is to test the validity of a new measure using future criterion measures (Bryman & Bell, 2011). Thereby, the same construct is studied over time frames and a researcher got more than one set of responses (Laerd dissertation, 2012). These responses are then tested together in order to prove the predictive validity (Ibid). Nevertheless, due to the limited time scope for this thesis, the predictive validity is not employed.

**Construct validity** is often referred to ‘measurement validity’ and is regarding the question to what extent a research measurement conforms and reflects theoretical expectations, i.e. which is what the researchers denote (Punch, 2014; Saunders et al., 2012; Bryman & Bell, 2011). In other words, the research measurements have to be reliable (Bryman & Bell, 2011). Therefore, the test of internal reliability is a proof for construct validity in this thesis because it is difficult to validate the measurements against the data that we have (Saunders, et al., 2012).

**Convergent validity** urges the researcher to compare a measure of oneself to measures of the same concept, but devised through different methods (Bryman & Bell, 2011). In this thesis, most parts of measures are compared with the existing research in order to confirm convergent validity.

**External validity**

External validity is regarding the question of whether or not the conclusions can be generalised beyond the chosen research settings or groups (Saunders et al., 2012; Bryman & Bell, 2011). Therefore, the process of generating representatives of the population, i.e. samples, is critical to validate in the external validation (Ibid). In this thesis, the whole population is selected; therefore, it implies to be externally validated.
2.11.3 Replicability

When conducting research, a researcher might desire to replicate other studies for various reasons (Bryman & Bell, 2011). For instance, the researcher might be curious if the set of model proposed by the original researcher is applicable for other settings (Ibid). In order to make replication possible, one’s study must be capable to be replicated, which is replicability (Ibid). Bryman and Bell (2011) explain that the idea of replication is rooted as a claim of the natural science that one seeks to reproduce other experiments in order to prove something. The problem that arises, when one could not succeed with the replication, is that the validity of the findings are doubtful (Ibid). Therefore, a researcher tempts to clearly provide the details of procedures of his or her experiment (Ibid). By the same token, a person conducting quantitative research is often concerned about the replicability of his or her study in the social science research. Despite the fact that the criterion of being replicable does not make the study more attractive, Bryman and Bell (2011) assert that it is crucial to obtain the replicability for the study. Making research replicable can be done through explicitly explaining the set of findings and that includes, e.g. how the sample was selected (Ibid).

In the thesis, the authors explicitly provide how the set of sample is selected in chapter 2.8. Furthermore, the procedure to obtain the findings and the methods of handling them are clearly explained in chapter 5. In chapter 3 and 4, the theory and the assumptions for the hypotheses of the study are explained in order to state the measures of the research model.

2.12 Ethical considerations

Examples in the history like the medical experiments towards the end of the second World War in the Nazi death camp Auschwitz have underlined how important ethical considerations are when it comes to research (Bordens & Abbott, 2014; Eynon et al., 2008). Therefore, guidelines like the Nuremberg Code in 1949 or the Helsinki Declaration in 1969 have been developed in order to protect the human participants in research (Bordens & Abbott, 2014; Punch, 2014; Eynon et al., 2008). Important issues from the guidelines, but also ethical considerations specifically regarding online research in terms of sending surveys by emails and fraudulence are discussed in this section.
2.12.1 Ethical issues with human participants

For the human research participant, it is important to have confidentiality, anonymity, and informed consent guaranteed (Bordens & Abbott, 2014; Kumar, 2014; Graziano & Raulin, 2013; Cohen et al., 2011; Eynon et al., 2008). Informed consent includes informing the participating population about the purpose of the study, the methods and the requirements to participate in the study, but also the costs and advantages for the participants self (Bordens & Abbott, 2014; Kumar, 2014). The participant usually signs a specific paper that informs about those issues, explains the participant that the participation is voluntary and that he/she is allowed to quit at any point of the research without any punishment for him/her (Bordens & Abbott, 2014; Kumar, 2014; Graziano & Raulin, 2013; Cohen et al., 2011; Eynon et al., 2008). In addition to that, anonymity for the participants should be given by the researchers (Bordens & Abbott, 2014; Graziano & Raulin, 2013; Cohen et al., 2011). It is important that neither the participant self nor his/her responses can be identified to him/her (Bordens & Abbott, 2014; Cohen et al., 2011). This goes in coherence with the confidentiality aspect of the ethical considerations, the aspect of avoiding harm to the participants (Kumar, 2014; Graziano & Raulin, 2013). The Belmont Report from 1978 states that it is desired to minimise the risk and maximise the benefits for participants (Graziano & Raulin, 2013). One risk pointed out by Kumar (2014) is that it is seen as being unethical to use the responses of a participant for other purposes than the research itself. Furthermore, deception, which is the misguidance of participants through wrong information by the researchers, and concealment, which is the withholding of information needed by participants, should be avoided (Graziano & Raulin, 2013; Cohen et al., 2011). Therefore, it is essential to assure confidentiality by using certain approaches, for example, labeling the observations by numbers instead of names (Graziano & Raulin, 2013).

2.12.2 Online Research

Online research might be affected by different regulations than offline research because the participants could be in different parts of the world with different ethical considerations (Eynon et al., 2008). One crucial concern that arises with online research is that the individuals should not be harmed in any way (Ibid). Harm can appear, for example, through stealing sensitive information of the participants (Bordens & Abbott, 2014). Therefore, it is important to use appropriate hardware and
software in order to prevent hackers to gain access to the data (Ibid). Moreover, it is advised to inform the participants before the survey about the risk of data disclosure (Ibid).

One issue that especially occurs by the use of emails is the lack of anonymity because the email addresses usually contain the names of the participants, their locations, and their positions in an organisation (Bordens & Abbott, 2014; Eynon et al., 2008; Keller & Lee, 2003). Even the use of services that provide anonymous emails cannot assure that the participants can be guaranteed anonymity because a copy of the email will be stored for several years on all involved servers; the sending account, the transmitting, and the destination server (Ibid).

2.12.3 Fraudulence

It is important that the researchers treat their studies ethically in order to prevent harm to others (Bordens & Abbott, 2014). Therefore, fraudulent or other dishonest behaviour regarding research should be eliminated because it can influence the confidence about scientific researches of the society (Ibid). To fraudulence belong the following aspects, according to the Office of Research Integrity (2008, p. 2):

“(a) Fabrication is making up data or results and recording or reporting them.

(b) Falsification is manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record.

(c) Plagiarism is the appropriation of another person’s ideas, processes, results, or words without giving appropriate credit.”

2.12.4 Ethical considerations of this thesis

In this thesis, the survey is sent out through email. Therefore, the participants are informed about the purpose, the requirements, data disclosure, and the costs and benefits after entering the link in the email. Furthermore, the text clarifies that the participation is voluntarily and that the participant can quit the survey at any time without any penalty. When the participants click the button "submit", all their answers are sent through the Survey&Report software. On the other hand, through ignoring the button "submit" and closing the window, the participants will end the
survey process and the answers are not submitted. Moreover, we guarantee the participants the highest anonymity as possible by coding the cases in order to prevent harm of the participants. In addition to that, neither deception nor concealment nor permission regarding the use of the data for other than the mentioned purpose, are in our interest and do not take place. Also in terms of fraudulence we apply strict rules. Therefore, we have a great concern about eliminating fabrication, falsification, and plagiarism.

2.13 Summary of the methodology

Table 4 below summarises the methodology for this thesis. The first column contains the issues explained earlier in the previous chapters. The second column sums up the implication for the thesis.

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3. Theoretical framework

This chapter includes the theoretical framework that is used in this thesis for answering the research questions. In-depth explanations of the demand and supply integration based on Esper et al.’s framework, exploration of our definitions on environmental commitment and trust, and theory about the German textile manufacturing industry are provided. Moreover, the literature presented in this chapter is a basis for the operationalisation of the questionnaire shown in Appendix C.

3.1 The integration of demand and supply (DSI)

Esper et al. (2010) introduce the framework of demand and supply integration (DSI) together with the knowledge management concept. DSI is defined as "the balancing of demand and supply market information and business intelligent through integrated knowledge management processes to strategically manage demand and supply activities for the creation of superior customer value" (Esper et al., 2010, p.7). The DSI process is made under the assumption that customer value can be generated from cross-functional integration of supply chain management (SCM) and marketing (Ibid). In other words, together with the emphasis on the knowledge on demand of markets and knowledge on supply capabilities, the manufacturer can create and deliver the relevant customer value (Stank et al., 2012; Esper et al., 2010; Jüttner et al., 2007).

Porter (2004) points out the core competitive strategies as low cost or differentiation. The choices of strategies lead to the consideration of two different processes in a firm; namely demand-focused processes and supply-focused processes (Esper et al., 2010; Porter, 2004). The demand-focused processes consist of marketing management, customer relationship management, and sales (Porter, 2004). On the other hand, the supply-focused processes refer to inbound logistics, production, and outbound logistics (Ibid). Hilletofth et al. (2009) emphasise that it is important for manufacturers to realise that both sides of processes are equally significant. Moreover, managers have to coordinate to be able to optimise the processes and generate advantages from efficiency of processes from both sides so that they can create and deliver value to the market.
(Esper et al., 2010; Hilletofth et al., 2009). In order to succeed, all managers responsible for supply-focused processes need to have the same knowledge of the demand-focused processes, e.g. to understand the market situation (Madhani, 2012), and vice versa (Esper et al., 2010). In summary, the core of the DSI framework is that broad strategic decisions are made, and this should be done by the top management of a firm based on the knowledge of the demand- and the supply-side (Esper et al., 2010).

The DSI framework is adapted in the conceptual paper of Gligor (2014). The demand-focused processes and supply-focused processes are interpreted as the demand management and the supply management (Ibid). The demand management consists of the study of demand-side and demand forecasting, which are parts of the DSI framework (see Figure 6). The supply management includes the study of supply-side and capacity forecasting, which are also parts of the DSI framework (see Figure 6). Therefore, it is important to define both the demand management and the supply management as following.

**Demand management**

The elements of demand-focused processes are recognised as being parts of the marketing management. Defined is marketing management as “the activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners, and society at large” (AMA, 2007 cited in Baines et al., 2013, p. 6; cf. Kotler & Keller, 2009). Another extracted definition of the demand-focused processes is that the processes are responsible for understanding, creating, and stimulating customer demand (Hilletofth, 2011). This definition is supported by the definition given by APICS (2013). Demand management is defined as the processes that discern the demand for goods and services for supporting the market, including prioritising the demand (Ibid). As well as in the marketing discipline, the demand-focused processes include “the process of planning, executing, controlling, and monitoring the design, pricing, promotion, and distribution of products and services to bring about transactions that meet organizational and individual needs” (APICS, 2013, p. 8). In this thesis, we agree on the definition provided by Hilletofth (2011) that in our interpretation includes the definition of APICS (2013) which comprises of the activities of the marketing management. All in all, the corresponding definition is named as demand management under this study.
Supply management

In contrary to the demand management, the supply management has not been discussed so broadly so that only a few definitions matching the purpose of our study exist (Gligor, 2014). However, Eltantawy et al. (2009, p. 926) come up in their research with the following definition of supply management: the supply management is "the identification, acquisition, access, positioning, and management of resources the organization needs or potentially needs in the attainment of its strategic objectives". In addition to that, Leenders et al. (2002) extracted a more specific definition from the National Association of Purchasing Management. According to Leenders et al. (2002, p. 10), supply management is

a systems management concept employed by some organizations, designed to optimize the factors of material costs, quality, and service. This is accomplished by consolidating the following operating activities: purchasing, transportation, warehousing, quality assurance for incoming materials, inventory management, and internal distribution of materials.

For the purpose of this study, we define supply management as the combination of both definitions: the management of identifying, acquiring, accessing, and positioning the needed resources for the organisation and it includes the activities regarding purchasing, transportation, warehousing, quality assurance for incoming materials, inventory management, and internal distribution of materials.

Figure 6 is a simplified version of Esper et al.’s (2010) DSI framework. The framework is based on the knowledge management process including knowledge generation, knowledge dissemination, shared interpretation, and knowledge application. In the sections 3.1.1 to 3.1.3, the first three knowledge management phases are elaborated. Each colour of Figure 6 represents one of the three elaborated knowledge management phases. This adjustment is made in order to help the reader following the line. The knowledge application phase, on the other hand, is not described since the authors of this thesis see the critical part of DSI in the shared integration phase built up by the knowledge generation and dissemination phases. Therefore, the knowledge application phase can be part of further studies.
3.1.1 Knowledge generation

The knowledge generation (see Figure 6) belongs to the knowledge management process (Esper et al., 2010; Rubenstein-Montano et al., 2001). Knowledge generation comprises the action of creating and gaining knowledge, e.g. through observations of various market variables and their influence on present and future business activities (Ibid).

Assessing current strategies

The very first thing to begin with in the DSI process is that manufacturing companies assess their current strategies, the first green box in Figure 6 above (Esper et al., 2010). Hereby, it is vital to first have a look at the formulated business strategies which are connected to the business model of the enterprise and which define the way to accomplish a goal (Casadesus-Masanell & Ricart, 2010). After that, the tactical choices,
which refer to the business choices that the manufacturer has made in order to assist the chosen strategy, need to be taken into consideration (Ibid).

As suggested by Esper et al. (2010), assessment of strategies and tactics used in both demand-focused processes and supply-focused processes is the very initial starting point as this assessment influences the rest of the DSI process. For the demand-focused side, managers should identify and revise strategies and tactics regarding the following areas: branding, positioning, new product launches, advertising, selling, sales force management, promotion, public relations, pricing, distribution, and market research (Ibid). These areas are parts of the principle of marketing: product, price, place, and promotion – so called 4Ps (Baines et al., 2013; Armstrong & Kotler, 2011; Kotler & Keller, 2009). Assessing current strategies of firms regarding demand management can also be done by applying Porter’s Five Forces3 for industry analysis (Baines et al., 2013). Analysing environment at a macro level is also common and useful for the beginning of strategic analysis (Warner, 2010). When analysing the macroenvironment, manufacturers have to understand the impact of PESTLE4 factors on an industry’s future (Ibid).

For the supply-focused side, managers should identify and revise strategies and tactics regarding the following areas: production, purchasing/sourcing, inventory management, transportation, network design, research and development, and supply research (Esper, et al., 2010). These related areas are recognised as supply strategies which are controlled by supply managers (Burt et al., 2003). To assess the current strategy of a firm, a supply manager is then involved in the meetings of, e.g. positioning sources, managing costs, strategic alliance for network design, and strategic supplier relationship management (Ibid). Supply management covers all these activities.

The study about sourcing strategies of Su (2013) helps affirming the importance of assessing strategies and tactics before any action. Su (2013) points out that the decisions on sourcing have an effect on other strategies regarding production, distribution, marketing and finance. This is far beyond the cost issues (Ibid). Proactive sourcing

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3 Elements of Porter’s Five Forces are barriers to entry, buyer power, supplier power, substitute power, and rivalry (Warner, 2010).

4 PESTLE stands for Political, Economic, Sociocultural, Technological, Legal, and Environmental factors (Warner, 2010).
strategies receive a lot of interest from top management in textile and apparel companies to cope with risks, changes, and uncertainty towards environment (Ibid).

**Studying demand-side**

Under the knowledge generation phase, the kind of knowledge such as customer requirements and competitor information are generated (Esper et al., 2010). This form of knowledge generation refers to the second green box ‘Studying demand-side’ in Figure 6. Manufacturing companies can obtain information about customer requirements through the marketing management which consists of the 4Ps principle: product, price, place, promotion (Baines et al., 2013). Customer needs are represented concerning the design of products, the distribution place, the price which is the cost to the customer, and promotion attracting the customer (Ibid). Market research has to be performed in this stage in order to provide sufficient information of the particular industry and market (Ibid); in this thesis is textile manufacturing industry.

In the business-to-business context, the customers are not a household buyer; in fact, they are organisations that purchase in order to make a profit out of the products (Baines et al., 2013). Therefore, the prospect requirements of customers are, for instance, reliable delivery, inventory availability, and flexible delivery times (Christopher, 1986 cited in Baines et al., 2013). These requirements can be linked to the management of supply capabilities in the next section.

**Studying supply-side**

In the knowledge generation phase, information about suppliers’ capabilities and constraints are gathered (Esper et al., 2010). This form of knowledge generation refers to the third green box ‘Studying supply-side’ in Figure 6. Issues of supply-side capabilities and constraints are, for instance, lead time, on-time delivery, return capability, and credit facility (Gangula, 2010). Capabilities of suppliers are considered in many areas, for instance, quality, capacity, management, service, information technology, and flexibility capability, and financial condition (Burt et al., 2003). Moreover, information regarding supply situations and trends has to be monitored and identified by the management (Ibid). In addition to that, the information regards, for example, change in regulations and legislations, conflicts and war situations in the world, and reinforcements among suppliers (Ibid). Therefore, the supply management
research or analysis has to be done in order to obtain knowledge concerning the following issues (Burt et al., 2003, p. 249):

- *The availability of standard products suitable to meet the need (with or without modification)*
- *The terms, conditions, and prices under which products are sold.*
- *Any applicable trade provisions or restrictions or controlling laws.*
- *The performance characteristics and quality of available products, including quality control and test procedures followed by the manufacturers.*
- *Information on the satisfaction of other users having similar needs.*
- *Any costs or problems associated with integration of the item with those currently used.*
- *Industry production practices, such as continuous, periodic, or batch production.*
- *The distribution and support capabilities of potential suppliers.*

3.1.2 Knowledge dissemination

The knowledge dissemination, the two pink boxes in Figure 6, is the second step in the knowledge management process (Esper et al., 2010; Rubenstein-Montano et al., 2001). Knowledge dissemination includes sharing the appropriate data of the market situation and confidential business information throughout the enterprise and also to applicable stakeholders (Esper et al., 2010). The dissemination process can be done through cross-functional and cross-organisational meetings where managers explain the meaning of the data they have generated (Ibid).

*Sharing demand-side information*

After the knowledge has been generated, the information regarding the demand-side needs to be shared. Dissemination of demand-side information refers to the first pink box in Figure 6. The sharing of data regarding the demand-side includes the demand forecast which is the product of the knowledge generation of the demand-side (Esper et al., 2010; Croxton et al., 2002). Next, it is spread through the organisation cross-functionally and even across the organisation (Esper et al., 2010).

Within the business-to-business context, CPFR (collaborative planning, forecasting, and replenishment) is introduced as a technology solution to ease the flow of information for
coordination under the areas of, for instance, production planning, purchase planning, demand forecasting (Dong et al., 2014; Fliedner, 2003). A company can select internal information and share it on the server (Fliedner, 2003); i.e. it is a concept of having transparent information with supply chain partners (Ramanathan & Gunasekaran, 2014). Transparent information that manufacturers share with their customers can be data about the inventory status or sales forecast (e.g. Duffy et al., 2004).

**Sharing supply-side information**

After the knowledge has been generated, information regarding the supply-side need to be shared. Dissemination of supply-side information refers to the second pink box in Figure 6. The sharing of data regarding the supply-side includes the capacity forecast/planning which is the product of the knowledge generation phase of the supply-side (Esper et al., 2010). Capacity is reflected as available resources, the production hours, the knowledge of current technologies and labour forces (Jacobs, 2011). Capacity is varied over a period of time, therefore it can be planned in three ranges: long-term, medium-term, and short-term (Ibid). Strategic capacity planning is, thus, a support for the overall capacity level (Jacobs, 2011; Stevenson, 2009). In the strategic capacity planning, the results to be disseminated are, e.g. the financial analyses and key qualitative issues of each capacity alternative (Stevenson, 2009). The information is disseminated in the knowledge dissemination phase.

In the same manner as for sharing demand-side information, CPFR can be applied in order to support the information flow for coordination (Dong et al., 2014; Fliedner, 2003). Under the supply-side, the software can be used for similar areas of the demand-side such as production planning and purchase planning, and in addition it can be used in the area of capacity forecasting (Ibid). In coherence with the sharing of demand-side data, internal information can be selected from the organisation and disseminate it on the server (Fliedner, 2003) so that transparent information can be achieved (Ramanathan & Gunasekaran, 2014).

### 3.1.3 Shared interpretation

The heart of the DSI framework is the strategic balancing between marketing information and supply information (Esper et al., 2010). This can be done in the shared interpretation phase, the blue box in Figure 6 (Ibid). Esper et al. (2010) emphasise that the balancing of demand and supply in the DSI framework does not aim at producing
sales and operation planning (S&OP), rather at strategic decisions. Therefore, knowledge generation is discussed and interpreted between demand-side and supply-side managers in order to make broad strategic decisions (Esper et al., 2010). Knowledge regards not only the raw sales data (Jüttner et al., 2007) and the capacity planning, but also customers’ trend, market situation, and supply capacities and capabilities (Esper et al., 2010). This knowledge is needed when it comes to, for example, entering new market sections, or expanding distribution channels when the supply exceeds the demand, or amplifying the ability to supply when the demand exceeds the capacity (Ibid). Thus, it requires that the top management is involved in the meeting.

Some scholars point out that the integration between demand and supply has not been performed effectively (e.g. Madhani, 2012; Jüttner et al., 2007). In many cases, the supply side appears to be disconnected from the demand side (Jüttner et al., 2007). As a result, supply managers have only a dim idea of the market situation or the driving forces of customer demand (Ibid). Jüttner et al. (2007) give an example from the study of Mentzer published in 2004. Mentzer’s findings show that the supply chain community do not have a well understanding about the concept of demand management. Mentzer (2004, cited in Jüttner et al., 2007) concludes that without an adequate understanding of the demand concept, the supply chain coordination and collaboration are not achievable. Another example given by Madhani (2012) is the disconnection of knowledge which regards Volvo’s situation in the mid of the 1990s. The supply side managers misunderstood that the customer demand for a green-coloured car is high; in fact, the sales persons influenced the demand for the green car product by offering discounts and giving rebates to distributors. It ended up that, in the end of its fiscal year, Volvo had a significant amount of inventory. Hence, it is crucial that individuals responsible for demand or supply processes understand all information, situations, and issues that both sides are facing, so that firms can effectively make strategic decisions (Esper et al., 2010). All in all, the most important element of the shared interpretation phase is the cross-functional collaboration, i.e. between supply-side personals and demand-side personals; therefore, it becomes vital for an effective demand and supply integration (Esper et al., 2010; Jüttner et al., 2007).

The integration and collaboration in the shared interpretation phase are referred to both intra-organisation and inter-organisation (Esper et al., 2010). Once the DSI process is
effectively in place within an organisation, the next step is to incorporate representatives from both, the supply side and the demand side of the manufacturer, to share information and knowledge (Esper et al., 2010). Quantity and quality aspects are important to successfully develop supplier partnerships (Heikkilä, 2002). While high quantity of information and knowledge is important, it is not the only condition for the successful integration: the quality aspect plays a crucial role as well (Ibid).

The benefit of achieving coordination and collaboration with supply chain partners is shown in the outperformances of the competitors in the performance areas, e.g. sales growth, market share, and return on assets (Deloitte Research, 2002). Uncertainty of demand is avoidable by reducing lead-times and increasing flexibility of the supply chain due to the flow of information which is shared through the demand side to the supply side (e.g. the operation) (Heikkilä, 2002). Consequently, important decision making regarding capacity (for example, inventory location) is made in order to evade demand uncertainty (Ibid). The location of inventory being stored and available production capacity are the main issues being solved (Ibid).

However, if information is not properly shared, it is possible that inventories exceed and are out of stock (Madhani, 2012). The latter situation leads to loss of market share and revenue (Ibid). Failing in shared interpretation is a critical barrier that hinders many processes such as optimising inventories, delivering the right value to customers, and product development opportunities (Ibid). Madhani (2012) states that this can lead to the following situations: under delivering, over delivering, and lost share of customer opportunities. Under-delivering causes the decline in customer satisfaction, while over-delivering leads to an unprofitable effort. Lost share of customer opportunities happens when both supply and demand side do not perform their job and end up with the inability to develop strategies that make a profitable offering to customers.

### 3.1.4 Key characteristics of DSI

As highlighted in the section about shared interpretation, one characteristic of DSI is that it is strongly linked to information sharing and information quality (Heikkilä, 2002). Hilletofth (2011) classifies eight characteristics of DSI which he derived from a literature review and through his case studies. The characteristics from Hilletofth (2011) explained below are outlined in order to improve the knowledge and the understanding of the DSI framework.
1. The market orientation, in other words customer focus, is an important aspect in DSI. It is essential that the whole supply chain is based on value creation and value delivering towards the end customer at a minimal cost level (cf. Esper et al., 2010).

2. The coordination of activities regarding demand and supply is another vital characteristic of DSI. Thereby, it is essential to know the most cost efficient way of creating and delivering customer value, and to find the best way to coordinate supply and demand (cf. Esper et al., 2010; Jüttner et al., 2007).

3. It is important that the processes of demand and supply are seen as equally significant. This equality implies that, for example, demand processes should not be given more attention to than to supply processes or vice versa.

4. The action of creating value should be taken into consideration not only in the supply activities, but also in the demand processes. This consideration should be done because companies do not only compete with the products self, but also with the delivering of the products and the customer services.

5. Companies, on the other hand, should also have differentiation in the demand and supply activities. It is recommended to differentiate between different products and between several supply chains in order to be competitive.

6. Innovativeness plays a crucial role in DSI because it creates opportunities for the company to enhance the product and supply chain differentiation. While on the demand-focused side innovations include new innovative products, innovations on the supply side are more connected to innovative supply chain solutions.

7. Also the responsiveness of DSI creates new opportunities for the company to improve product differentiation and supply chain differentiation. Responsiveness on the demand side refers more to the fast and responsive development of new products and on the supply side more to the fast and responsive delivery of the products.

8. The last characteristic regards the cost efficiency in DSI which means that all characteristics and activities in DSI should be done in the most cost-efficient way.
3.1.5 Advantages

Esper et al.’s (2010) framework of DSI includes the integration of supply chain management and marketing. Especially the supply management can gain huge advantages when the manufacturer improves DSI (Madhani, 2012). The first advantage refers to decreased lead times that can be achieved through DSI because the managers responsible for the supply coordinate more with the managers responsible for the demand and thus, the supply side is more aware about the actual demand (Ibid). Moreover, due to the information and integration sharing through the whole supply chain, the ability to deliver on time can be improved which leads to a better customer service (Ibid). In addition to that, there is an increase in the degree of responsiveness which leads to a faster development and delivery of new products (Madhani, 2012; Hilletofth, 2011). Furthermore, the demand management gets the opportunity to increase the sales volume with DSI because through the cooperation with the supply side knowledge about the product availability is gained (Madhani, 2012). Flexibility regarding products and on-time delivery can be expanded because of the coordination of demand and supply (Ibid). In addition to the aforementioned benefits, the inventory level can be decreased (Madhani, 2012; Heikkilä, 2002). Many supply chains suffer from the bullwhip effect because manufacturers order more from the suppliers than their customers’ demand is which means the more upstream a firm is the higher is its inventory (Heikkilä, 2002). An improved information flow can reduce this phenomenon due to its influence on plans regarding production, inventory, and delivering (Ibid). Therefore, it is essential for companies to coordinate their processes between all partners of the supply chain so that lead-times can be cut and with that inventory levels reduced (Ibid).

There are further advantages of the DSI framework. The customers’ satisfaction can be increased through DSI because the companies can keep their promises of on-time delivery, short lead-times, and high quality more easily (Madhani, 2012). Moreover, the operational efficiency can be improved because the optimised information flow through the integration leads to an enhanced capacity and resources utilisation (Ibid). Even the overall cost of the product in the supply chain can be cut and the customer value increased through the cooperation between the customers and the suppliers along the whole supply chain (Heikkilä, 2002). As it can be seen with all the aforementioned benefits, the manufacturer can improve its top and bottom line performance through the
introduction of DSI (Madhani, 2012; Esper et al., 2010). Manufacturers, on the other hand, can gain through those improvements even more competitive advantages such as flexibility towards customer demands (Madhani, 2012).

3.2 Environmental commitment

In recent time, environmental commitment within manufacturers has increased (Vachon, 2007). Environmental commitment is a way for manufacturers to show that they care about the environment (Chang, 2012; Henriques & Sadorsky, 1999). Adapting this type of commitment, a manufacturer can not only solve environmental problems, but also gain more competitive advantages (Chang, 2012; Porter & Van der Linde, 1995). There are numbers of research concerning environmental commitment of corporate in various areas. Henriques and Sadorsky (1999) conducted cluster analysis to group different types of environmentally committed firms. The results show that the firms with high environmental commitment do differ from the firms with a low environmental commitment profile (Henriques & Sadorsky, 1999). Another study conducted by Lynes and Dredge (2006) is investigating the forces for environmental commitment in the airline industry. Teng et al. (2014) point out the effect of being committed to environment on a short term and long term. Turning now to the study in Taiwan conducted by Chen and Chang (2013b); the effects of environmental commitment and green intangible assets on green competitive advantages are investigated. Notwithstanding various research related to environmental commitment, Figure 7 illustrates the concept of environmental commitment operationalised in this study. The three different dimensions, which are concerned as the measures of environmental commitment, are internal environmental commitment, external environmental commitment, and product-related environmental commitment. As it can be seen in Figure 7, the dimensions are in a nondirectional cycle which shows that they are equally important.
3.2.1 Internal environmental commitment

When manufacturers strengthen their environmental management, it is called environmental commitment (Chang & Lin, 2010; Roy & Thérin, 2008). In every business, environmental management starts internally with setting vision, mission, and strategies and plans (Chang & Lin, 2010). Therefore, the way approaching to prove whether manufacturers have environmental commitment, in this study, is starting from asking strategy-related questions guided by Henriques & Sadorsky (1999). Environmental plan, vision, and mission have been pointed out as an example for internal environmental management practices for a manufacturer that has environmental commitment (Henriques & Sadorsky, 1999). Manufacturers strive to show their environmental commitment (Chang, 2012); and the environmental commitment can be expressed through possessing and following different certificates and standards (Naturvårdsverket, 2014; Whitelaw, 2011). The regulations, certificates, and legalisations concerns factors like air quality, emission of air, waste, urban waste water, and chemicals (European Commission, 2015a; 2015b; 2015c; 2015d; Council Directive (2008/50/EC)). Examples of certificates and standards are as follows (for more detailed information, see Appendix A):

- EU Eco-Management and Audit Scheme (EMAS)
- EU Ecolabel
- The Global Organic Textile Standards (GOTS)
- The International Standards Organizations (ISO) 14001

![Environmental Commitment Diagram](image-url)
Furthermore, Henriques and Sadorsky (1999) implicitly underline that the communication with manufacturers’ employees, regarding the environmental plan and environmental standard, is essential. There are examples to show that when manufacturers obtain different certificates in order to prove that they care about environment, it implies that the manufacturers have created environmental standards or policies in order to get those certificates. One example is that a manufacturer can obtain EU Eco-Management and Audit Scheme (EMAS) and attaches an EMAS logo when it annually provides, e.g. environmental reports (European Commission, 2015e; Naturvårdsverket, 2014). Based on the described example of EMAS, the manufacturer has standards for providing environmental report. These standards can open up other possibilities for manufacturers, for instance, to reach out to their supply chain partners of how they deal with the environmental issues (Ottman, 2011). To clarify more about EMAS; it is a certificate that is closely related to ISO 14001 (International standards organisations) that concerns environmental management on an international level (Naturvårdsverket, 2014).

3.2.2 External environmental commitment

The second dimension is the external environmental commitment. Kirchoff et al. (2011) highlight environmental commitment as a strategy and include the supply chain relation as one. Regarding supply chain relations, green supply chain management (GSCM) has emerged as a concept that involves a broad perspective of environmental management and players in supply chains (Linton et al., 2007). GSCM is, according to Vachon and Klassen (2006) and Kannan et al. (2014), defined as a gathering of environmental practices in order to improve the environmental performances within the supply chain. It is, according to Ahi and Searcy (2013) and Lau (2011), important to adapt environmental practices such as harmful material reduction and green product design to increase the environmental performance within the supply chain. To manage the supply chain relations regarding environmental commitment in the supply chain, Chang (2012) mentions the green relationship learning.

Green relationship learning is defined as “companies’ learning activities in environmental management field by facilitating information exchange, developing
common learning arenas, and updating their behavior accordingly from their suppliers, customers, partners, and stakeholders, etc.” (Chang, 2012, p. 1145). Three items are employed to measure the green relationship learning of a manufacturer (Ibid). First, manufacturers need to share their information about environmental commitment with suitable suppliers (Ibid). Second, by inhaling information from other suppliers and customers, the manufacturers have knowledge about technologies and environmental trends in relation to their business and adjust the understanding to that common knowledge (Ibid). Third, the manufacturers have to cooperate with other suppliers and customers to analyse and evaluate environmental issues (Ibid). Ageron et al. (2012) mention that the environmental issues, when a company is sourcing, producing, and distributing, need to be considered and minimised through the whole material flow within the supply chain. Examples of environmental solutions are waste reduction, eco-design, reverse logistics and clean programs (Ibid). The manufacturers and their partners should be aware of the issues and the solutions, and consider them in order to be able to establish a green supply chain (Ibid). One way of showing green supply chain is to have the EU Ecolable on products. The EU Ecolabel is a voluntary scheme that supports manufacturers to show their environmental thinking throughout the production line (European Commission, 2015f).

3.2.3 Product-related environmental commitment

Another way of showing commitment to the environment is done through the product itself (Chang & Lin, 2010) which is the third dimension of the concept of environmental commitment in this study. The textile manufacturers and their customers have become more aware of the environment and demanded more of, for instance, organic products than before (Dawson, 2012). Therefore, the green product innovation regarding the environmental concerns of the product and its measures proposed by Chang (2012) are employed in this thesis. This dimension consists of three items (Ibid): First, the manufacturer considers using materials that consume as little energy and resources as possible in the product development and design phase. Second, the manufacturer tries to use as few amount of material as possible. Third and last, the manufacturer needs to evaluate the possibilities for the material and product to be recyclable and reusable.

There are different certificates which support that the textile manufacturers are concerned with the use of materials for products throughout the production line, e.g. the OEKO-TEX® Standard 100, the Global Organic Textile Standards (GOTS), and the
Intertek Eco-certification. The OEKO-TEX® Standard requires that there is no use of illegal substances and other substances with dangerous chemicals (OEKO-TEX®, 2013). GOTS focuses on the organic aspect of the product and that the handling of chemicals in dyes follow the criteria (Global Organic Textile Standard International Working Group, 2014), while Intertek Eco-certification is a certificate regarding the quality of the materials and affirms that the products follow the standards examined through different lab tests (Intertek, 2010).

3.3 Trust

Trust is defined as “the extent of expectation held by one party that can rely on the word, promise, or statement of another party” (Chen & Chang, 2013a, p. 67). In addition to this definition, trust is “a willingness to rely on an exchange partner in whom one has confidence” (Moorman et al., 1992, p. 315). Trust also refers to confidence that one organisation will conform the other organisation’s expectations (Hart & Saunders, 1997). Another aspect regards emotion and experience which, according to Pulido et al. (2014), embraces in and leads to a feeling of trust. To play fair or to show friendliness and helpfulness side can describe trust as well since it represents the emotional part of trust, that is benevolence (Peppers & Rogers, 2013; Halliburton & Poenaru, 2010). Confidence in the following three areas result in trust, according to Stoel and Muhanna (2012; cf. Chen & Chang, 2013a): integrity, benevolence, and ability.

Although trust is difficult to measure, there exists various research about trust on the integration. The study of Corbett et al. (1999) points out that trust is needed for a successful cooperative supply chain. Another research conducted by Kwon and Suh (2005) shows that trust is a root for a successful supply chain integration. In a similar way, Eng (2006) investigates the linkage between the organisational norms, in which trust is taken into account, and SCM performance. The results of Eng’s (2006) study (2006) implies that trust influences on supply chain responsiveness and company’s performance. In coherence, Li et al. (2007) study the impact of specific supplier development efforts on buyer competitive advantage and assert that trust has an impact on the operational effectiveness (quality and low cost perspectives) of purchasers. In addition, the recent research in China by Zhang and Huo (2013) indicates that trust on suppliers and customers significantly affect SCI.
Trust can be measured in different dimensions, according to the study of Whipple et al. (2013). They examine the articles related to trust research and assert that different researches measure trust in uni-dimension or multi-dimensions. This is supported by Li (2007, p. 423) that “despite disagreement over the specifics of trust, scholars share the view that trust is highly complex with multiple dimensions.” Moreover, Koeszegi (2004) asserts that trust is shown in both attitude and actions. The dimensions are considered because measures of trust are different regarding dimensional perspectives, scales, and the central point (Whipple et al., 2013). In this paper, we employ the multidimensional perspective.

In order to get an overview of what dimensions of trust can be, the following examples are provided. Paine (2003) highlights that dimensions of trust include, e.g. competence, integrity, dependability, openness, and satisfaction. Competence, integrity, and benevolence are used by Halliburton and Poenaru (2010) who not only show the dimensions in the trust construct, but also group them into two other dimensions: rational and emotional. Competence is considered to be rational, whereas integrity and benevolence are the matter of emotion (cf. Koeszegi, 2004). In the study of Kwon and Suh (2005), they operationalise trust to include the dimensions of honesty, benevolence, and competence. In addition to those examples, the review of the organisational literatures by McEvily and Tortoriello (2011) show the summary of the dimensions that appear in those literature, e.g. integrity, ability, benevolence, affective, cognitive, loyalty, openness, fairness, and reliability. Therefore in this study, we employ the dimensions competence/ability, integrity/honesty, openness, and benevolence in accordance with the study results of McEvily and Tortoriello (2011) that these dimensions are most operationalised. Moreover, Garbarino and Lee (2003) point out that the dimensions of competence and benevolence are most common. We then define the scope of each dimension as in Table 5.
Table 5: Definitions of the different dimensions of trust

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competence</td>
<td>The expectation on a company's ability to perform/keep what it promised (Paine, 2003). A company’s ability is based on its “capital, human resources, equipment, market strength, technology and other resources” (Wei &amp; Yucetepe, 2013, p. 569), for example, technical knowledge, in order to perform the tasks (Hosmer, 1995).</td>
</tr>
<tr>
<td>Integrity</td>
<td>The belief in one’s quality of being honest, fair, and truthful (Paine, 2003; Hosmer, 1995).</td>
</tr>
<tr>
<td>Benevolence</td>
<td>The perception of goodwill and willingness to protect, support, and encourage partners without a self-centered motive and interest in the partners' own benefits (Pepper &amp; Rogers, 2013; Wei &amp; Yucetepe, 2013; Garbarino &amp; Lee, 2003; Mayer et al., 1995).</td>
</tr>
<tr>
<td>Openness</td>
<td>“The willingness to share ideas and information freely” (Hosmer, 1995, p. 1994) and sincerely with partners, and appropriately discuss it (Paine, 2003).</td>
</tr>
</tbody>
</table>

Another fact that should be considered is that trust exists in different levels (Whipple et al., 2013; Paine, 2003). As trust is a result of interaction, trust appears in the relationship of interperson, organisation, interorganisation, and network (Ibid). In this research, we focus on the interorganisational level of trust as it is assumed to be an important factor to achieve high level of demand and supply integration (DSI).

3.4 Textile manufacturing industry in Germany

The activities of the textile manufacturing industry cover every step "from the transformation of fibres to yarns and fabrics to the production of a wide variety of products such as hi-tech synthetic yarns, wools, bed-linen, industrial filters, geotextiles, clothing etc." (European Commission, 2013a). In this thesis, we consider all activities in the textile manufacturing industry that belong to the sub-groups of manufacturing textiles in the database Orbis. This covers not only the preparation and spinning of textile fibres, the weaving of textiles, and the finishing of textiles, but also
the manufacturing of other textiles such as knitted and crocheted fabrics, carpets and rugs, or technical and industrial textiles.

Germany is one of the largest European producers within the textile manufacturing industry. The textile manufacturing industry market in Germany has a value of over 11 billion US dollars in 2013 and employs more than 40 million people (BMWI, 2015; MarketLine, 2014). As it can be seen in Figure 8, the growth rate of the German textile manufacturing industry had up- and downturns between 2009 and 2013. However, in average the industry grew annual by 3.6 percent in Germany (MarketLine, 2014). Thereby, the fabrics production covered 86 percent and the yarns production 14 percent in 2013 of the total German market value (MarketLine, 2014).

![Graph showing the growth rate of the German textile manufacturing industry from 2009 to 2013.](image)

**Figure 8: Germany textile mills market value: $ dollars, 2009-13, MarketLine, 2014, p. 8**

The German textile industry can be divided into two main sectors which are clothing and textiles (iXPOS, 2014). While the fashion and clothing sector covers 40 percent of the total industry turnover in Germany, the remaining 60 percent belong to the textiles section (Ibid). Moreover, the German textiles can be split into house and home textiles, and technical textiles (Ibid). The most important sector in the German textile manufacturing industry is the technical textiles segment in which Germany is the world-leader (Fashionunited, 2015). Technical textiles are used, for example, in the cars and transport industry or in medical areas such as hospitals and include “high tenacity yarns, or special elastic or coated fabrics” (European Commission, 2013b, para. 1).
Germany with its export value of 25 billion Euros in 2014 (which is around 26.25 billion dollars) is the world leader for technical textiles with a market share of 45 percent (Gesamtverband textil+mode, 2015; iXPOS, 2014). Most of Germany’s exports of textiles stay in the European Union (BMWI, 2015; Gesamtverband textil+mode, 2015). However, due to the increased political uncertainty Germany experienced a decline of sales in the export market to Russia, who is after the United States and the European Union the third biggest importer of German textiles worldwide (Gesamtverband textil+mode, 2015). Other threats that the German textile manufacturing industry has to deal with are the high tariff rates, the increasing energy costs in Germany, the lack of uniform standards all over the world, and the limited free trade (Ibid).
4. Research framework and hypotheses development

This chapter is about concluding the theory from the theoretical framework chapter, adjusting it towards our research questions and formulating hypotheses. In the first research question, we want to know how environmental commitment of textile manufacturers in Germany influences the extent of demand and supply integration (DSI). The second research question, on the other hand, is about how trust of German textile manufacturers influences the extent of DSI.

4.1 Influence of environmental commitment on DSI

To provide the framework for the first research question, the literature regarding the environmental commitment, green supply chain management (GSCM), and the DSI framework are drawn. In the light of environmental concerning, manufacturers show their commitment to environment in order to survive in the fierce market situation (Chang, 2012; Porter & Van der Linde, 1995). In such a situation, environmental concerns from customers have increased nowadays and are seen as a critical factor for the competitiveness (Ibid). Customers seek for environmental-friendly products without, for example, any harmful chemical substances (Dawson, 2012; cf. Ahi & Searcy, 2013; Lau, 2011). Furthermore, customers are getting more and more aware about the negative influence of manufacturing products on the environment (e.g. Bingkley, 2009 cited in Kirchoff et al., 2011, p. 684).

DSI emphasises on the integration with shared interpretation not only across the firms, but also within a firm (Esper et al., 2010). Conceptually, it can serve as an environmental management practice that firms adopting GSCM can deploy (Kirchoff et al., 2011). GSCM has emerged as a concept that involves a broad perspective of environmental management and players in supply chains (Linton et al., 2007). GSCM comprises of a set of environmental practices that help companies improving the performances regarding the environmental aspects within the supply chain.
(Kannan et al., 2014; Vachon & Klassen, 2006). Correspondingly, the manufacturers have to ensure not only the product itself to be environmental-friendly, but also the processes behind it that reflect the customers’ requirements (including, for example, sourcing, product design and development, production, choices of materials) (Ageron et al., 2012). In this study, the aforementioned examples of processes refer to the supply management that covers the supply side activities.

Under those circumstances, DSI is a key tool in the process of creating customer values and delivering those (Kirchoff et al., 2011). The demand and supply integration has several advantages as mentioned in chapter 3.1.5 (Madhani, 2012; Hilletoft, 2011; Heikkilä, 2002). These advantages, for instance, reducing the bullwhip-effect, enhancing on-time delivery, reducing lead-times, or improving the customer service, can be crucial to the performance of a manufacturer surrounded by a high competitive environment (Ibid). The textile manufacturing industry is in such a competitive environment as it can be seen that in the coming years the demand of textile products is expected to increase due to the rise of the world population and the economic growth (Schindler, 2014). Therefore, we expect that this will also have influence on the German textile manufacturing market. Merging the collective information; within such a high competitive situation and concerning the environment, the DSI framework can support the manufacturers to be competitive not only in financial terms, but also in environmental commitment.

Speaking of environmental commitment, manufacturers can show it in different ways. First, environmental commitment is illustrated internally in form of a manufacturer’s plan including vision, mission, and strategies towards environmental concerns (Chang & Lin, 2010), and in form of the achieved environmental certificates (Naturvårdsverket, 2014; Whitelaw, 2011). This environmental plan is more directed towards environmental aspects such as air pollution and waste water (European Commission, 2015a; 2015b; 2015c; 2015d; Council Directive, 2008/50/EC). Second, environmental commitment can be expressed externally in form of the environmental management within a manufacturer and its supply chain; this refers to GSCM (Kirchoff et al., 2011). We use the green relationship learning (Chang, 2012) as a measure representing GSCM. Third, the most obvious expression for environmental commitment is conveyed through the product itself (Chang, 2012); in this research we name it product-related environmental commitment. We employ
the criteria of green product innovation proposed by Chang (2012). In order to achieve a green innovative product, the manufacturers can be aware of these criteria regarding recyclable material and usage of minimum amount of material. To be even more competitive, it is important that the manufacturers share the same goals regarding the environment (Chang, 2012; cf. Ottman, 2011).

In our opinion, DSI is getting more and more important due to its significant competitive advantages. The cooperation not only between the departments inside the company, but also between the company and its suppliers and customers leads to major improvements of the supply chain performance (Madhani, 2012; Esper et al., 2010). Especially, the environmental drawbacks of the textile manufacturing industry could be reduced through the integration of customer demand and supply constraints. We propose that environmental commitment can be a reason for the German textile manufacturers to optimise DSI within their supply chain. However, environmental commitment is not the only force for improving the balance and cooperation of demand and supply. Thus, we would like to know how environmental commitment influences the extent of DSI in the German textile manufacturing industry.

Based on the provided theory about environmental commitment, which is expressed through the products and processes, environmental commitment can be a striving force for a higher extent of DSI as we propose that it requires that a manufacturer and its partners share interpretation. For example, the green relationship learning includes communication and dissemination of the information between supply chain partners. We suppose that the involved partners share the same understanding in the green relationship learning practices. This understanding can be achieved through the process of shared interpretation, which is the crucial part of the DSI process. Another example is that when the manufacturer shows its product-related environmental commitment, which we call this practice as green product innovation, the need for the same understanding of the customers’ requirements and the supply capabilities are necessary. This necessity can be done through the phase of shared interpretation of DSI. Therefore, we test the following hypothesis:

$$H_1: \text{The higher environmental commitment in the German textile manufacturing industry towards their main first-tier supply chain partners, the higher the extent of DSI is.}$$
4.2 Influence of trust on DSI

To provide framework for the second research question, the literature regarding trust and the DSI framework are drawn. The demand and supply chain integration is one of the forms of integration besides, for example, supply chain integration (SCI). Some studies have already proved that integration in general requires trust as an accelerator (e.g. Zhang & Huo, 2013; Kwon & Suh, 2005). Therefore, we have basic knowledge that trust has influence on the extent of integration. The DSI framework is created for helping balancing the demand and supply in the strategic level (Esper et al., 2010). The core phase of DSI is the share of interpretation not only within the manufacturing company self, but also within the whole textile supply chain (cf. Esper et al., 2010). In order to be able to share interpretation, a close collaboration of all potential supply chain partners is needed (Panayides and Venus Lun, 2009; Fang et al., 2008; Li, 2007; Eng, 2006). To be able to collaborate, Brattström and Richtnér (2014) highlight that trust between partners firms is important. We propose that in order to exploit the idea of the DSI framework, trust between organisations is required. Generally, trust exists in different relationships, for example, interperson, interorganisation, and network (Whipple et al., 2013; Paine, 2003). Nonetheless, the research is designed to explore the manufacturers in the textile industry and their main first-tier suppliers and customers, that is, it is in the business-to-business context. While trust can be measured in different dimensions (Whipple et al., 2013; McEvily & Tortoriello, 2011; Halliburton & Poenaru, 2010; Kwon and Suh, 2005; Garbarino & Lee, 2003; Paine, 2003), four dimensions support the theory of trust in this thesis; which are competence, integrity, benevolence, and openness. Through these dimensions the level of trust can be measured. We scoped this mechanism a triadic one which means that trust of the manufacturers on their main first-tier suppliers and customers is investigated as it can be seen in Figure 9 that the arrows represent trust from the manufacturers' perspective.

![Figure 9: Scope of trust in this thesis](image-url)
We propose that there is an influence from the independent variable trust (measured with the dimensions of competence, integrity, openness, and benevolence) on the extent of the dependent variable DSI, based on the aforementioned argument in the research framework. Therefore, we test the following hypothesis:

$$H_2: \text{The higher the trust within the German textile manufacturing industry towards the manufacturers’ main first-tier supply chain partners, the higher the extent of DSI is.}$$
5. Empirical findings

This chapter is about the empirical findings. First, we explain how we handle the response rate of the conducted survey and how we cope with the nonresponses. Second, we prepare the data by coding it, and dealing with the missing values and the outliers. Third, we perform an internal reliability analysis with the help of Cronbach’s alpha. Finally, we describe the findings of the general questions through appropriate figures such as pie charts.

5.1 Handling response issues

The questionnaire (see Appendix B) was sent out to 982 German textile manufacturers with the help of the software Artologik’s Survey&Report. The software makes it possible to import the email addresses, generated from the database Orbis, and to send out the survey including the content of the email to the population. Since we are aware of the risk of getting low response using the web survey, we cope with the issue in various ways. First, since Orbis mainly provides the general email addresses of the manufacturers (e.g., info@ABC.de), we additionally checked the websites of all manufacturers within the population. Moreover, we added email addresses found on the manufacturers’ websites including email addresses from CEOs, managing directors, and managers in order to increase the response rate. Second, seven reminders have been sent out via Survey&Report to the manufacturers that have not participated until then. Third, we called some manufacturers randomly, but since this was not successful we focused on email addresses instead. Finally, in the informed consent, we offered the executive summary report of this study as an incentive for the ones who participates.

Altogether, a response rate of only 5.6 percent of the defined population was reached. Aaker et al. (2011) point out that a 90 percent nonresponse in surveys done through emails is quite common. We expected a low response rate due to the facts that emails were first sent out to general addresses of manufacturers, that the time
horizon of this thesis is limited, and that the native language of Germans is not English, but German. However, in order to avoid nonresponse bias, we need to make sure that the respondents do not significantly differ from the nonresponses in order to draw conclusions about the whole population. Therefore, the technique of comparing respondents to nonrespondents is applied (Wagner & Kemmerling, 2010). Characteristics of respondents and nonrespondents, for instance, firm size, number of employees, turnover, and industry types (Wagner & Kemmerling, 2010; Forslund & Jonsson, 2009), are statistically compared by using the chi square test for independence.

We test the nonresponse bias regarding the variables ‘segment of the textile manufacturing industry’ and ‘manufacturer size’ based on number of employees. Information about these two variables for the nonrespondents and the respondents can be extracted from the database Orbis. Since we do not have a 2 by 2 table (our variables size and section have several parameters), the relevant value for us is the Pearson Chi-Square from the Chi-Square Tests table (Pallant, 2013).

*Table 6: Chi-Square Tests for independence of response and industry*

<table>
<thead>
<tr>
<th>Chi-Square Tests</th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>2.977</td>
<td>4</td>
<td>.562</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>3.040</td>
<td>4</td>
<td>.551</td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>.011</td>
<td>1</td>
<td>.916</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>982</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In Table 6, the respondents and nonrespondents are compared regarding the variable ‘segment of the textile manufacturing industry’. The Pearson Chi-Square value is 2.977 with an associated significance level of 0.562. Since the significance level of 0.562 is higher than the *p*-value (*α*) of 0.05, the result is not significant. Therefore, the proportion of respondents in each industry segment does not differ from the proportion of nonrespondents in each industry segment which means that no significant difference between respondents and nonrespondents is found.
Table 7: Chi-Square Tests for independence of response and company size

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>0.214*</td>
<td>3</td>
<td>0.975</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>0.216</td>
<td>3</td>
<td>0.975</td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>0.156</td>
<td>1</td>
<td>0.863</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>982</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. 1 cells (12.5%) have expected count less than 5. The minimum expected count is 4.70.

In Table 7, the respondents and nonrespondents are compared regarding the variable ‘manufacturer size’. The Pearson Chi-Square value is 0.214 with an associated significance level of 0.975. Since the significance level of 0.975 is higher than the p-value (α) of 0.05, the result is not significant. Therefore, the proportion of respondents in different sizes of manufacturers does not differ from the proportion of nonrespondents in different sizes of manufacturers which means that no significant difference between respondents and nonrespondents is found.

5.2 Data preparation

The data needs to be prepared (Kothari & Garg, 2014). This step includes coding the data, dealing with missing values, and checking outliers (Ibid). The data was collected via Artologik’s Survey&Report software which has the option to export the data directly to the software IBM SPSS Statistics 22 (in the following referred to SPSS). Even though SPSS already codes the data for us, we made some adjustments regarding the variable labels and names, and regarding the values (for more information, see Appendix C).

After having a closer look to the data set, we discover that there are no missing values. The absence of missing values is reasonable since all questions concerning the analysis are mandatory to answer. The only question that is voluntarily is the option to enter the email address of the respondent in order to receive an executive summary. Therefore, we do not have to deal with missing values.

The next step is to check for outliers. The checking is necessary since many analysing techniques are sensitive towards outliers (Pallant, 2013). An outlier is defined as a value that is extremely above or extremely below the average value.
(Robson, 2011). SPSS labels outliers that exceed 1.5 box-lengths measured from the edge of the box with a little circle (Pallant, 2013). Outliers that are marked with an asterisk exceed 3 box-lengths measured from the edge of the box (Ibid). In this thesis, nine potential outliers have been discovered. They fall under three variables which are TS4, TS5, and DSI_S1 (see Appendix C for explanation of the variables). In order to find out if those potential outliers are real outliers, the 5% Trimmed Mean value of those three variables is compared to their mean values (Pallant, 2013). In our case, the 5% Trimmed Mean Value of TS4, TS5, and DSI_S1 are 5.36, 5.40, and 4.32 respectively, and their mean values are 5.31, 5.33, and 4.29 respectively. It was found that those three 5% Trimmed Mean Values do not significantly differ from their mean values which means that the nine cases can be kept for the analysis.

5.3 **Internal reliability analysis**

In this thesis, Cronbach’s alpha is used for the internal reliability analysis. The higher Cronbach’s alpha, the higher is the inter-item reliability (Robson, 2011). Due to our research questions and hypotheses, we define the following constructs: environmental commitment, trust, and demand and supply integration (DSI).

The results from Cronbach’s alpha are derived from the Tables 16 to 18 (see Appendix D) and are depicted in the following table. From Table 8, it can be seen that the Cronbach’s alpha are in the range between 0.886 and 0.952 which means that the questionnaire used for these variables are highly to very highly reliable (Pallant, 2013; Cohen et al., 2011). The Tables 17 and 18 show that even after deleting a specific variable within the constructs trust and DSI the overall Cronbach’s alpha of these constructs cannot be increased. The construct environmental commitment, on the other hand, could generate a higher Cronbach’s alpha if the variables EC5 and EC6 (see Appendix C for explanation of the variables) would be deleted. Due to the facts that the overall Cronbach’s alpha of the construct environmental commitment is higher than 0.7 and the Corrected Item-Total Correlations of the variables EC5 and EC6 are higher than 0.3, no removal of the variables is necessary (Pallant, 2013).
Table 8: Cronbach's alpha of the three variables in this thesis

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Environmental commitment</th>
<th>Trust</th>
<th>DSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Cronbach’s alpha</td>
<td>0.886</td>
<td>0.934</td>
<td>0.952</td>
</tr>
</tbody>
</table>

5.4 Descriptive of findings

In the following section, our findings of the general questionnaire variables are described. The first question, manufacturer’s location, is not described since it was asked to ensure that every respondent manufacturer is located in Germany.

![Position in the company](chart.png)

Figure 10: Distribution of the job positions

For describing the job position of the respondents themselves inside their company, a pie chart is used. Figure 10 above demonstrates that most of the participants, namely 43.64 per cent, are CEOs. The second largest group is the manager position with 25.45 per cent, followed by the directors with 23.64 per cent. The rest of the participants, 7.27 per cent, are neither a CEO nor a manager nor a director.
The third question about the different segments of the textile manufacturing industry is formulated as a checkbox question with the possibility to give multiple responses.

As it can be seen from Figure 11 above, some textile manufacturers operate in several textile manufacturing industry segments. The majority of the respondents is working within the finishing of textiles (42.9 per cent), followed closely by manufacture of technical industries and manufacture of other textiles which each reach 37.5 per cent. The weaving of textiles and the preparation and spinning of textile fibres were the two industries with lowest responses (30.4 and 12.5 per cent, respectively).

Figure 12 illustrates the number of employees of the manufacture that the respondent works for. This question is asked in order to receive the size of the company. Companies with less than ten employees, which are equal to the micro-sized companies, are counted for 7.27 per cent, and the companies with 10-19 employees (small-sized) reach 36.36 per cent. Furthermore, the companies with 50-249 employees (medium-sized) stretch to a total of 45.45 per cent, while only 10.91 per cent of the German textile manufacturers are large-sized companies with 250 or more employees.
Figure 12: Distribution of employee numbers

- 45.45%: Less than 10 employees
- 36.36%: 10 - 49 employees
- 7.27%: 50 - 249 employees
- 10.91%: 250 or more employees
6. Analyses

This chapter is about the analyses regarding the two research questions. The analysis technique used in this thesis is the simple linear regression. This section is structured as follows: The first section is about how we prepared the variables for the analyses. The second section is regarding the analysis of the first research question which examines the influence of environmental commitment on the extent of the demand and supply integration (DSI). In the third section, the second research question regarding the influence of trust on the extent of DSI is investigated. Finally, the chapter concludes the previous gathered results with a summary of the analyses.

6.1 Preparation

Before we can perform any analysis with our raw data, we need to do a few steps of preparations. We need to group our variables so that we get one dependent variable and two independent variables. The dependent variable refers to the demand and supply integration variable which is the fundament of both research questions. The first independent variable, environmental commitment, is the subject of the first hypothesis, while the second independent variable, trust, is the subject of the second hypothesis. In order to gain those three variables, we summed up the values of the Likert scales from the questions of each construct and standardised the summed up values which means that we transformed it to z-score values.

6.2 Analysis: Influence of environmental commitment on DSI

Research question one, which is “How does environmental commitment influence the demand and supply integration of textile manufacturers in Germany?”, is answered by testing the hypothesis of “the higher environmental commitment in the German textile manufacturing industry towards their main first-tier supply chain partners, the higher the extent of DSI is”. The simple linear regression analysis is applied to test this hypothesis. By using simple linear regression, the null hypothesis and alternative hypothesis are stated as follows (Laerd statistics, 2013):
The null hypothesis is that the regression coefficient (β₁) of environmental commitment is equal to zero. The meaning of the null hypothesis is that the independent variable environmental commitment has no explanatory power on the dependent variable DSI. Thus, there is no relationship between them. The alternative hypothesis is stated in the opposite way. We have to test several assumptions both before running the analysis and during the analysis when using simple linear regression (Laerd statistics, 2013). The assumptions are explained in the following paragraphs.

Figure 13: Test of linear relationship between environmental commitment and DSI

The first assumption that has to be tested is that there is a linear relationship between environmental commitment and the extent of DSI. The scatterplot in Figure 13 presents that there seems to be a positive linear relationship indicating that linear regression is an appropriate analysis technique.
The second assumption, homoscedasticity of residuals, is proved through the scatterplot (Laerd statistics, 2013). As it can be seen from Figure 14, the regression standardised residual scores are spread horizontally over the x-axis as it should be to fulfil the assumption.
The third and last assumption is that the residuals are normally distributed (Laerd statistics, 2013). The Normal P-P plot of regression standardised residuals is considered in order to check the assumption. In this case, the residuals are normally distributed as it can be seen from Figure 15, the Normal P-P plot, that the scores are plotted along the diagonal line. With the third assumption, all assumptions have been proved so that simple linear regression analysis can be used.

**Table 9: Simple linear regression results of DSI and environmental commitment**

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Dependent variable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DSI</td>
</tr>
<tr>
<td></td>
<td>Standardised coefficient</td>
</tr>
<tr>
<td>Environmental Commitment</td>
<td>0.628</td>
</tr>
<tr>
<td>$R$</td>
<td>0.628</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.394</td>
</tr>
<tr>
<td>$F$-statistics</td>
<td>34.501</td>
</tr>
<tr>
<td>Significance</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Table 9 shows the results of the simple linear regression analysis of the dependent variable DSI and the independent variable environmental commitment. The hypothesis of simple linear regression analysis is tested through the $F$-statistic which
is equal 34.501 with a significance value of less than 0.0005. The $F$-statistic tests the hypothesis of whether the independent variable environmental commitment has explanatory power on the dependent variable DSI or not (Chatterjee & Hadi, 2006). If the $F$-statistic is significant, the null hypothesis can be rejected (Ibid). In our case, the significance value of $F$-statistic is less than 0.0005 which is lower than the $p$-value ($\alpha$) of 0.05 which means the $F$-statistic is significant. Therefore, we reject the null hypothesis and accept the alternative hypothesis which means that environmental commitment has explanatory power on DSI.

The result of the $F$-statistic is supported by the $R$ squared value which is shown in Table 9. The $R$ squared value indicates that the linear relationship between environmental commitment and DSI is moderate. The range of $R$ squared is from 0 to 1 where the value 1 indicates that there exists a strong linear relationship between the variables (Chatterjee & Hadi, 2006). In our model, the $R$ squared value is 0.394 and with that not so close to 0, rather close to the middle. Therefore, we somewhat have a positive linear relationship between environmental commitment and DSI. This linear relationship with the $R$ squared value of 0.394 tells that in the German textile manufacturing industry, 39.4 per cent of the variability of the dependent variable DSI is explained by the independent variable environmental commitment.

From the results of the simple linear regression analysis, the null hypothesis is rejected. This rejection implies that environmental commitment of German textile manufacturers has explanatory power on the extent of DSI. Therefore, our research framework hypothesis, the higher environmental commitment is, the higher the extent of DSI, seems to be confirmed.

### 6.3 Analysis: Influence of trust on DSI

Research question two, which is “How does trust influence the demand and supply integration of textile manufacturers in Germany?”, is answered by testing the hypothesis of “the higher the trust within the German textile manufacturing industry towards the manufacturers main first-tier supply chain partners, the higher the extent of DSI is”. The simple linear regression analysis is applied to test this hypothesis. By using simple linear regression, the null hypothesis and alternative hypothesis are stated as follows (Laerd statistics, 2013):
The null hypothesis is that the regression coefficient ($\beta_1$) of trust is equal to zero. The meaning of the null hypothesis is that the independent variable trust has no explanatory power to the dependent variable DSI. Thus, there is no relationship between them. The alternative hypothesis is stated in the opposite way. We have to test several assumptions both before running the analysis and during the analysis, when using simple linear regression, (Laerd statistics, 2013). The assumptions are explained in the following paragraphs.

![Test of linear relationship between DSI and trust](image)

**Figure 16: Test of linear relationship between trust and DSI**

The first assumption that has to be tested is that there is a linear relationship between trust and DSI. The scatterplot presents that there seems to be a positive linear relationship (see Figure 16) indicating that the linear regression analysis seems to fit for the influence of trust on the extent of DSI.
The second assumption, homoscedasticity of residuals, is proved through the scatterplot (Laerd statistics, 2013). As it can be seen from the scatterplot in Figure 17, the regression standardised residual scores are spread horizontally over the x-axis as it should be to fulfil the assumption.
The third and last assumption is that the residuals are normally distributed (Laerd statistics, 2013). The Normal P-P plot of regression standardised residuals is considered in order to check the assumption. In this case, the residuals are normally distributed as it can be seen in the Normal P-P plot that the scores are plotted along the diagonal line (see Figure 18). With this assumption, all assumptions have been proved so that simple linear regression analysis can be used.

Table 10: Simple linear regression results of DSI and trust

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Dependent variable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DSI</td>
</tr>
<tr>
<td></td>
<td>Standardised coefficient</td>
</tr>
<tr>
<td></td>
<td>Sig.</td>
</tr>
<tr>
<td>Trust</td>
<td></td>
</tr>
<tr>
<td>$R$</td>
<td>0.238</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.056</td>
</tr>
<tr>
<td>$F$-statistics</td>
<td>3.171</td>
</tr>
<tr>
<td>Significance</td>
<td>0.810</td>
</tr>
</tbody>
</table>
Table 10 shows the results of the simple linear regression analysis of the dependent variable DSI and the independent variable trust. The hypothesis of simple linear regression analysis is tested through the $F$-statistic which is equal to 3.171 with a significance value of 0.81. The $F$-statistic tests the hypothesis of whether the independent variable trust has explanatory power on the dependent variable DSI or not (Chatterjee & Hadi, 2006). If the $F$-statistic is significant, the null hypothesis can be rejected (Ibid). In our case, the significance value of $F$-statistic is 0.81 which is higher than the $p$-value ($\alpha$) of 0.05 which means the $F$-statistic is not significant. Therefore, we reject the alternative hypothesis and accept the null hypothesis which means that trust has no explanatory power on DSI.

The result of the $F$-statistic is supported by $R$ squared value which is shown in Table 7. The $R$ squared value indicates as well that the positive linear relationship between trust and DSI is weak. The range of $R$ squared is from 0 to 1 where the value 1 indicates that there exists a strong linear relationship between the variables (Chatterjee & Hadi, 2006). In our model, the $R$ squared value is 0.056 and with that close to 0. Therefore, we hardly have any positive linear relationship between trust and the extent of DSI. This positive linear relationship with the $R$ squared value of 0.056 tells that in the German textile manufacturing industry, only 5.6 per cent of the variability of the dependent variable DSI is explained by the independent variable trust.

The null hypothesis is accepted due to the result of the simple linear regression analysis. The acceptance indicates that trust has no explanatory power on the extent of DSI when using the simple linear regression model. However, all assumptions are proved to be valid to run the simple linear regression. In addition, the $R$ squared value signals that there is somewhat a weak linear relationship between trust and the extent of DSI. Therefore, our hypothesis from the research framework which is stated as the higher trust is, the higher the extent of DSI, can neither be confirmed nor falsified.
6.4 Summary of analysis

Figure 19 shows the overview of the independent variables (environmental commitment and trust), the dependent variable (demand and supply integration), together with two hypotheses (H₁ and H₂) that are tested separately. H₁ is the hypothesis which is made in order to answer the research question one regarding the influence of environmental commitment on the extent of DSI, while H₂ is the hypothesis for answering the research question two concerning trust and its influence on the extent of DSI.

Table 11: Summary of the linear regression results of this thesis

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Dependent variable</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DSI</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Standardised coefficient</td>
</tr>
<tr>
<td>Trust</td>
<td></td>
<td>0.238</td>
</tr>
<tr>
<td>R</td>
<td></td>
<td>0.238</td>
</tr>
<tr>
<td>R²</td>
<td></td>
<td>0.056</td>
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<tr>
<td>F-statistics</td>
<td></td>
<td>3.171</td>
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<tr>
<td>Significance</td>
<td></td>
<td>0.810</td>
</tr>
<tr>
<td>Environmental Commitment</td>
<td></td>
<td>0.628</td>
</tr>
<tr>
<td>R</td>
<td></td>
<td>0.628</td>
</tr>
<tr>
<td>R²</td>
<td></td>
<td>0.394</td>
</tr>
<tr>
<td>F-statistics</td>
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<td>34.501</td>
</tr>
<tr>
<td>Significance</td>
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<tr>
<td>Significance</td>
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</tbody>
</table>
In the summary table (Table 11) regarding the variables, we can see the differences of the influence of the independent variables on the dependent variable. Trust has a noticeable higher significance value of 0.81 compared to the \( p \)-value \((\alpha) = 0.05\) which is therefore proved that linear relationship between trust and the extent of DSI does not exist. On the other hand, the significant value of environmental commitment is equal to less than 0.0005, and is lower than the \( p \)-value \((\alpha)\) of 0.05. The significant value of the linear model for environmental commitment and the extent of DSI indicates that there is a linear relationship between them. The \( R \) squared value of trust (0.056) indicates that the linear relationship between trust and the extent of DSI is weak. While the tests of all assumptions lead to the simple linear regression analysis, the \( R \) squared value of environmental commitment (0.394) infers that there is a moderate linear relationship between environmental commitment and the extent of DSI. Therefore, we can confirm the influence of environmental commitment on the extent of DSI and we can neither confirm nor falsify the influence of trust on the extent of DSI.
7. Discussions

Chapter 7 regards deep discussions of the research questions together with the theoretical framework, the empirical findings, and the results of analyses. The chapter is divided into two parts. First is the discussion about the influence of environmental commitment on the extent of demand and supply integration (DSI). The second discussion is concerned the influence of trust on the extent of DSI.

7.1 Discussion: Influence of environmental commitment on DSI

This research explores the influence of environmental commitment of German textile manufacturers and its main first-tier suppliers and customers on the extent of DSI. Therefore, we tested the hypothesis that a higher level of environmental commitment results in a higher extent of DSI. There are research about how environmental commitment influences the product innovation (Chang, 2012), how competitive advantage is affected by being committed to environment (Chen & Chang, 2013b), and how environmental commitment impacts on a company’s economic performances (Teng et al., 2014). Nonetheless, we found no research in the area of investigating environmental commitment on the integration, especially not on the demand and supply integration framework proposed by Esper et al. (2010). This research investigates this gap. However, due to our low response rate, we cannot draw definite conclusions, rather the directions. Despite the low response rate, the empirical results we got support our hypothesis that the environmental commitment of the manufacturers positively influences the extent of DSI that the German textile manufacturers have. According to this result, German textile manufacturers with a higher degree of environmental commitment seem to have a higher extent of DSI. On the other hand, German textile manufacturers with a lower level of environmental commitment are more likely to have a lower extent of DSI.

Our result is supported through the following ideas. The thesis operationalises the concept of environmental commitment and constructs three dimensions as the
measurements of the concept. Previous researchers have opened up the discussion regarding the impact of environmental commitment not only within the company itself (Chang & Lin, 2010), but also within the supply chain (Ahi & Searcy, 2013; Lau, 2011; Linton et al., 2007). Thus, in our research, the three dimensions are the internal, external, and product-related environmental commitment.

The textile manufacturing industry is an industry where the importance of delivering environmental products has increased (cf. Dawson, 2012). With the increase in demand for environmental-friendly products and in the awareness of manufacturing processes of products, it is becoming more important for the German textile manufacturers to be committed along the supply chain and care more about the production of green products. One of the defined dimensions, which concerns the product itself, is the green product innovation. Through the green product innovation, we can see that the knowledge, information, and action within the German textile manufacturers and their partners need to be homogeneous in order to deliver optimal environmental products. According to Dawson (2012), customers are willing to pay 10 to 15 per cent more for environmental products. However, the manufacture and development of environmental-friendly products is costly (Dangelico et al., 2013; Barari et al., 2012). In order to decrease the costs, manufacturers can use the framework of DSI which has the advantage that costs can be cut through the collaboration along the supply chain (Heikkilä, 2002). This relationship implies that the environmental-friendly the products of a textile manufacturing supply chain are, the higher is the extent of DSI in the supply chain self.

Certificates are one way for companies to show internal environmental commitment and these certificates have different criteria depending on the certificate itself. The textile industry has encountered environmental issues where they need to be more committed to environment and the certificates might help them to display this. Environmental issues that can be considered are, for example, pollution and waste. Thus, one of the aspects of environmental commitment is to minimise the waste. As far as we are concerned, supply chains suffer quite often from the bullwhip effect due to the uncertainty of demand (Heikkilä, 2002). The textile manufacturers can reduce the uncertainty by having demand and supply integration. Manufacturers with a high extent of DSI are supposed to have high accuracy of demand forecasts because they continuously exchange information and understanding along the supply chain. An
accurate demand forecast, on the other hand, is needed in order to reduce the bullwhip effect. Thus, a textile manufacturer that has a higher level of internal environmental commitment is most likely to have as well a higher level of DSI.

Customers are more aware of products themselves and the manufacturing processes of them (e.g. Dewey, 2014). It is essential for the German textile manufacturers to be committed along the supply chain and care more about the product design and production phases. We suppose that the external environmental commitment, concerning environmental information sharing and commitment throughout the supply chain, is vital in order to create an environmental committed supply chain. The phenomenon, we use to describe information sharing, is green relationship learning (cf. Chang, 2012). When exchanging and understanding information within the supply chain, it can indicate that the higher level of sharing, i.e. the green relationship learning, the more it will affect the extent of DSI positively.

All in all as discussed above, the three dimensions are supposed to have positive effects on the extent of DSI. These positive effects imply that environmental commitment, which is measured with these three dimensions in this thesis, has as well a positive effect on the extent of DSI. Our empirical findings, derived from a survey conducted in the German textile manufacturing industry, indicate that there is a positive relation between environmental commitment and DSI. Thus, regarding the limitations, our hypothesis seems to be approved. However, it might be necessary to test whether the sub-hypotheses stated in this chapter are valid as well in future research.

Our empirical findings open up for further research. Most importantly, as highlighted in the first paragraph of this discussion, our results are only based on a low response rate which means that our findings are only indicators and determined conclusions cannot be drawn. Therefore, it is vital to re-investigate the hypothesis by confirming or, if necessary, falsifying it. Moreover, the limitations of this research are both geographical and industrial. Follow-up studies are possible in other countries in different regions such as Europe, Asia or Africa. By the same token, other industries could be investigated, for example, the automobile industry, the pharmacy industry, and the food industry because the results might differ from industry to industry.
Other research opportunities are explained as follows. The dimensions have the purpose of orientation and give an overview what could be considered when environmental commitment is measured. There are other ways to measure environmental commitment and one option is to investigate more, for example, the intensiveness of environmental practices the manufacturers have set. One of the environmental practices is, for instance, the development of pollution prevention technologies (Vachon & Klassen, 2006), which could be topic for other research.

7.2 Discussion: Influence of trust on DSI

This research explores the influence of trust of German textile manufacturers and their main first-tier suppliers and customers on the extent of DSI. We tested the hypothesis that a higher level of trust results in a higher extent of DSI. Due to the low response rate, the result cannot firmly draw a conclusion. Based on this fact, the result of our analysis can only act like an indicator in order to falsify or confirm our hypothesis from the research framework. From our results, the $R$ squared value shows that there is a weak linear relationship between the independent and dependent variable, trust and DSI, respectively. Moreover, the test of linear relationship through scatterplot shows that there is somewhat a positive linear relationship between trust and the extent of DSI. In addition, the other assumptions are proved and allowed us to use the simple linear regression analysis. However, the result of $F$-statistic shows that the linear model is not fit with the data. Hence, on the one hand, we accept that there is no linear relationship between trust and the extent of DSI. On the other hand, our hypothesis from the research framework which is stated that the higher trust, the higher the extent of DSI is, can neither be confirmed nor falsified due to the proof of all assumptions, the $R$ squared value, and the low response rate. To simplify, the results indicate that trust does not have any linear influence on the extent of DSI in the German textile manufacturing industry. Nonetheless, it cannot be concluded that there is no relationship between trust and the extent of DSI either.

Previous researchers have open up the discussion with trust and its influence on integration. Zhang and Huo (2013) highlight that trust including honesty and openness is a reason for an effective integration. Another study by Corbett et al. (1999) points out that the knowledge dissemination phase, which is one of the phases of DSI (Esper et al., 2010), requires that supply chain partners trust each other. Li et al. (2007) and Eng (2006) stress that trust and a good comprehension of the activities
of supply chain partners are important when it comes to cross-functional and inter-organisational collaboration between supply chain partners. A good comprehension is also needed for the demand and supply integration since the heart of DSI is to share interpretation and to understand each other’s activities and processes (cf. Esper et al., 2010).

Despite the fact that all the previous research connected trust strongly positive to integration, our research has a different result. We can only speculate on the discrepancy of our result to previous results. First, we employed the linear equation for regression analysis which can give a different result compared to the other equations which are quadratic and exponential equation. With the quadratic equation or non-linear regression model, the output might be that there is a stronger positive relation of trust on the extent of DSI. In this thesis, the simple linear regression is applied because we expected a strong positive linear relationship between our two variables which is supported by the scatterplot (see Figure 16). The result is unexpected for us since we reckoned that a higher level of trust makes the German textile manufacturers to integrate even stronger.

One of the reasons for the discrepancies of the results can be that trust is a sensitive topic. As it can be seen from the scatterplot (Figure 16), it seems like there is somewhat a positive linear relationship between trust and DSI. In the scatterplot (Figure 16), the values of the relationship are mainly plotted in the middle range. Therefore, the first assumption of simple linear regression is proved indicating that the linear regression analysis is the best method. Nevertheless, the results from the linear regression analysis did not tell us that the linear equation is appropriate for the data we have, arguing from the low R squared value of 0.056. The possible reason for the inappropriate linear equation is that respondents who have to deal with the sensitive topic trust are more likely to answer with a moderate to high extent of the variable because they might be afraid that the answer towards their main suppliers and customers would be discovered or leak. In addition to this discrepancy possibility, a look into the raw data tells us that the variables used for measuring the construct trust are in the range between one and seven which means that every point of the Likert scale was rated. This result is in coherence with the created Normal P-P plot which shows that the variable trust seems to be normally distributed. Through the low response rate, indeed, the result might be influenced and in reality it might
actually be that the variable trust is not normally distributed indicating that the linear regression analysis is an inappropriate analysis technique.

Since the construct of trust is difficult to measure, the defined dimensions of this research might not be appropriate to detect a strong positive linear relationship of trust on DSI. We suggest that further research on the stated hypothesis should be done considering different dimensions of trust. On the other hand, the defined dimensions of trust might be solid enough and the problem could arise from a different source. Collaboration usually takes place when partners trust each other. The level of trust of the German textile manufacturers that integrate with their supply chain partners, however, might not differ from the manufacturers that do not integrate. Therefore, there might not be a linear relationship between trust and the extent of DSI of the German textile manufacturers when the linear relationship assumption is tested.

Further research should be done investigating this research question. Besides the aforementioned study possibilities, another study field could be to change the population. Different countries or even different industries could lead to other results. In future research, especially a higher response rate should be desired since the found results are solely indicators. Moreover, this research could be investigated in a longitudinal time horizon to gather a result over a longer time frame, instead of only one occasion.
8. Conclusions

This chapter contains the conclusions of our research about the influence of environmental commitment and trust on the extent of demand and supply integration (DSI). The chapter comprises of a summary and conclusion section, managerial implications, and limitations and further research.

8.1 Summary and conclusion

In this paper, two research questions have been investigated regarding the population of the German textile manufacturers and their main first-tier supply chain partners. Firstly, we tested how environmental commitment influences the level of DSI, hereafter the first research question. Secondly, we analysed the question how trust impacts on the extent of DSI, hereafter, the second research question. In the first research question, we assumed that manufacturers possessing a high level of environmental commitment have also a high extent of DSI, which means that we expected to have a positive linear relationship. In the second research question, the assumption was that manufacturers who trust their main first-tier suppliers and main customers have also a high extent of DSI, which means that we also expected a positive linear relationship between trust and DSI.

For answering these questions, we carried out a study using the quantitative method. A web survey was conducted in order to collect data from German textile manufacturers. In order to increase the validity, the whole population was used which is defined as follows: German textile manufacturers that provided an email address in the database Orbis and have the status active, but not active with insolvency proceedings and dormant status. Consequently, we had a population of 982 manufacturers within the German textile manufacturing industry. Fifty-five observations were gathered from the web survey. Empirical findings show that 92.73 per cent of the observations were CEOs, managers, and directors. However, due to the low response rate, the chi square of independence was tested to check whether
there is a nonresponse bias. Manufacturer’s size and segments of textile manufacture, e.g. preparation and spinning textile, and weaving textile, were used as variables in the chi square test. No difference between respondents and nonrespondents regarding those two variables and the answer status was found.

Simple linear regression was the method performed in this thesis for analysing the collected data in order to confirm or falsify the stated hypotheses. Due to the low response rate, the results of this paper can only be seen as indicators. The analysis reveals that there is a positive linear relation of environmental commitment on the extent of DSI, in other words the hypothesis has been verified. This result could not be linked to previous studies since this thesis investigated a research gap. Therefore, further investigations in this research field should be performed in order to fill the research gap. The hypothesis of the second research question, on the other hand, was neither falsified nor confirmed because the result of F-statistics (analysis of model fit) shows that there is no linear relationship, but all assumptions are proved to be able to run linear regression analysis. To simplify, the analysis of model fit told us that the linear model does not fit the data we have for trust and DSI which does not imply that trust and DSI are not interrelated. Based on the result of the scatterplot that shows that there is a somewhat a positive linear relation between the two variables, another form of relationship might be more suitable than the linear regression, such as the quadratic or nonlinear regression which can be explored in further research. Our result of the second research question differs from the results of previous studies that emphasize that there is a strong positive relation from trust on integration. The discrepancies might be because of the sensitivity of trust, complexity of measuring trust in the business to business context, or the relatively new concept DSI which emphasises on the share of interpretation. Therefore, further studies should be done.

8.2 Managerial implications

The pressures about environmental issues from stakeholders such as customers, politicians, and society are increasing in the textile manufacturing industry. Nowadays, products are supposed to be environmental-friendly and the production is supposed to use the latest or advanced production technologies that require the minimum use of resources. The increased pressures influence manufacturers in a way that they need to expand their environmental commitment. From our result of
analysis, the higher environmental commitment indicates that the extent of DSI is higher as well. This positive influence implies that the German textile manufacturers might get advantages from having a high extent of DSI. This conclusion can be drawn since DSI provides several advantages for manufacturers such as decreased lead-times or higher product differentiation as explained in chapter 3.1.5. The DSI framework is relatively new and focuses on balancing demand and supply (Esper et al., 2010). This focus, as we are pointing out, provides benefits to a textile manufacturer who has a high level of environmental commitment in terms of reducing costs through balancing demand and supply. As a result, a textile manufacturer can decrease the costs of environmental-friendly products. In similar way, Heikkilä (2002) has pointed out that the overall costs of the product can be minimised throughout the whole supply chain. Eventually, a textile manufacturer can have a low-cost advantage. Therefore, our suggestion to textile manufacturers is to commission further studies on this research topic. If the further studies lead to the same result as our indicators, German textile manufacturers should go forward to be even stronger environmental committed in order to increase the competitiveness.

Our research points out that there exists no linear relation of trust on the extent of DSI. Nevertheless, there is still some relationship and therefore, further research might be suitable in order to discover the drastic discrepancies between our research and previous research that show that there is a strong relationship between trust and integration in general. Further studies should be done before proper managerial implications can be drawn since the response rate of this thesis is not sufficient enough to perform various analysis methods such as factor analysis.

8.3 Limitations and further research

In this thesis, there is a number of limitations which open up for further research proposals. The most problematic limitation in our research was the low response rate which did not only limit our conclusion drawing, but also restrain our analysis technique. Other analysis techniques that could be applied are the factor analysis or cluster analysis. Accordingly, we propose that follow-up studies take different analysis techniques into account and compare the results of the different techniques in order to draw definite conclusions.
In further research, there are possibilities to go more deep down into the chosen dimension to see each dimension’s relationship towards the dependent variable DSI. For example, one might study which of the three dimensions of environmental commitment (the product-related, internal, and external environmental commitment) have the strongest influence on the extent of DSI. To see this relationship, a multiple regression can be done in order to rank the effect of each dimension. The same research proposals could be applied on the dimensions of trust as well.

Another limitation of this thesis is that the purpose was not to investigate every job position separately. To be more specific, we did not analyse whether the results differ if a CEO, a manager, a director, or another person answered. There might be a difference in results regarding the job position group since the framework of DSI requires a lot of knowledge regarding not only the internal processes, but also the communication and activities towards the main first-tier suppliers. Depending on the kind of the manager or the director, the knowledge might be more one-sided, especially if shared interpretation did not take part in the textile manufacturing industry. Consequently, we propose that future investigations separate between the respondents’ position inside the manufacturer should be performed.

One limitation that arises from our defined population is that only the German textile manufacturers have been investigated. However, the results might differ from country to country and from industry to industry. Hence, we propose that further research should be done investigating the two hypotheses in other countries, for example, in the top-leaders of the textile manufacturing industry China, Bangladesh, India, and Italy. Moreover, the two hypotheses could be tested in other industries as well such as in the automobile industry, the food industry, or the pharmacy industry.
References


Appendices
Appendix A: Certificates and standards

Appendix A gives a more detailed explanation of the examples of certificates and standards in chapter 3.2 regarding the environmental commitment and how manufacturers can show environmental commitment towards their supply chain partners. The certificates and standards that are concerning this research are explained below.

EU Eco-Management and Audit Scheme (EMAS) is an instrument for any company to achieve better environmental performance (Naturvårdsverket, 2014; European Commission, 2015). It is based on ISO 14001, but EMAS mentions additional criteria, e.g. that the environmental report should be published on the environmental protection agency which is used as a communication tool (Naturvårdsverket, 2014). Manufacturers need to provide their environmental report annually and if all criteria are fulfilled, they can use the EMAS logo as a competitive advantage (Ibid). With these year by year reports, customers can follow the improvements annually (Ibid).

The EU Ecolabel is a voluntary scheme that helps manufacturers to show that they think environmentally throughout the production line (European Commission, 2015f). Well recognised in the European Union, the EU Ecolabel is “a voluntary label promoting environmental excellence which can be trusted.” (European Commission, 2015f, para. 1). The standards of manufacturing, production, packaging etc. are evaluated by an expert with an objective perspective to ensure that the company meets the criteria of the EU Ecolabel (Ibid).

The Global Organic Textile Standard (GOTS) is one of the leading standards regarding organic fibres in the textile world (Global Organic Textile Standard International Working Group, 2014). The main criterion of GOTS is that the material needs to be at least 70 per cent out of organic fibres (Ibid). Furthermore, the dyes and other chemicals need to meet the in the GOTS stated criteria (Ibid). The regulations for waste water and energy are two other important aspects that need to be fulfilled to meet the GOTS criteria (Ibid).

The International Organization for Standardization developed the international standards ISO 14000. ISO 14000 highlights the impact on the environment (Whitelaw, 2011). ISO 14001, a sub-standard of ISO 14000, regards the environmental management (Ibid). ISO 14001 is an international standard that helps all different types and sizes of organisations to
“control and reduce its impact on the environment” (Whitelaw, 2011, p. 4). To reach the criteria, the manufacturer needs to have forethought, planning and action (Ibid). These actions aim to change the environment to the better such as recycling, minimising waste and air pollution, proper facilities, and energy and water savings (cf. European Commission, 2015a). The manufacturers need to develop an environmental policy, continuous documentation, control, communication and a follow-up evaluation (Whitelaw, 2011). According to Whitelaw (2011), the manufacturers often “take a subjective approach to environmental management rather than one more focused on meaningful improvements in environmental performance by using the concept of significance” (p. 21).

**Intertek Eco-certification** is a certificate concerning the quality of manufacturer’s ecological textile products (Intertek, 2010). An aim with this certificate is to remove all unsafe substances as early in the product line as possible (Ibid). Yearly, Intertek evaluates a sample of the certified products to maintain the standards validity, through lab tests and control tests (Ibid). According to Intertek (2010), products that meet the criteria will cover most of the environmental criteria that are required internationally.

**OEKO-TEX® Standard 100** is an independent certificate regarding the textile industry and its materials throughout the whole production line, such as yarn, garment and clothing (OEKO-TEX®, 2013). After manufacturers have applied for this certificate, the institution does random samples and evaluates whether all criteria are fulfilled (Ibid). The criteria include that there are no use of illegal substances and other substances with dangerous chemicals (Ibid). This certificate is known to be stricter than many of the national legislations (OEKO-TEX®, n.d.).
Appendix B: The questionnaire

Appendix B consists of the list of questions used in the survey, the content of email sent to the respondents, and the informed consent. Since the survey was sent to 982 German textile manufacturers, the content of email has been translated to German, yet we contain the English translation in this part.

Questionnaire

In the following section, you will be asked about general information regarding the company you are working for.

Please mark in which country you are located.
- Germany
- Other

Which position do you have in your company?
- CEO
- Director
- Manager
- None of above

In which part of the textile manufacturing supply chain is your company in?
- Preparation and spinning of textile fibres
- Weaving of textiles
- Finishing of textiles
- Manufacture of technical textiles
- Manufacture of other textiles

How many employees are hired at your company?
- Less than 10 employees
- 10-49 employees
- 50-249 employees
- 250 or more employees
In the following section, you will be asked about the environmental management of your company.

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<tr>
<th>Question</th>
<th>Vary small extent</th>
<th>Moderate extent</th>
<th>Vary large extent</th>
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<tr>
<td>To what extent does your company follow environmental management standards (ISO 14001)?</td>
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<td>To what extent does your company communicate with your employees about the environmental standards that your company has established? (e.g., ISO 14001, ODOT, ISOT, Eco-label, Intertek Eco-certification, DEKO-TEX 100, ...)</td>
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<td>To what extent does your company communicate your environmental commitment together with your main suppliers? (e.g., environmental plan, vision, mission, and/or strategies, environmental action plans, ...)</td>
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<td>To what extent does your company exchange information related to environmental management of products with your main suppliers? (e.g., procurement management, lifecycle assessment, product policy, ...)</td>
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<td>To what extent does your company choose materials of the products that consume the minimum amount of resources? (e.g., energy, materials for production, ...)</td>
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<td>To what extent does your company evaluate whether your products are easy to recycle and reuse?</td>
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<td>To what extent does your company select the suppliers based on environmental performance aspects?</td>
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In the following section, you will be asked about trust your company has on your main suppliers.

To what extent do you agree with the following statements?

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<thead>
<tr>
<th>Statement</th>
<th>Very small extent</th>
<th>Moderate extent</th>
<th>Very large extent</th>
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<tr>
<td>Our main suppliers keep our best interest in mind. (e.g., when it comes to important decision making)</td>
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<td>Our main suppliers have always been fair in its negotiation with our company.</td>
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<tr>
<td>Our main suppliers have the ability to do what they promised.</td>
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<tr>
<td>Our main suppliers are known to be successful at the things they try to achieve.</td>
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<tr>
<td>We are feeling confident about the competent skills of our main suppliers.</td>
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<tr>
<td>Our main suppliers never use opportunities that arise to profit at our expense.</td>
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<tr>
<td>Our company characterises our main suppliers as being honest.</td>
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<tr>
<td>Our company shares confidential, relevant information with our main suppliers.</td>
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In the following section, you will be asked about trust your company has on your main customers.

To what extent do you agree with the following statements?

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<tr>
<th>Statement</th>
<th>Very small extent</th>
<th>Moderate extent</th>
<th>Very large extent</th>
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<tr>
<td>Our main customers keep our best interest in mind. (e.g., when it comes to important decision making)</td>
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<td>Our main customers have always been fair in its negotiation with our company.</td>
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<tr>
<td>Our main customer have the ability to do what they promised.</td>
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<td>Our main customers are known to be successful at the things they try to achieve.</td>
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<td>Our main customers never use opportunities that arise to profit at our expense.</td>
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<tr>
<td>Our company characterises our main customers as being honest.</td>
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<tr>
<td>Our company shares confidential, relevant information with our main customers.</td>
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In the following section, you will be asked about the demand-side activities with your company’s direct main customers.

Examples of demand-side activities: market research, demand forecasting.

*Medium-term = 5-10 years
**Long-term = more than 10 years

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<tr>
<th>To what extent does your company study the demand-side capabilities? (e.g., technology capability, financial capability, market share, ...)</th>
<th>Very small extent</th>
<th>Moderate extent</th>
<th>Very large extent</th>
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<td>To what extent is your company aware of your main customers’ medium-term* and long-term** strategies?</td>
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<td>To what extent does your company communicate your medium-term* and long-term** strategies to your main customers?</td>
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<td>To what extent does your company analyse the industrial situation together with your main customers?</td>
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<td>To what extent do your company and your main customers evaluate the production resources for each other’s production together?</td>
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<td>To what extent do your company and your main customers have transparent information between each other? (e.g., inventory status, production plan, ...)</td>
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<td>To what extent does your company share your understanding with your main customers? (e.g., understanding about market situation, demand forecast, suppliers’ capability, ...)</td>
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<tr>
<td>To what extent is your company’s top management involved in the analysis process with your main customers? (e.g., analysis of balancing demand and supply, ...)</td>
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</table>
In the following section, you will be asked about the supply-side activities with your company’s direct main suppliers.

Examples of supply-activities: supplier capability study, capacity planning, study of supply constraints.

<table>
<thead>
<tr>
<th><em>Medium-term – 5-10 years</em></th>
<th><strong>Long-term – more than 10 years</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>To what extent does your company study the supply-side capabilities? (e.g., capacity capability, technology capability, quality capability, service capability, ...)</td>
<td>Very small extent</td>
</tr>
<tr>
<td>To what extent is your company aware of your main suppliers medium-term* and long-term** strategies?</td>
<td></td>
</tr>
<tr>
<td>To what extent does your company communicate your medium-term* and long-term** strategies to your main suppliers?</td>
<td></td>
</tr>
<tr>
<td>To what extent do you and your main supplier analyse the industrial situation together?</td>
<td></td>
</tr>
<tr>
<td>To what extent do your company and your main suppliers evaluate the production resources for each others production together?</td>
<td></td>
</tr>
<tr>
<td>To what extent do your company and your main suppliers have transparent information between each other? (e.g., inventory status, production plan, product availability status, ...)</td>
<td></td>
</tr>
<tr>
<td>To what extent does your company share your understanding with your main suppliers? (e.g., understanding about market situation, demand forecast, suppliers capability, ...)</td>
<td></td>
</tr>
<tr>
<td>To what extent in your company’s bto management involved in the analysis process with your main suppliers? (e.g., analysis of balancing demand and supply, ...)</td>
<td></td>
</tr>
</tbody>
</table>

In the following section, you will be asked about the integration between demand and supply activities within your company.

<table>
<thead>
<tr>
<th>Very small extent</th>
<th>Moderate extent</th>
<th>Very large extent</th>
</tr>
</thead>
<tbody>
<tr>
<td>To what extent do the other functions within your company share their understanding of the received information with your function?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>To what extent do the other functions within your company try to understand your function’s understanding of the received information?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If you would like to receive the results of our research, please enter your e-mail address in the field below.
The content in the email - German

Subject: Umfrage über demand and supply integration

Sehr geehrte Damen und Herren,

Wir sind drei Studenten an der Linnéuniversitetet in Schweden und führen im Rahmen unserer Masterarbeit gerade eine Umfrage aus, um deren Mitwirkung wir Sie herzlichst bitten. Wir untersuchen die Einflüsse von umweltbewusstem Engagement und Vertrauen auf ein relativ neues Konzept – Demand and Supply Integration (DSI). Firmen mit einem hohen Maß an DSI zeichnen sich durch mehrere Wettbewerbsvorteile aus, z.B. optimierte termingerechte Auslieferung, verkürzte Durchlaufzeiten, erhöhter Flexibilität und Prozessdifferentiation.

Die Zielgruppe unserer Forschung ist die Textilherstellungsindustrie in Deutschland. Deshalb wären wir sehr dankbar, wenn Ihr Unternehmen uns mit seinem Wissen und seinen Erkenntnissen bei unserer Forschung unterstützen könnte. Da die Beantwortung der Fragen Kenntnisse über Bedarf (inklusive Kunden) und Beschaffung (inklusive Lieferanten) voraussetzen, würden wir Sie bitten diese E-Mail freundlicherweise weiterzuleiten, z.B. an die Geschäftsführung, den/die Supply Chain Manager/in, den/die Logistikmanager/in, den/die Einkaufsleiter/in oder den/die Marketingchef/in.


Um die Umfrage zu starten, klicken Sie bitte auf den folgenden Link: Survey URL incl. log-in

Mit freundlichen Grüßen,

C. Damm, P. Sombat und S. Trenz
English translation of the content of email

Subject: Survey about the demand and supply integration

Dear Sir or Madam,

We are three students at Linnaeus University in Sweden and we would appreciate if your company could help us by answering a questionnaire for the empirical part of our Master thesis. We are examining the influences of environmental commitment and trust on a relatively new concept which is called the demand and supply integration (DSI). Companies that have a high extent of DSI are characterized by having several competitive advantages such as optimised on-time delivery, reduced lead-times, increased flexibility, and process differentiation.

The target group of our research is the textile manufacturing industry in Germany. Therefore, we would be really grateful if your company would support us with its knowledge. Since the questions require knowledge about demand (including customers) and supply (including suppliers), we kindly ask you to forward this email to employees who have enough knowledge about these areas such as the CEO, directors, supply chain manager, purchasing manager, logistics manager, or marketing manager.

We would like to thank you in advance for your participation. Answering the survey will take around 10 minutes and will be available until the 21st of May 2015. As a reward for participation in our survey, we would be pleased to send you an executive report about our results or, if desired, our Master thesis in electronic form.

In order to start the survey, please click on the following link: Survey URL incl. log-in

Sincerely yours,

C. Damm, P. Sombat, and S. Trenz
The informed consent

You have been invited to participate in this survey because you are a CEO, manager, director or are in another high position within the textile manufacturing in Germany. This study in supply chain management is conducted by Christopher Damm, Phichaporn Sombat, and Sandra Trenz, Master students in Business Process and Supply Chain Management (2 years) at Linnaeus University, Sweden. The purpose of this study is to investigate how environmental commitment and trust influence the demand and supply integration (DSI) of textile manufacturers in Germany. By answering this survey, you will contribute your knowledge and experience to enable us to answer to our study purpose.

In the end of the survey, you get the opportunity to request an executive summary or our whole Master thesis from us. This can be a valuable report for you because gaining more knowledge about the demand and supply integration (DSI) can help your company to be more competitive in the textile market in terms of process differentiation. Moreover, you can learn more about environmental commitment and trust which can have a significant influence on DSI.

The survey will take approximately 10 minutes to complete all questions which are about general basic information, environmental commitment, trust, and the demand and supply integration.

No risks or discomforts are anticipated from taking part in this study. Your participation is voluntary; you are free to withdraw your participation from this study at any time. If you do not want to continue, you can simply leave the survey. If you do not click on the "submit" button at the end of the survey, your answers will not be submitted. Moreover, the participation in this survey will not lead to any costs for you.

Your responses will be kept completely confidential. You answer this survey anonymously and we will NOT know your IP- or email addresses when you respond to the survey. The list of email address of our participants will be stored electronically in a password protected folder. After we have finished our data collection, we will destroy the list of all participants’ email addresses. However, if you wish to receive the results in electronic form (in the end of June), you have the possibility to write down your email address in the end of the survey.
By beginning the survey, you acknowledge that you have read this information and agree to participate in this research, with the knowledge that you are free to withdraw your participation at any time without penalty.

Questions regarding the purpose or procedures of the study can be directed to Christopher Damm, Phichaporn Sombat, or Sandra Trenz at st222gk@student.lnu.se or +46 723- 28 88 10.
Appendix C: Codebook

Appendix C provides the codebook of this thesis. In order to be able to work with IBM SPSS 22, it is necessary to code each variable. Table 12 provides the codebook for the general questions. While the variables position and number of employees have four different codes, the variables location and segments have a binary code. Table 13 presents the codebook for the environmental commitment variables which are created based on the studies of Chang (2012), Whitelaw (2011), and Henriques & Sadorsky (1999). Table 14 is for the trust variables which are operationalised from the existing questions of Whipple et al. (2013) and Paine (2003). The variables of DSI are presented in Table 15 where some questions are created based on the study of Esper et al. (2010) and some questions are brought forward from the existing questions of Hosseini Baharanchi’s (2009) study. All variables of the Tables 13 to 15 are coded from 1 to 7 where 1 means very small extent and 7 very large extent.

Table 12: Codebook of this thesis – General questions

<table>
<thead>
<tr>
<th>Name</th>
<th>Label</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Please mark in which country you are located.</td>
<td>1 = Germany 2 = Other</td>
</tr>
<tr>
<td>Position</td>
<td>Which position do you have in your company?</td>
<td>1 = CEO 2 = Director 3 = Manager 4 = None of above</td>
</tr>
<tr>
<td>Segment1</td>
<td>Preparation and spinning of textile fibres</td>
<td>1 = Yes 0 = No</td>
</tr>
<tr>
<td>Segment2</td>
<td>Weaving of textiles</td>
<td>1 = Yes 0 = No</td>
</tr>
<tr>
<td>Segment3</td>
<td>Finishing of textiles</td>
<td>1 = Yes 0 = No</td>
</tr>
<tr>
<td>Segment4</td>
<td>Manufacture of technical textiles</td>
<td>1 = Yes 0 = No</td>
</tr>
<tr>
<td>Segment5</td>
<td>Manufacture of other textiles</td>
<td>1 = Yes 0 = No</td>
</tr>
</tbody>
</table>
| Num_employees | How many employees are hired at your company? | 1 = Less than 10 employees  
2 = 10-49 employees  
3 = 50-249 employees  
4 = 250 or more employees |

**Table 13: Codebook of this thesis – Environmental commitment questions**

<table>
<thead>
<tr>
<th>Name</th>
<th>Label</th>
<th>Theory</th>
<th>Measurement</th>
</tr>
</thead>
</table>
| EC1   | Your company follows environmental management standards (ISO 14000).  | Whitelaw, 2011             | 1 = Very small extent  
4 = Moderate extent  
7 = Very large extent |
| EC2   | Your company communicates with your employees about the environmental standards that your company has established. | Henriques & Sadorsky, 1999 |                               |
| EC3   | Your company communicates your environmental commitment together with your main suppliers. | Chang, 2012               |                               |
| EC4   | Your company exchanges information related to environmental management of products with your main suppliers. | Chang, 2012               |                               |
| EC5   | Your company chooses materials of the products that consume the minimum amount of resources. | Chang, 2012               |                               |
| EC6   | Your company evaluates whether your products are easy to recycle and reuse. | Chang, 2012               |                               |
| EC7   | Your company selects the suppliers based on environmental performance aspects. | Chang, 2012               |                               |

**Table 14: Codebook of this thesis – Trust questions**

<table>
<thead>
<tr>
<th>Name</th>
<th>Label</th>
<th>Theory</th>
<th>Measurement</th>
</tr>
</thead>
</table>
| TS1   | Our main suppliers keep our best interest in mind.                   | Whipple et al., 2013       | 1 = Very small extent  
4 = Moderate extent  
7 = Very large extent |
| TS2   | Our main suppliers have always been fair in its negotiation with our company. | Whipple et al., 2013; Paine, 2003 |                               |
### Table 15: Codebook of this thesis – Demand and supply integration questions

<table>
<thead>
<tr>
<th>Name</th>
<th>Label</th>
<th>Theory</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>TS3</td>
<td>Our main suppliers have the ability to do what they promised.</td>
<td>Whipple et al., 2013; Paine, 2003</td>
<td>extent</td>
</tr>
<tr>
<td>TS4</td>
<td>Our main suppliers are known to be successful at the things they try to achieve.</td>
<td>Paine, 2003</td>
<td></td>
</tr>
<tr>
<td>TS5</td>
<td>We are feeling confident about the competent skills of our main suppliers.</td>
<td>Whipple et al., 2013</td>
<td></td>
</tr>
<tr>
<td>TS6</td>
<td>Our main suppliers never use opportunities that arise to profit at our expense.</td>
<td>Whipple et al., 2013</td>
<td></td>
</tr>
<tr>
<td>TS7</td>
<td>Our company characterises our main suppliers as being honest.</td>
<td>Whipple et al., 2013</td>
<td></td>
</tr>
<tr>
<td>TS8</td>
<td>Our company shares confidential, relevant information with our main suppliers.</td>
<td>Esper et al., 2010; Paine, 2003</td>
<td></td>
</tr>
<tr>
<td>TC1</td>
<td>Our main customers keep our best interest in mind.</td>
<td>Whipple et al., 2013</td>
<td></td>
</tr>
<tr>
<td>TC2</td>
<td>Our main customers have always been fair in its negotiation with our company.</td>
<td>Whipple et al., 2013; Paine, 2003</td>
<td></td>
</tr>
<tr>
<td>TC3</td>
<td>Our main customers have the ability to do what they promised.</td>
<td>Whipple et al., 2013; Paine, 2003</td>
<td></td>
</tr>
<tr>
<td>TC4</td>
<td>Our main customers are known to be successful at things they try to achieve.</td>
<td>Paine, 2003</td>
<td></td>
</tr>
<tr>
<td>TC5</td>
<td>Our main customers never use opportunities that arise to profit at our expense.</td>
<td>Whipple et al., 2013</td>
<td></td>
</tr>
<tr>
<td>TC6</td>
<td>Our company characterises our main customers as being honest.</td>
<td>Whipple et al., 2013</td>
<td></td>
</tr>
<tr>
<td>TC7</td>
<td>Our company shares confidential, relevant information with our main customers</td>
<td>Esper et al., 2010; Paine, 2003</td>
<td></td>
</tr>
</tbody>
</table>

1 = Very small extent  
4 = Moderate extent  
7 = Very large extent
<table>
<thead>
<tr>
<th>Name</th>
<th>Label</th>
<th>Theory</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSI_C3</td>
<td>Your company communicates your medium-term and long-term strategies to your main customers.</td>
<td>Hosseini Baharanchi, 2009</td>
<td></td>
</tr>
<tr>
<td>DSI_C4</td>
<td>Your company analyses the industrial situation together with your main customers.</td>
<td>Esper et al., 2010</td>
<td></td>
</tr>
<tr>
<td>DSI_C5</td>
<td>Your company and your main customers evaluate the production resources for each other's production together.</td>
<td>Hosseini Baharanchi, 2009</td>
<td></td>
</tr>
<tr>
<td>DSI_C6</td>
<td>Your company and your main customers have transparent information between each other.</td>
<td>Hosseini Baharanchi, 2009</td>
<td></td>
</tr>
<tr>
<td>DSI_C7</td>
<td>Your company shares your understanding with your main customers.</td>
<td>Esper et al., 2010</td>
<td></td>
</tr>
<tr>
<td>DSI_C8</td>
<td>Your company's top management is involved in the analysis process with your main customers.</td>
<td>Esper et al., 2010</td>
<td></td>
</tr>
<tr>
<td>DSI_S1</td>
<td>Your company studies the supply-side capabilities.</td>
<td>Esper et al., 2010</td>
<td></td>
</tr>
<tr>
<td>DSI_S2</td>
<td>Your company is aware of your main suppliers' medium-term and long-term strategies.</td>
<td>Hosseini Baharanchi, 2009</td>
<td></td>
</tr>
<tr>
<td>DSI_S3</td>
<td>Your company communicates your medium-term and long-term strategies to your main suppliers.</td>
<td>Hosseini Baharanchi, 2009</td>
<td></td>
</tr>
<tr>
<td>DSI_S4</td>
<td>Your company and your main supplier analyse the industrial situation together.</td>
<td>Esper et al., 2010</td>
<td></td>
</tr>
<tr>
<td>DSI_S5</td>
<td>Your company and your main suppliers evaluate the production resources for each other's production together.</td>
<td>Hosseini Baharanchi, 2009</td>
<td></td>
</tr>
<tr>
<td>DSI_S6</td>
<td>Your company and your main suppliers have transparent information between each other.</td>
<td>Hosseini Baharanchi, 2009</td>
<td></td>
</tr>
<tr>
<td>DSI_S7</td>
<td>Your company shares your understanding with your main suppliers.</td>
<td>Esper et al., 2010</td>
<td></td>
</tr>
<tr>
<td>DSI_S8</td>
<td>Your company's top management is involved in the analysis process with your main suppliers.</td>
<td>Esper et al., 2010</td>
<td></td>
</tr>
<tr>
<td>DSI_Int1</td>
<td>The other functions within your company share their understanding of the received information with your function.</td>
<td>Esper et al., 2010</td>
<td>1 = Very small extent</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4 = Moderate extent</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7 = Very large extent</td>
</tr>
<tr>
<td>DSI_Int2</td>
<td>The other functions within your company try to understand your function's understanding of the received information.</td>
<td>Esper et al., 2010</td>
<td>7 = Very large extent</td>
</tr>
</tbody>
</table>
Appendix D: Cronbach’s alpha

Appendix D gives the opportunity to gain further knowledge about the tables of Cronbach’s alpha. Table 16 gives the Item-Total Statistics table for the construct environmental commitment, Table 17 for the construct trust, and Table 18 for the construct DSI.

Cronbach’s alpha of environmental commitment

Table 16: Identifying unreliable items in environmental commitment

<table>
<thead>
<tr>
<th>Item</th>
<th>Scale Mean if Item Deleted</th>
<th>Scale Variance if Item Deleted</th>
<th>Corrected Item-Total Correlation</th>
<th>Squared Multiple Correlation</th>
<th>Cronbach’s Alpha if Item Deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC1</td>
<td>25.82</td>
<td>71.855</td>
<td>.745</td>
<td>.672</td>
<td>.862</td>
</tr>
<tr>
<td>EC2</td>
<td>25.27</td>
<td>75.646</td>
<td>.665</td>
<td>.610</td>
<td>.872</td>
</tr>
<tr>
<td>EC3</td>
<td>25.69</td>
<td>76.059</td>
<td>.602</td>
<td>.744</td>
<td>.955</td>
</tr>
<tr>
<td>EC4</td>
<td>25.67</td>
<td>78.743</td>
<td>.741</td>
<td>.662</td>
<td>.863</td>
</tr>
<tr>
<td>EC5</td>
<td>25.40</td>
<td>84.487</td>
<td>.523</td>
<td>.347</td>
<td>.887</td>
</tr>
<tr>
<td>EC6</td>
<td>25.76</td>
<td>81.613</td>
<td>.511</td>
<td>.340</td>
<td>.991</td>
</tr>
<tr>
<td>EC7</td>
<td>25.84</td>
<td>76.251</td>
<td>.806</td>
<td>.690</td>
<td>.855</td>
</tr>
</tbody>
</table>

Overall alpha: .886

As it can be seen from Table 16, the overall Cronbach’s alpha of the construct environmental commitment is 0.886. This value could be improved by deleting the variables EC5 and EC6 since the last column of this table indicates that the Cronbach’s alpha would be increased to 0.887 in case of a removal of EC5 and 0.891 in case of a removal of EC6. Since the overall Cronbach’s alpha is already higher than 0.7, the column Corrected Item-Total Correlation should be investigated for the two problematic variables (Pallant, 2013). The Corrected Item-Total Correlation for EC5 is 0.523 and for EC6 0.511. The values of the Corrected Item-Total Correlations for both variables are higher than 0.3 and thus, no removals are necessary (Pallant, 2013).
Cronbach’s alpha of trust

Table 17: Identifying unreliable items in trust

<table>
<thead>
<tr>
<th>Item</th>
<th>Scale Mean if Item Deleted</th>
<th>Scale Variance if Item Deleted</th>
<th>Corrected Item-Total Correlation</th>
<th>Squared Multiple Correlation</th>
<th>Cronbach’s Alpha if Item Deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>TS1</td>
<td>68.75</td>
<td>212.897</td>
<td>.668</td>
<td>.644</td>
<td>.930</td>
</tr>
<tr>
<td>TS2</td>
<td>68.56</td>
<td>213.473</td>
<td>.658</td>
<td>.687</td>
<td>.930</td>
</tr>
<tr>
<td>TS3</td>
<td>68.25</td>
<td>212.082</td>
<td>.750</td>
<td>.777</td>
<td>.928</td>
</tr>
<tr>
<td>TS4</td>
<td>68.22</td>
<td>215.306</td>
<td>.765</td>
<td>.829</td>
<td>.928</td>
</tr>
<tr>
<td>TS5</td>
<td>68.20</td>
<td>217.644</td>
<td>.677</td>
<td>.840</td>
<td>.930</td>
</tr>
<tr>
<td>TS6</td>
<td>69.15</td>
<td>213.015</td>
<td>.660</td>
<td>.670</td>
<td>.930</td>
</tr>
<tr>
<td>TS7</td>
<td>69.24</td>
<td>211.962</td>
<td>.712</td>
<td>.720</td>
<td>.929</td>
</tr>
<tr>
<td>TS8</td>
<td>68.38</td>
<td>219.389</td>
<td>.577</td>
<td>.686</td>
<td>.933</td>
</tr>
<tr>
<td>TC1</td>
<td>68.87</td>
<td>211.632</td>
<td>.625</td>
<td>.712</td>
<td>.932</td>
</tr>
<tr>
<td>TC2</td>
<td>69.09</td>
<td>209.010</td>
<td>.730</td>
<td>.808</td>
<td>.928</td>
</tr>
<tr>
<td>TC3</td>
<td>68.78</td>
<td>211.618</td>
<td>.696</td>
<td>.804</td>
<td>.929</td>
</tr>
<tr>
<td>TC4</td>
<td>68.29</td>
<td>217.062</td>
<td>.725</td>
<td>.804</td>
<td>.929</td>
</tr>
<tr>
<td>TC5</td>
<td>69.36</td>
<td>214.384</td>
<td>.547</td>
<td>.690</td>
<td>.934</td>
</tr>
<tr>
<td>TC6</td>
<td>68.71</td>
<td>207.951</td>
<td>.767</td>
<td>.778</td>
<td>.927</td>
</tr>
<tr>
<td>TC7</td>
<td>68.53</td>
<td>213.190</td>
<td>.640</td>
<td>.784</td>
<td>.931</td>
</tr>
</tbody>
</table>

Overall alpha: .934

Table 17 shows the overall Cronbach’s alpha for the construct trust. This construct has an overall alpha of 0.934 and a deletion of one of the variables would not lead to an increased reliability of the variables. Therefore, all variables can be kept for the analysis.
Cronbach’s alpha of DSI

Table 18: Identifying unreliable items in DSI

<table>
<thead>
<tr>
<th>Item</th>
<th>Scale Mean if Item Deleted</th>
<th>Scale Variance if Item Deleted</th>
<th>Corrected Item-Total Correlation</th>
<th>Squared Multiple Correlation</th>
<th>Cronbach’s Alpha if Item Deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSI_C1</td>
<td>70.75</td>
<td>429,712</td>
<td>.505</td>
<td>.730</td>
<td>.951</td>
</tr>
<tr>
<td>DSI_C2</td>
<td>71.05</td>
<td>425,793</td>
<td>.659</td>
<td>.809</td>
<td>.960</td>
</tr>
<tr>
<td>DSI_C3</td>
<td>70.75</td>
<td>414,092</td>
<td>.700</td>
<td>.687</td>
<td>.946</td>
</tr>
<tr>
<td>DSI_C4</td>
<td>71.25</td>
<td>415,800</td>
<td>.700</td>
<td>.735</td>
<td>.950</td>
</tr>
<tr>
<td>DSI_C5</td>
<td>71.36</td>
<td>413,088</td>
<td>.735</td>
<td>.754</td>
<td>.949</td>
</tr>
<tr>
<td>DSI_C6</td>
<td>71.25</td>
<td>419,378</td>
<td>.656</td>
<td>.747</td>
<td>.950</td>
</tr>
<tr>
<td>DSI_C7</td>
<td>70.76</td>
<td>421,999</td>
<td>.725</td>
<td>.734</td>
<td>.949</td>
</tr>
<tr>
<td>DSI_C8</td>
<td>70.95</td>
<td>417,867</td>
<td>.619</td>
<td>.734</td>
<td>.951</td>
</tr>
<tr>
<td>DSI_S1</td>
<td>70.93</td>
<td>414,846</td>
<td>.739</td>
<td>.850</td>
<td>.949</td>
</tr>
<tr>
<td>DSI_S2</td>
<td>71.16</td>
<td>414,213</td>
<td>.745</td>
<td>.786</td>
<td>.949</td>
</tr>
<tr>
<td>DSI_S3</td>
<td>71.04</td>
<td>405,902</td>
<td>.803</td>
<td>.880</td>
<td>.948</td>
</tr>
<tr>
<td>DSI_S4</td>
<td>71.22</td>
<td>411,729</td>
<td>.759</td>
<td>.771</td>
<td>.948</td>
</tr>
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<td>417,401</td>
<td>.743</td>
<td>.778</td>
<td>.948</td>
</tr>
<tr>
<td>DSI_S6</td>
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<td>410,625</td>
<td>.819</td>
<td>.852</td>
<td>.948</td>
</tr>
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<td>.683</td>
<td>.771</td>
<td>.950</td>
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<td>.824</td>
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<tr>
<td>DSI_Int1</td>
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<td>424,537</td>
<td>.632</td>
<td>.949</td>
<td>.951</td>
</tr>
<tr>
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<td>70.42</td>
<td>429,537</td>
<td>.595</td>
<td>.944</td>
<td>.951</td>
</tr>
</tbody>
</table>

Overall alpha: .952

Table 18 shows the overall Cronbach’s alpha for the construct DSI. This construct has an overall alpha of 0.952 and a deletion of one of the variables would not lead to an increased reliability of the variables. Therefore, all variables can be kept for the analysis.