Improvement of Sustainability by Vertical Supply Chain Collaboration at Logistics Service Providers

A Multiple Case Study

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Abstract

**Background:** Today’s organizations operate in a competitive and dynamic business environment in which the attainment of economic, social and environmental sustainability targets has become crucial for firms. Supply chain collaboration is considered as a strategic issue for the fulfillment of these targets. Thus, studies on supply chain collaboration for sustainability have increased, especially for manufacturing firms. However, there is a lack of research of the perspective of logistics service providers in this context, requesting scientific investigations.

**Purpose:** The purpose of this thesis is to explore vertical supply chain collaboration between logistics service providers and their partners with regards to improving economic, environmental and social sustainability at logistics service providers.

**Method:** Within this multiple case study and a deductive research approach, qualitative data from three logistics service providers is gathered by conducting interviews and analyzed. Firstly, each individual case is investigated by using an explanation building, and thereafter compared and generalized by means of a cross-case analysis.

**Findings and Conclusion:** Considering the improvement of sustainability at logistics service providers, the research reveals that economic, environmental and social sustainability can be improved by vertical supply chain collaboration jointly conducted by logistics service providers and their key suppliers as well as key customers. However, strong interdependencies between the three sustainability dimensions are noticeable as they overlap in-between. Besides, the findings indicate that the executed vertical supply chain collaboration practices mostly have the potential to improve economic sustainability at logistics service providers. Environmental and social sustainability are less improved or sometimes even negatively affected.

**Keywords:** Vertical Supply Chain Collaboration; Sustainability, Logistics Service Provider; Information Sharing; Joint Decision Making; Incentive Sharing; Goal Congruence; Joint Knowledge Creation
Acknowledgement

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<tr>
<td>EDI</td>
<td>Electronic Data Interchange</td>
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<tr>
<td>ERP</td>
<td>Enterprise Resource Planning</td>
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<td>FOB</td>
<td>Free On Board</td>
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<td>HSCC</td>
<td>Horizontal Supply Chain Collaboration</td>
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<tr>
<td>KPI</td>
<td>Key Performance Indicator</td>
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<td>LSP</td>
<td>Logistics Service Provider</td>
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<td>RFID</td>
<td>Radio-Frequency Identification</td>
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<td>RQ</td>
<td>Research Question</td>
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<td>SC</td>
<td>Supply Chain</td>
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<td>SCC</td>
<td>Supply Chain Collaboration</td>
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<td>TBL</td>
<td>Triple Bottom Line</td>
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<tr>
<td>TMS</td>
<td>Transport Management System</td>
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<td>VSCC</td>
<td>Vertical Supply Chain Collaboration</td>
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<td>WMS</td>
<td>Warehouse Management System</td>
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1 Introduction

The following chapter provides an introduction of the thesis topic. First, a background of the research topic is given and the concepts of sustainability, supply chain, collaboration, supply chain collaboration and logistics service provider are defined. Secondly, the problem discussion presents existing research gaps, including the purpose and research questions. Finally, the delimitations of this thesis and its structure are illustrated.

1.1 Background

The debate about global sustainability has increased in the last decades due to environmental changes and sustainability has become a critical factor for the whole economy (van der Hel & Biermann, 2017). According to Kreibich et al. (2011), the 21st century is considered as the “century of sustainable development”. Consequently, today’s organizations operate in a competitive and dynamic business environment in which they try to achieve their sustainability targets (Chen et al., 2017). Sustainability is a concept that has emerged in the 1960 to answer environmental issues and social equity (McKenzie, 2004). Since then, the actual meaning of this term has shifted several times and different definitions exist (Kuhlman & Farrington, 2010). One of the most cited and comprehensive definition of sustainable development comes from the Brundtland Commission: “the development that meets the needs of the present without compromising the needs of future generations to meet their own needs” (Brundtland, 1987, p. 8). Furthermore, sustainability is composed of three pillars: economic, environmental and social (Brundtland, 1987). A study from Ioannou and Serafeim (2017) reveals a grow in consideration of sustainability with an analysis of the last five years where the number of S&P 500 companies composed with a sustainability committee has evolved from 5% to 24% and the number of companies that produce a sustainability report has also increased from 20% to 80%.

Within the literature field of supply chain management many academics have in recent years highlighted the importance of sustainability (Kudla & Klaas-Wissing, 2012; Blome et al., 2014; Chen et al., 2017). The attainment of economic, social and environmental sustainability targets has become crucial for firms, and supply chain
collaboration is considered as a strategic issue for the fulfillment of these targets (Chen et al., 2017).

An increased competition among firms and the fact that the majority of products reach the customer through supply chains, created a greater need for close collaborations and permanently improved effectiveness within supply chains (Meca & Timmer, 2008). As stated by Christopher (2016), a supply chain (SC) is the entire network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services delivered to the ultimate consumer. Two or more firms are necessary for collaboration and collaboration is defined as sharing responsibility and exchanging information about planning, management and performance measurement (Anthony, 2000). Additionally, collaboration helps companies to improve the management of supply chains (Horvath, 2001). Some key elements for a successful collaboration within the supply chain exist and need to be considered at the beginning of the collaboration such as trust in other partners, an intra-organizational support for the whole supply chain and a good communication with high a level of information sharing (Hubeau et al., 2017). In this regard, Barratt (2004) argues that for an efficient collaboration between supply chain partners, it is important to focus on a small number of close partnerships due to incurring related high costs of resources for collaboration.

Accordingly, collaborative relationships within supply chains can be defined as “long-term relationships where participants generally cooperate, share information, and work together to plan and even modify their business practices to improve joint performance” (Whipple et al., 2010, p. 507). Moreover, these collaborative relationships within supply chains, further referenced to supply chain collaboration (SCC), are normally long-lasting and the involved partners know the capabilities, needs, and weaknesses of the other parties. SCC can be separated into two categories of collaboration: vertical and horizontal. Vertical supply chain collaboration (VSCC) includes external collaboration with both suppliers and customers. Horizontal supply chain collaboration (HSCC) comprises external collaboration with competitors as well as external collaboration with non-competitors (Barratt, 2004). Furthermore, the concept of SCC can be divided into five related practices: information sharing, joint
decision making, incentive sharing, goal congruence and joint knowledge creation (Cao & Zhang, 2011; Wee et al., 2016).

The overall aim of SCC is to improve managerial difficulties, but as a consequence the companies become interdependent to a greater extent, must operate less opportunistic, and lose some of their control to involved chain partners (Ralston et al., 2017). Collaboration in supply chains helps to enhance supply chain performance in various areas such as the improvement of forecast with better information and accuracy, reduction of cost, reduction of inventory, and the improvement of customer service (Angulo et al., 2004). In order to understand the effects of SCC on firm performance, it is necessary to consider both upstream and downstream dimensions (Vachon & Klassen, 2006). Finally, SCC reinforces relations between supply chain partners in order to broaden knowledge and technologies, but also share risks (Koka & Prescott, 2002).

Sustainable supply chain management practices have become a key factor to enhance a company’s sustainable supply chain performance such as environmental purchasing or sustainable packaging with regards to a reduction of waste and resources (van Hoek & Johnson, 2010; Zailani et al., 2012). In addition, sustainability is an important criterion for the selection of partners (Centobelli et al., 2017). Indeed, manufacturers, retailers and customers are trying to comply with sustainability regulations and increasingly looking for logistics service providers (LSPs) that also care about it (Colicchia et al., 2013). A logistics service provider is a company that provides logistics services for goods and materials from a point of origin to a destination on behalf of its clients (Coyle et al., 1996). Depending on different services offered by a LSP, Lai (2004) divides LSPs into four types: traditional freight forwarder, transformer, full service provider and nicher. LSPs try to differentiate themselves from their competitors by adding services to better meet their customers' requirements (Evangelista, 2004) as reverse logistics, fleet management or security services among others (Isaksson, 2012).

As a result of an increased globalization and the pressure to achieve competitive advantages, the logistics and transport service market has become larger and more complex. Consequently, the need for logistics services among manufacturers and retailers has increased meaningfully. Numerous companies outsource their logistics services to LSPs and rather concentrate on their core competencies to achieve a
competitive advantage (Selviaridis & Spring, 2007; Giri & Sarker, 2017). Within the SC, the LSPs have normally played a supporting role by providing resources, knowledge, utilities or assets to major SC partners (Spens & Bask, 2002). This view about the supporting role has changed as LSPs have become increasingly influential within the supply chain due to the certainty that the extent of wisely undertaken logistics processes influences the efficiency and performance of the whole supply chain (Panayides & So, 2005). The number of large LSPs with capabilities to deliver innovative logistics solutions on a global scope is continuously increasing and these LSPs are assuming more strategic positions within supply chains (Selviaridis & Spring, 2007). This resulted in a new role of some LSPs having now a leadership function and controlling the supply chain (Zacharia et al., 2011).

1.2 Problem Discussion

Even though supply chain collaboration was one of the most popular topics in business ten years ago (Min et al., 2005), recent papers have requested more research emphasizing the importance of SCC to the future business world (Ralston et al., 2017; Singh et al., 2018). Detailed studies and a renewed emphasis about collaboration among firms are needed to answer open questions about the strategy behind it (Ralston et al., 2017), the requirements to implement collaboration (Singh et al., 2018), as well as the effects of SCC on sustainability (Blome et al., 2014; Chen et al., 2017). Chen et al. (2017) call for more research in order to better understand the interrelation between SCC and sustainability and specific issues in creating sustainability. However, as recognized by Chen et al. (2017), León-Bravo et al. (2017) and Pero et al. (2017), SCC for the purpose of sustainability is a comparatively new topic in business literature and is increasingly gaining attention. According to León-Bravo et al. (2017), green collaborative relationships in the supply chain have been studied but literature on economic, environmental and social sustainability areas is rather rare. Besides, previous literature on SCC for sustainability highly focused economic and environmental considerations, while the social aspect of sustainability has not been sufficiently researched. Hence, there is a need to gain an extensive overview of all three sustainability areas relating to the supply chain collaboration in order to provide a comprehensive assessment (Chen et al., 2017). Against this background, several authors discovered that SCC for sustainability facilitates the companies’ possibilities to develop resources and
competences and as a consequence can effectuate a competitive advantage (Cao & Zhang, 2011; Chen et al., 2017; Pero et al., 2017).

Studies on SCC for sustainability have increased in present literature, however they are solely focusing on the manufacturing industry and have been made from the perspective of manufacturing firms (Blome et al., 2014; Chen et al., 2017), but there is a lack of research of the perspective of LSPs in this context. In this regard, Chen et al. (2017) further elaborates that these studies are investigating especially upstream entities and the collaboration with suppliers. However, LSPs are those actors in the SC who in particular possess unique capabilities to generate solutions for more sustainable supply chains (Evangelista et al., 2010). Due to the position and role in the supply chain, LSPs can support manufacturers and customers with their sustainability efforts by introducing and adopting environmentally friendly initiatives (Centobelli et al., 2017) as well as reducing the environmental impact of the whole supply chain (Colicchia et al., 2013). The constant growth of demand for the mobility of goods has indeed made environmental issues essential and various research studies emphasize the crucial role of environmental initiatives established by LSPs to address these issues (van Hoek & Johnson, 2010; Centobelli et al., 2017). In fact, Björklund and Forslund (2013) argue that sustainable performance is an essential part of LSPs' offerings and a crucial component of their strategic planning.

Furthermore, the literature lacks holistic examinations of “the coalignment of demand- and supply-side sustainability-related collaboration” (Blome et al., 2014, p. 2) and the ”input-output sequence from raw materials to final products” (Chen et al., 2017, p. 83). Additionally, appointing the key supply chain partners involved in the supply- and demand-side sustainability-related practices is vital (Chen et al., 2017). As Chen et al. (2017) state, organizations should simultaneously aim for sustainability practices of both the input and output sequence to achieve an enhanced sustainability and strategic performance. From the input perspective, supplier collaboration can help companies to develop sustainability (Chen et al., 2017). In contrast, customer collaboration can give necessary support to companies for their output processes (Un & Asakawa, 2015).

In order to get a complete view and as discussed above there are fragments of evidence for analyzing VSCC between LSPs and their key supply chain partners involved in the supply-side (supplier) and demand-side (customer) for improving
economic, environmental and social sustainability at logistics service providers (see Figure 1). Thus, an enhanced sustainability performance of LSPs is vital in order to fulfill the selection requirements (Centobelli et al., 2017) and then come into consideration for being selected as a partner for customers such as manufacturers or retailers. Likewise, the role of LSPs within supply chains has usually a supporting nature, but many LSPs are seeking for more strategic and responsible positions within supply chains (Selviaridis & Spring, 2007). On the one hand, an improved sustainability performance by VSCC at LSPs can lead to a better reputation for LSPs and a claim to power within the SC. On the other hand, it can improve the performance of the supply chain, reduce overall costs and inventories, and lastly lead to a competitive advantage.

![Figure 1: Study object - vertical supply chain collaboration (Own illustration)](image)

Therefore, the purpose of this thesis is to explore vertical supply chain collaboration between logistics service providers and their key suppliers and their key customers with regards to improving economic, environmental and social sustainability at LSPs by answering the following research questions (RQ).
1.2.1 VSCC between LSP and Supplier for Sustainability
Especially, supplier collaboration can facilitate the development of sustainability of firms (Chen et al., 2017). Chen et al. (2017) list supplier collaboration, supplier development, supplier integration, supplier monitoring, supplier involvement and green purchasing as possible practices of supply chain collaboration for sustainability. The investigated suppliers of the LSP can either be wholesalers and manufacturers providing the LSP with goods or carriers and shipping lines executing the transportation for the LSP. The related research question is:

*RQ 1: How can vertical supply chain collaboration between LSPs and their suppliers improve sustainability at LSPs?*

1.2.2 VSCC between LSP and Customer for Sustainability
Additionally, customer collaboration can help to enhance company's resources and capabilities for sustainable development in terms of collaboration with customers, communication, infrastructure integration and integrated decision making (Chen et al., 2017). The considered customers of the LSP are companies such as retailer, manufacturer or a wholesaler that contract the LSP to perform their logistics functions. The corresponding research question is:

*RQ 2: How can vertical supply chain collaboration between LSPs and their customers improve sustainability at LSPs?*

1.3 Delimitations
The research scope of this thesis is delimited; the focus lies on VSCC with both suppliers and customers, while horizontal collaboration within supply chains is neglected, as vertical collaboration is expected as more appropriate for LSPs. This thesis is also restricted to the perspective of only one player within a supply chain, namely the logistics service provider, and lays its focus towards the relationships between LSPs and their downstream activities with customers and upstream activities with suppliers. Accordingly, VSCC for economic, environmental and social sustainability is solely explored for the LSP in order to achieve reasonable solutions.
1.4 Structure

Subsequently to the introduction chapter, the methodology describes the choice of the chosen approaches. A theoretical framework follows and introduces all key concepts including vertical supply chain collaboration, sustainability and VSCC for sustainability. In the frame of reference the research model is illustrated and key concepts are operationalized. Then, empirical findings are presented and analyzed to address the research questions. Therefore, single cases are first analyzed with an explanation building and then generalized by means of a cross-case analysis for the purpose of answering the research questions. Finally, a discussion is given and conclusions are drawn. The structure of this research is depicted below in Figure 2.
2 Methodology

The methodology chapter presents the applied methodology to answer the research questions of this thesis and discusses justifications for the methodological choices. This chapter begins with the research philosophy, followed by the research approach, research purpose and research strategy. Next, the research design and population and sampling method are discussed. Then, the data collection method and data analysis method are introduced. Finally, the quality criteria, research ethics and research working process are addressed.

2.1 Research Philosophy

The term research philosophy refers to the development of knowledge and the related nature of the knowledge. The adoption of a specific research philosophy by a researcher sheds light on essential assumptions about the researcher's way of seeing the world and on the chosen research strategy as well as corresponding methods (Saunders & Thornhill, 2009). Saunders and Thornhill (2009) note that ontology, epistemology and axiology are the common ways of thinking about research philosophies and all three hold distinct characteristics that affect the researcher's way of thinking about the research process. Ontology deals with the form and nature of reality or being. This refers to researcher’s assumptions about the way the world functions and how knowledge is developed within these assumptions. Epistemology is concerned with acceptable knowledge and the limits of acceptable knowledge in particular fields. Lastly, axiology concerns judgments about value and the role of value in the research processes (Saunders & Thornhill, 2009). According to Saunders and Thornhill (2009), four research philosophies are of importance in management research: positivism, realism, interpretivism and pragmatism.

**Positivism**

Positivism refers to the philosophical attitude of natural scientists. “This entails working with an observable social reality and the end product of such research can be law-like generalisations” (Saunders & Thornhill, 2009, p. 129). Besides, positivism is characterized by an objective view and research is based on observable phenomena. These observable phenomena in turn are required for the creation of reliable data. Finally, the usage of existing theories and large quantitative samples
are appropriate for the creation of data and the development of hypotheses which then further need to be tested (Saunders & Thornhill, 2009).

**Realism**

Realism is a philosophy arguing that there exist “a reality quite independent of the mind” (Saunders & Thornhill, 2009, p. 114). This philosophy relates to scientific enquiry with observable phenomena that provide a credible collection of data. Thus, the truth is what senses reveal and objects exist autonomously of the human mind. The chosen methods for collection data can be quantitative or qualitative and must suit the subject matter (Saunders & Thornhill, 2009).

**Interpretivism**

The philosophy of interpretivism is based on subjective meanings and has the objective to understand social phenomena. The researcher is part of the researched subject and the focus lies upon a reality behind details (Saunders & Thornhill, 2009). According to Saunders and Thornhill (2009), the reality is viewed differently by every individual, so each human as a social actor can interpret its own reality. Therefore, for this philosophy it is applicable to conduct qualitative research with in-depth investigations and small samples.

**Pragmatism**

Pragmatism declares the research question as the most important criterion of the adoption of epistemology, ontology and axiology, whereas their suitability to answer specific questions differs. Pragmatism based upon observable phenomena and subjective meanings and either or both sorts can generate knowledge on the research question. Suitable data collection methods can be either mixed or multiple and quantitative as well as qualitative (Saunders & Thornhill, 2009).

**Applied Research Philosophy**

Deciding on the applied research philosophy, interpretivism is most suitable as the objective of this thesis is to understand the phenomenon of how vertical supply chain collaboration can improve sustainability at LSPs. Subjective meanings and interpretations are for this reason necessary to fully explore this phenomenon which is little known. Moreover, the interpretivism philosophy is characterized by
qualitative and exploratory research, small samples, and in-depth investigations (Saunders & Thornhill, 2009) which all correspond to this thesis.

2.2 Research Approach

The research approach ascertains the nature of relationship between theory and research. The two main research approaches for considering the relationship between theory and relationship are deductive and inductive (Saunders & Thornhill, 2009).

**Deductive**

The deductive approach is regarded as the “most common view of the nature of the relationship between theory and research” (Bryman & Bell, 2011, p. 11). In the deductive approach, the researcher develops a theory and a hypothesis as well as designs a research strategy in order to test the developed hypothesis (Saunders & Thornhill, 2009). The theory guides the research and based on the theory observations and findings are generated. The beforehand developed hypothesis is based on what is already known within the theoretical domain and must then be empirically investigated. Besides, the hypothesis contains specific concepts and eventually the researcher translates it into researchable objects and operational concepts (Bryman & Bell, 2011).

**Inductive**

In the inductive approach the connection of theory and findings is now converse compared to deduction (Bryman & Bell, 2011). Data are collected and the theory is developed as an outcome of research observations or findings (Saunders & Thornhill, 2009). In this phase of theoretical reflection the researcher should be able to draw inferences on a set of data that can be generalized based on observations. In case the researcher wants to find out the conditions for holding or not holding a theory, a general strategy called iterative might be helpful in which the collection of additional data is necessary. However, it must be noted that the inductive approach has also a deductive element and therefore is another strategy for linking theory and research (Bryman & Bell, 2011).
**Applied Research Approach**

With regards to the research approach, the applied approach is deductive. The theory guides the research and based on the theory observations and findings are generated. Following the stages of deduction, previous literature concerning sustainability and supply chain collaboration is reviewed to have a better knowledge of the existing literature. A research question is designed and then translated into operationalizable concepts to finally generate empirical findings based on the theory.

### 2.3 Research Purpose

Business research is conducted for different purposes. These research purposes are concerned with the relation between knowledge and a problem and can be categorized as exploratory, descriptive and explanatory (Saunders & Thornhill, 2009).

**Exploratory**

Exploratory research is performed to clarify the understanding of a problem or a phenomenon. The objective is to better understand a precise nature of a problem, get new insights and review phenomena in a new light (Saunders & Thornhill, 2009).

**Descriptive**

Descriptive research is conducted to create an exact profile and describe the characteristics of variables of interest such as persons, events or situations (Saunders & Thornhill, 2009).

**Explanatory**

Explanatory research is executed to establish and explain causal relationships between variables in order to profoundly study a situation or a problem (Saunders & Thornhill, 2009).

**Applied Research Purpose**

The purpose of this research is both explanatory and exploratory. This thesis is mainly of an explanatory nature as it is executed to establish and profoundly explain the cause and effect relationship between the variables VSCC and sustainability. As this causal relationship is unexplored, subjective explanations are needed to study
this situation. Besides, little is known about the phenomenon VSCC for sustainability and new insights and a clarified understanding about the nature of the problem are desirable. Therefore, in this thesis exploratory research is applied as it is a valuable means of seeking new insights and clarifying the understanding the nature of the problem by interviewing participants in this subject (Saunders & Thornhill, 2009).

2.4 Research Strategy

A research strategy can be described as a “general orientation to the conduct of business research” (Bryman & Bell, 2011, p. 26). Two distinctive research strategy categories are established in the methodological literature; authors differ between quantitative and qualitative research (Bryman & Bell, 2011). The differentiation helps to understand the requirements of being able to analyze quantitative and qualitative data (Saunders & Thornhill, 2009).

**Quantitative**

Quantitative research is concerned with quantitative phenomena and their measurement expressed in terms of numbers (Kothari, 2004). It is based on numbers and for the collection and analysis of data quantification is emphasized (Saunders & Thornhill, 2009; Bryman & Bell, 2011). Quantitative research encompasses a deductive approach to the relationship between theory and research in which the testing of theories is focused (Bryman & Bell, 2011). Furthermore, the collection of quantitative data by means of surveys or questionnaires results in numerical and standardized data. Finally, the data analysis is carried out and illustrated by diagrams and statistics (Saunders & Thornhill, 2009).

**Qualitative**

Qualitative research refers to qualitative phenomena such as the subjective assessment of attitudes, opinions or behavior (Kothari, 2004). It is based on words and mostly highlights words for the collection and analysis of data instead of quantification (Saunders & Thornhill, 2009; Bryman & Bell, 2011). Additionally, qualitative research involves an inductive approach to the relationship between theory and research and the focus lies on the generation of theories (Bryman & Bell, 2011). Common techniques for qualitative research are focus group interviews, projective techniques and depth interviews (Kothari, 2004). These collection
techniques results in non-standardized data that requires classification into categories and through the usage of conceptualization this data can be analyzed (Saunders & Thornhill, 2009).

Applied Research Strategy

The conducted research strategy can be classified as qualitative as the thesis is based on interviews and the related subjective assessment of attitudes, opinions or behavior. Quantifications are not relevant, and rather words are emphasized for the collection and analysis of data in terms of the response of the interviewees (Saunders & Thornhill, 2009; Bryman & Bell, 2011).

2.5 Research Design

A research design refers to the criteria that enable the assessment of business research. It provides a framework to collect and analyze data and thereby generates evidence for both a related criteria and a specific research question (Bryman & Bell, 2011). Indeed, “a choice of research design reflects decisions about the priority being given to a range of dimensions of the research process” such as causal connections or meanings of behavior (Bryman & Bell, 2011, p. 40). Bryman and Bell (2011) differentiate between five research designs: experimental, cross-sectional, longitudinal, case study and comparative.

Experimental Design

The experimental design is a rarely used research design, but is considered and frequently used as a benchmark against which non-experimental quantitative research is evaluated. The little application of this design is due to the difficult achievement of the necessary level of control concerning organizational behaviors. Another reason is the often required manipulation of the independent variable for conducting a true experiment. However, true experiments tend to reduce uncertainty about internal validity by creating substantial certainty in the robustness and trustworthiness of causal findings (Bryman & Bell, 2011).

Cross-Sectional Design

The cross-sectional design also called social survey design “entails the collection of data on more than one case [...] and at a single point in time in order to collect a body
of quantitative or quantifiable data in connection with two or more variables [...], which are then examined to detect patterns of association” (Bryman & Bell, 2011, p. 53). For the detection of patterns of association or investigation of relationships between variables this implies that more than one case needs to be examined to establish variation in terms of people, organizations or nations; at a single point in time the collection of data on the variables of interest occurs; and quantitative or quantifiable data are required for the purpose of establishing variation between cases.

**Longitudinal Design**

A longitudinal design is utilized to outline modifications in applied research of business and management. To detect and to evaluate evolving changes, organizations are regarded as data providers on mechanisms and processes. This process involves time and costs and thus, the design is not so common in research. The longitudinal design is considered as an extension of social survey research with data collection through questionnaires or structured interviews. On that account, a sample is at least twice surveyed and can allow finding causal inferences (Bryman & Bell, 2011). Bryman and Bell (2011) differ between two different types of longitudinal design: the panel study and the cohort study. The panel study relates to the collection of data from a random sample (individuals or organizations) at two or more different moments. The cohort study refers to either the collection of data from a whole cohort of people or or the collection of data from a random sample. However, the sample must be composed of people with particular characteristics (Bryman & Bell, 2011).

**Case Study Design**

As stated by Bryman and Bell (2011, p. 59), a case study design “entails the detailed and intensive analysis of a single case”. This design is very common in business and management research and investigates the certain nature as well as complexity of that single case (Bryman & Bell, 2011). As claimed by Knights and McCabe (1997), a case study is more appropriate for a qualitative research but it can also be used for quantitative research. According to Ghauri and Grønhaug (2010), a case study is mostly used to answer questions of ‘how’ and ‘why’ and in cases where the researcher has little influence on the situation. However, the case study design is not only narrowed to single cases but also to multiple cases which are considered as an extension of the case study approach (Bryman & Bell, 2011). The objective of
multiple case studies is to compare the cases in question and then compare the deduced findings in order to reflect upon similar characteristics across the included cases. Finally, in a multiple case study, the structure of the research is a key component to guarantee cross-case comparability and semi-structured interviews are recommended for the execution of such studies (Bryman & Bell, 2011).

**Comparative Design**

A comparative design “entails the study using more or less identical methods of two or more contrasting cases” (Bryman & Bell, 2011, p. 63). In this design, the comparison of at least two cases or situations with social phenomena is vital to better understand the latter. To be realized, the comparative design requires at least two cases (organizations, nations or people) and works for both qualitative and quantitative research (Bryman & Bell, 2011). Besides, Hantrais and Mangen (1996) state that this research design is used for the comparison of phenomena or issues between two or more countries with regards to their nature of socio-cultural backgrounds.

**Applied Research Design**

The research design of this thesis consists of a multiple case study of three logistics service providers. A multiple case study is mostly used for qualitative research (Knights & McCabe, 1997) and to answer the question of ‘how’ (Ghauri & Gronhaug, 2010), which correspond to the purpose and research questions of this thesis. With semi-structured interviews the cases in question, viz. analyzing VSCC between each LSP and its suppliers as well as customers for sustainability, are contrasted and the findings compared in order to reflect upon similar characteristics.

### 2.6 Population and Sampling Method

According to Saunders and Thornhill (2009), for some research questions it is not possible to collect data from the whole population due to monetary and time issues as well as lacking access to information. In the sense of sampling, population is the complete set of cases from which a sample is taken. For these instances, a sample needs to be selected for investigation, which represents a segment or subset of the population (see Figure 3).
Sampling methods can be divided into two different approaches: probability sampling and non-probability sampling (Saunders & Thornhill, 2009; Bryman & Bell, 2011).

**Probability Sampling**

Bryman and Bell (2011, p. 176) define a probability sample as “a sample that has been selected using random selection so that each unit in the population has a known chance of being selected”. This sampling approach is also called representative sampling and is mostly related to research strategies that necessitate in evaluating statistically the characteristics of a certain population from a sample such as survey and experimental strategies in order to be able to answer research questions (Saunders & Thornhill, 2009). The main goal of probability sampling is to minimize the level of sampling errors (Bryman & Bell, 2011). According to Bryman and Bell (2011), the size of a sample is important with regards to the level of error. The larger the sample, the less errors will be in the representation of the population.

In order to select a probability sample, five different techniques are commonly used: simple random sampling, systematic sampling, stratified random sampling, cluster sampling and multi-stage sampling. The simple random sampling technique includes the random selection of the sample from the sampling frame using technology such as computers (Saunders & Thornhill, 2009). The systematic sampling method refers to the selection of the sample “at regular intervals from the sampling frame” (Saunders & Thornhill, 2009, p. 226). The stratified random sampling is similar to simple random sampling and implies the population to be divided “into two or more relevant and significant strata based on one or a number of attributes” (Saunders & Thornhill, 2009, p. 228). In the cluster sampling the population is also divided but
this time into discrete groups prior to sampling. The last technique, the multi-stage sampling, is an extension of the cluster sampling in which a series of cluster samples are taken and each of the series utilizes systematic, stratified or simple random sampling (Saunders & Thornhill, 2009).

**Non-Probability Sampling**

According to Saunders and Thornhill (2009), for some research (e.g. surveys or case studies) it is not possible to use probability sampling due to a lack of a sampling frame. Thus, another approach that is non-random is required for selecting a sample. A non-probability sample is “a sample that has not been selected using a random selection method” (Bryman & Bell, 2011, p. 176). For non-probability sampling, also known as judgmental sampling, the selection of samples occurs based on subjective judgments and can be purposively on specific populations. As a consequence, the probability or chance of the selection of certain cases from an entire population is unknown and statistical conclusions about the population are impossible to make.

To select a non-probability sample, different techniques can be utilized: quota sampling, purposive sampling, snowball sampling, self-selection sampling and convenience sampling (Saunders & Thornhill, 2009). Quota sampling is often applied for interview surveys and bases on the assumption “that your sample will represent the population as the variability in your sample for various quota variables is the same as that in the population” (Saunders & Thornhill, 2009, p. 235). Purposive sampling is normally adopted for case study research with a small sample and is built on researchers’ judgments for the selection of cases in order to answer the research question in a satisfactory manner. Snowball sampling is applicable for situations where the identification of the desired sample is problematic (Saunders & Thornhill, 2009). To solve this problem, at first initial contact to a relevant small population is established and these contacts are subsequently used to get in touch with a new population (Bryman & Bell, 2011). Self-selection sampling “occurs when you allow each case, usually individuals, to identify their desire to take part in the research” (Saunders & Thornhill, 2009, p. 241). Lastly, convenience sampling is the most convenient technique as it includes a random selection of cases for the sample due to its availability to the researcher. As a result, this technique involves a variation difficult to control (Saunders & Thornhill, 2009; Bryman & Bell, 2011).
Population and Applied Sampling Method

The population for this research encompasses logistics service provider and to further select suitable companies for this research, subjective selection criteria are established. First of all, the geographical location of the company matters. The LSPs must be based in Europe due economical similarities in business between European countries. The second criterion is that the LSPs are required to have upstream activities with suppliers and downstream activities with customers in order to be considered for the analysis of vertical collaboration within supply chains. Lastly and once the previous criteria have been met, the willingness of LSPs to participate in this research is vital.

As it is not possible to collect data from the entire population due to monetary and time issues, a subset of the population (sample) needs to be selected. This research, in the form of a case study, does not allow the usage of a probability sampling due to the lack of a sampling frame. Therefore, a non-probability sampling is used to select samples based on subjective judgments and be able to purposively reach individual European LSPs. In addition, the purposive sampling technique is used as it works for case study research with small samples and enables the researchers to use their judgments for the selection of LSPs that best permits to achieve a better understanding of VSCC for sustainability and answer the related research questions (Saunders & Thornhill, 2009). Fulfilling the selection and sampling criteria for LSPs, this thesis aims to answer the research questions by providing information from three European LSPs located in France and Germany within three case studies. However, the company names and interviewees have been anonymized in order to not to reveal the companies. The anonymized form of the case companies and interviewees is shown in Table 1.
Table 1: Overview of case companies (Own illustration)

<table>
<thead>
<tr>
<th>Case</th>
<th>Case Company</th>
<th>Interviewee</th>
<th>Job Position</th>
<th>Supplier</th>
<th>Customer</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Full service provider (France)</td>
<td>Interviewee A</td>
<td>CEO</td>
<td>Manufacturer</td>
<td>Retailer</td>
</tr>
<tr>
<td>B</td>
<td>Freight forwarder (France)</td>
<td>Interviewee B</td>
<td>Head of Supply Chain Solutions</td>
<td>Shipping line</td>
<td>Manufacturer</td>
</tr>
<tr>
<td>C</td>
<td>Freight forwarder (Germany)</td>
<td>Interviewee C</td>
<td>Assistant to CEO</td>
<td>Shipping line</td>
<td>Manufacturer/Retailer</td>
</tr>
</tbody>
</table>

2.7 Data Collection Method

Data collection is an important task within research. It starts after the definition of a research problem and the development of a research plan. Two data collection methods can be applied by researchers: primary and secondary data collection methods (Kothari, 2004). Primary data are collected for the first time, and hence are original (Kothari, 2004) whereas secondary data have already been collected, statically examined and stored for some specific purpose (Saunders & Thornhill, 2009). Thus, both data collection methods differ due to their origin; primary data are originally collected and secondary data are based on compilation. Consequently, each researcher has to decide which type of data is required and then select the data collection method that is most suitable for the purpose of the study (Kothari, 2004).

Primary Data Collection

Primary data can either be qualitative or quantitative and the collection methods contribute to more accurate analyses of research since the data are collected for the first time (Khan, 2011). Primary data can be collected with various methods in an experimental type or a descriptive type of research (Kothari, 2004). Saunders and Thornhill (2009) specify three main types of primary data collection: observations, interviews (semi-structured, in-depth or group), and questionnaires. Additionally, Kothari (2004) list two other methods viz. schedules and other methods including
warranty cards, distributor audits, pantry audits, consumer panels, usage of mechanical devices, projective techniques, depth interviews and content analysis.

**Secondary Data Collection**

Secondary data are that type of data that already exists, have been collected and analyzed, but can be extracted and used for a particular purpose of a study (Kothari, 2004; Khan, 2011). Several sources are available to obtain secondary data and hence, obtaining secondary data is easier than the collection of original data (Kothari, 2004). According to Saunders and Thornhill (2009), common types of secondary data are: documentaries, surveys and multiple sources.

Documentary data include written and non-written materials and can be analyzed both quantitatively and qualitatively. Written materials can be books, journal and magazine articles, newspapers, notices, correspondence, minutes of meetings, reports to shareholders, diaries, transcripts of speeches, and administrative and public records. Non-written materials consist of voice and video recordings, pictures, drawings, films and television programs, and organizations’ databases.

Survey-based data are normally collected by the usage of a survey strategy and in particular of one of three survey strategy sub-types: censuses, continuous and regular surveys, and ad hoc surveys (Saunders & Thornhill, 2009). Censuses are unique and official surveys performed by the government where the participation of the population is mandatory. Continuous and regular surveys are repeating surveys over time. Lastly, ad hoc surveys are typically distinct one-off surveys about a research topic (Saunders & Thornhill, 2009).

Multiple source data are a combination of different data sets based on documentary data, survey data, or a mixture of the two data sets, and include area-based and time-series based data. Area-based data are combined data sets from diverse sources but with the same geographical basis such as country reports or government publications. In contrast, time-series based data are compilations where selected and comparable variables from several surveys that have been repeated a number of times are extracted and combined. Examples are industry statistics and reports or European Union publications (Saunders & Thornhill, 2009).
**Applied Data Collection Method**

In order to gather sufficient information to explore the research topic and answer the research question, primary and secondary data are used as well as related collection methods are employed. Primary data is collected through semi-structured interviews with representatives of the case companies. Moreover, secondary data including books, scientific articles, journals and companies’ homepages is utilized to get further secondary information.

**2.8 Data Analysis Method**

According to Yin (2014), the analysis of evidence of a case study is complex and many researchers face issues of how to analyze the evidence. To face the issues, some investigators use computer-assisted tools, but these tools cannot replace general analytic strategies which are more essential. A general analytic strategy aims to associate a case study to particular concepts of interest in order to obtain a direction to analyze the evidence. Researchers are able to examine the evidence, generate analytic conclusions and exclude nonrelevant interpretations. Attention should be paid to the choice of the strategy; the researcher should be aware of it before the collection of data is conducted (Yin, 2014). Therefore, to structure and succeed in the analysis of case study evidence, four different general analytic strategies can be applied: “relying on theoretical propositions”, “working your data from the ground-up”, “developing a case description” and “examining plausible rival explanations” (Yin, 2014, p. 136).

Beside the four general analytic strategies, five analytic techniques within case studies are common to analyze data and answer research questions. These techniques are pattern matching, explanation building, time-series analysis, logic model and cross case synthesis. However, the usage of a particular technique depends on the research design and gathered data (Yin, 2014).

**Pattern Matching**

The pattern matching techniques have the logic of generating patterns based on empirical results and comparing them with earlier predicted patterns that were generated before the collection of data. The techniques are suitable for a case study and if the newly generated and earlier predicted patterns coincide, the results can
strengthen the internal validity of the investigated case study (Yin, 2014). Yin (2014) distinguishes between three types of pattern matching: (1) non-equivalent dependent variables as a pattern, (2) rival explanations as patterns and (3) simpler patterns. However, due to the logic of pattern matching, it offers no precise comparisons (Yin, 2014).

Explanation Building
The explanation building technique aims to analyze data of a case study by building an explanation of the case with an iterative nature. Further, this technique is used to explain a phenomenon by prescribing an assumed set of causal links that explain “how” and “why” something happens (Yin, 2014). Nevertheless, Yin (2014) points out that explanation building is a difficult technique due to the precise and complicated measurement of causal links, the complexity of the iterative process, and the risk of drifting away from original focus and thus, it is more adapted for explanatory cases.

Time-Series Analysis
A time-series analysis intends to investigate crucial questions of ‘how’ and ‘why’ in case studies. This technique can follow complex patterns concerning the relationship of events over time. A rule of thumb states that the more complex the pattern, the firmer the foundation for conclusions of the case study. Three types of time-series analyses exist: (1) simple time series, (2) complex time series and (3) chronologies (Yin, 2014).

Logic Model
The logic model technique is used to prescribe and operationalize an extensive chain of events over time and these events are then staged in repeated cause and effect relationships (Yin, 2014). It is similar to pattern matching and “consists of matching empirically observed events to theoretically predicted events” (Yin, 2014, p. 155). Yin (2014) differentiate between four types of logic models: (1) individual-level logic model, (2) firm or organizational-level logic model, (3) an alternative configuration for an organizational-level logic model and (4) program-level logic model.
Cross-Case Synthesis

A cross-case synthesis consists of separate analyses of case studies for the purpose of obtaining cross-case conclusions. This technique is solely applicable for multiple case studies composed of at least two cases in order to compare different cases and detect similarities between them (Yin, 2014). Yin (2014) also claims that the collected data from each case study must be depicted in a word table consisting of diverse categories and hence, a qualitative analysis of this word table enables cross-case conclusions.

Applied Data Analysis Method

This thesis will make use of a mixture of two analytic techniques within case studies to analyze the data and answer the research questions. Explanation building is utilized to analyze data of the cases A, B and C by building an explanation of the cases and explaining a phenomenon by prescribing an assumed set of causal links (Yin, 2014) that explain how VSCC between LSPs with partners can improve sustainability at LSPs. Besides, a cross-case synthesis/analysis is applied in order to compare different cases and detect similarities between the LSPs concerning their contribution of VSCC to sustainability as well as obtain cross-case conclusions in the multiple case study (Yin, 2014). Firstly, single cases are investigated as separate studies and classified into cases A, B and C. Then, the cases are compared and generalized to drawn cross-case conclusions.

2.9 Quality Criteria

In order to assess the quality of business and management research, criteria are necessary for the quality for the selected research (Bryman & Bell, 2011). Two of the most popular quality criteria for business research are validity and reliability. Validity is concerned with the question of whether or not the findings are about the accurate subject matter they appear to be, whereas reliability deals with the question of whether or not findings of a study result in the same outcomes when repeating the study (Saunders & Thornhill, 2009; Bryman & Bell, 2011). Yin (2014) states that four different tests are appropriate to assess the quality of empirical research such as case studies. The research design at hand is a case study design. Hence, the quality of case study designs can be enhanced through four criteria: construct validity, internal validity, external validity and reliability (Yin, 2014).
Construct Validity
Construct validity relates to the identification of the right operational measures for the phenomenon in question. In this regard, a critical aspect of the collection of data is that case study researchers frequently do not find the right operational measures and rather employ subjective judgments for the collection (Yin, 2014). In order to fulfill the construct validity criterion, Yin (2014) suggests two steps a researcher must follow: (1) specifying change with regards to certain concepts and linking them to the study purpose and (2) determining operational measures cited in prior research that fit to the concept. Furthermore, Yin (2014) recommends three tactics to enhance construct validity for case studies. During the collection of data, (a) multiple sources of evidence should be utilized and (b) a chain of evidence should be created. Lastly, (c) the final draft of the case study report should be surveyed by experts.

Internal Validity
Internal validity is concerned with the creation of a causal relationship between two or more variables and whether specific conditions effectuate different conditions (Bryman & Bell, 2011; Yin, 2014). Yin (2014) notes that the main target is to achieve a sufficient level of internal validity to be able to make inferences and answer research questions. Especially for case study research, it is problematic to prove that inferences and the data collected are correct. In order to reach a sufficient level of internal validity, Yin (2014) identifies four analytic tactics: (1) pattern matching, (2) explanation building, (3) rival explanations addressing and (4) logic models usage. However, internal validity is solely applied for explanatory and causal studies but is not applicable for descriptive and exploratory studies (Yin, 2014).

External Validity
External validity in Yin’s (2014) understanding refers to the extent to which findings of a study can be generalized across domains as well as the definition of such domain. The extent of generalization of the findings is unknown and might go beyond the particular research domain (Bryman & Bell, 2011) or beyond the case study under investigation (Yin, 2014). In particular, single case studies are a weak source for analytic generalizations but multiple case studies are more suitable as a source. Therefore to reach external validity, a certain set of findings must be
generalized across domains such as a general theory. The theory is then tested with a replication logic meaning that the results are replicated and the outcomes should be the same (Yin, 2014). After having conducted such replications, the results might be accepted as providing strong support for the theory (Yin, 2014, p. 44).

**Reliability**

Reliability implicates that the repetition of study operations with the same procedures leading to the same outcomes and conclusions (Yin, 2014). Yin (2014, p. 45) further highlights the objective of reliability; the minimization of “errors and biases in a study”. To enable future researchers to conduct the same case study again and seeking for the same findings, it is vital to document each step and procedures carried out in the previous case. For this reason, two different tactics should be applied: (1) utilizing a case study protocol and (2) developing a case study database (Yin, 2014).

**Applied Quality Criteria**

The applied quality criteria for this thesis (case study design) are construct validity, internal validity, external validity and reliability.

Construct validity is generated through the linkage of the key concepts to the study purpose. Clear conceptual definitions of all key concepts are given and operational definitions are identified based on existing and approved literature within the frame of reference. Additionally, multiple data sources of evidence (such as interviews and documents) are considered and the draft of the case study report is reviewed by participants as well as a supervisor (Yin, 2014).

In order to achieve a sufficient level of internal validity, the analytic data technique explanation building is used. Furthermore within this predominant explanatory thesis, a causal (cause and effect) relationship between the variables VSCC and sustainability is created (Yin, 2014).

In accordance with Yin (2014), external validity is reached through the early development of research questions based on theory and the logic of replication with means of the execution of a cross-case analysis.
Reliability is created through the transparent documentation of the conducted steps and procedures in this case study in order to allow the possible reproduction of this scientific work. Hence, case study protocols and a guide are created to answer the research questions (Yin, 2014). Moreover, the interviewees are informed about the interview structure and the interview questions are sent to the participants before the actual interview takes place to avoid misinterpretations of the questions.

2.10 Research Ethics

In business and management research ethical issues regularly occur at several phases (Bryman & Bell, 2011). These phases range from research planning to gaining access to individuals and companies, as well as to the collection, analysis and reporting of data. Saunders and Thornhill (2009, p. 183-184) define ethics in the context of research as “the appropriateness of your behavior in relation to the rights of those who become the subject of your work, or are affected by it”. As a consequence, research ethics are concerned with the question of how to conduct research in a moral and responsible way relating to the formulation of a research topic, the design of research, the attainment of access, the collection of data, the storage of data, the analysis of data and the presentation of research findings. Thus, researchers have the duty to guarantee that the way of designing the research is methodologically accurate as well as morally justifiable to all involved actors (Saunders & Thornhill, 2009).

The main ethical issues that frequently arise across the phases of research projects are harm to participants, lack of informed consent, invasion of privacy and deception (Saunders & Thornhill, 2009; Bryman & Bell, 2011).

Harm to Participants

The first ethical issue, harm to participants, deals with facets of harm that can be caused by conducting research and negatively affects the involved participants. Corresponding facets of harm can be physical harm, stress, and harm to the self-esteem or to future career prospects of participants (Bryman & Bell, 2011). Researchers should avoid all facets of harm to participants and be careful when undertaking observations, interviews and questionnaires. All three have the potential to provoke harm to participants, but also in particular the way of obtaining consent,
receiving confidentiality, and collecting and utilizing the data from the participants (Saunders & Thornhill, 2009).

*Lack of Informed Consent*

Lack of informed consent, which is the second ethical issue, is concerned with situations where research participants do not have enough information in order to make fully informed decisions (Bryman & Bell, 2011). Thus, informed consent is the condition of a fully clarified and freely given nature of that consent (Saunders & Thornhill, 2009). The scope of given consent to participate in a research study is not always clear. Simply agreeing to participate in a scientific study does not define the scope of nature of the consent and the way in which the researcher utilizes the collected data. This results in a continuum caused by lack of consent and lack of clarity about the character of consent where the researcher assumes consent and a fully informed consent from taking part in the study (Saunders & Thornhill, 2009). In any case, the researcher should avoid this lack of informed consent by providing the research participant with as much information and assurances about anonymity or confidentiality as needed to be able to make thoroughly informed decisions about his or her participation (Saunders & Thornhill, 2009; Bryman & Bell, 2011).

*Invasion of Privacy*

Invasion of privacy, the third ethical issue, refers to the extent to which invasions of privacy can be accepted. In general, the right to privacy is a basic principle for humans and individual’s values must be respected. Particular objectives of researchers’ studies that breach the respondent’s privacy in a harmful or aggressive manner are not regarded as reasonable (Bryman & Bell, 2011). Saunders and Thornhill (2009) assert that especially the internet serves as a source for research projects with an easier and faster way of contacting possible participants. Nonetheless, the usage of the internet involves several ethical issues and invasions of privacy for participants. For this reason, “a number of rules or guidelines about how to act ethically when using the Internet” have been developed, named netiquette (Saunders & Thornhill, 2009, p. 187).
**Deception**

The last ethical issue, deception, “occurs when researchers represent their research as something other than what it is” (Bryman & Bell, 2011, p. 136). Participants are deceived about the nature or use of the researchers’ study and led to believe the falsehood (Saunders & Thornhill, 2009). On behalf of both the researcher and participant deception should be reduced and related consequences minimized to not harm human dignity. However, when deception is necessary to some extent, potential benefits should be weighed up against the costs by the researcher (Bryman & Bell, 2011).

**Other Ethical Issues**

However, according to Saunders and Thornhill (2009), there are other ethical issues that need to be considered when planning a research project beside the four main ethical issues. The researcher must preserve objectivity and the research project should be of a voluntary nature of participation. The participants’ right to withdraw from the process is preexistent at any time. Besides, the anonymity of participants and confidentiality of data provided is maintained. Lastly, reactions of and effects on participants are respected relating to the way in which data are collected, used, analyzed and reported in order to avoid embarrassment, stress, discomfort and pain (Saunders & Thornhill, 2009).

**Applied Research Ethics**

The consideration of research ethics issues plays a major role in this thesis due to the nature of data collection, in particular the interviews with involved participants. Therefore, various research ethics are respected including respect for privacy of possible and actual participants, informed consent, anonymity and confidentiality. Additionally, the researchers preserve objectivity, the participation in the research study is of a voluntary nature and deception is avoided.

**2.11 Research Working Process**

This degree project is based on five seminars about the authors’ reports within the master program’s theory areas business process and supply chain management during the process of writing. Within the seminars the authors’ and fellow students’ texts at their different stages of development are discussed under the guidance of a
seminar leader. The different stages are (0) thesis idea, (1) introduction chapter, (2) methodology, (3) theory, (4) empirical chapter and analysis. The degree project course and seminar series complete with a final seminar, in which a presentation and an assessment is conducted. The time spans between each seminar are approximately one month. During the working process (including the different stages, final seminar with presentation and oppositions) the authors tried to share the work equally between them. All chapters were separated into several parts and each part was assigned to one of the two authors. Consequently, each author had specific parts to write on to enhance productivity and accomplish more tasks. Likewise, the data collection by means of conducting several interviews and reviewing secondary sources was performed by both researchers. By reason of the related location and language preferences of the case companies author B conducted two interviews and author A one interview. However, different motivations, scientific skills and language skills caused that author A occupied the leading position, structured and organized the degree project. This in turn implied that this author held a higher workload, also because after reviewing the beforehand assigned specific parts of author B; he rewrote it according to his expectations in order to improve it and achieve a better mutual outcome.

2.12 Summary of Methodology

A summary of the methodology subjects and the corresponding applied types for this thesis are presented in Table 2.

<table>
<thead>
<tr>
<th>Methodology Subject</th>
<th>Applied Methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Philosophy</td>
<td>Interpretivism</td>
</tr>
<tr>
<td>Research Approach</td>
<td>Deductive</td>
</tr>
<tr>
<td>Research Purpose</td>
<td>Explanatory and exploratory</td>
</tr>
<tr>
<td>Research Strategy</td>
<td>Qualitative</td>
</tr>
<tr>
<td>Research Design</td>
<td>Multiple case study</td>
</tr>
<tr>
<td>Population and Sampling Method</td>
<td>Non-probability and purposive sampling (European LSPs with up- and downstream activities)</td>
</tr>
<tr>
<td>Data Collection Method</td>
<td>Primary (interviews) and secondary data (books, scientific articles, journals and companies’ homepages)</td>
</tr>
<tr>
<td>Data Analysis Method</td>
<td>Explanation building and cross-case synthesis/analysis</td>
</tr>
<tr>
<td>----------------------</td>
<td>-------------------------------------------------------</td>
</tr>
<tr>
<td>Quality Criteria</td>
<td>Construct validity, internal validity, external validity and reliability</td>
</tr>
<tr>
<td>Research Ethics</td>
<td>Respecting privacy, anonymity and confidentiality, avoiding deception, informed consent</td>
</tr>
<tr>
<td>Research Working Process</td>
<td>Separation and equal allocation of chapters as well as data collection between authors to enhance productivity Overall workload not identical due to different motivations, scientific skills and language skills</td>
</tr>
</tbody>
</table>

3 Theoretical Framework

The theoretical framework provides descriptions and definitions of vertical supply chain collaboration, sustainability and vertical supply chain collaboration for sustainability. For vertical supply chain collaboration common underlying practices and for sustainability the economic, environmental and social pillars are further explained as these concepts will be of importance for answering the research questions.

3.1 Vertical Supply Chain Collaboration

Companies are constantly looking for a restructuring of the SC in order to increase the effectiveness and customer satisfaction. This requires companies to analyze the resources and capabilities of their customers and suppliers that can add value (Soosay et al., 2008). According to Barratt (2004) and Soylu et al. (2006), collaboration with suppliers and customers enables companies to gain competitive advantages and improve performances, and it further can benefit to companies due to closer relationships with their partners. This collaboration with suppliers and customers represents the vertical type of SCC and accordingly, vertical supply chain collaboration corresponds to external collaboration with suppliers and customers (Barratt, 2004). VSCC is described as two or more organizations (e.g. manufacturer, LSP, retailer, customer) sharing responsibilities, risks, resources and information within a supply chain in order to improve customer satisfaction and successfully serve the end customer (Simatupang & Sridharan, 2002). Examples of the downstream collaboration activities with suppliers are supplier relationship management, vendor managed inventory, supplier planning and production
scheduling, and collaborative design and transportation. In contrast, examples of upstream collaboration activities with customers are customer relationship management, collaborative planning, forecasting and replenishment, shared distribution, and efficient customer response (see Figure 4) (Simatupang & Sridharan, 2002; Barratt, 2004).

![Figure 4: Scope of vertical supply chain collaboration (Barratt, 2004)](image)

Moreover, VSCC is based on relationships with suppliers and customers and these relationships are directly linked to the intensity of the collaboration. The intensity of the collaboration depends on the period that the collaboration will be affected (Simatupang & Sridharan, 2002). Three types of period exist: short-term (less than one year), medium-term (one to three years) and long-term (more than three years). Short-term collaboration refers to the cooperation between different organizations with the goal to meet the needs of demands for products and services. Medium-term collaboration involves more responsibilities and risk sharing in order to synchronize product design and logistics capabilities. Finally, long-term collaboration includes a better collaboration and not only risk sharing but also sharing of capabilities to create superior service capabilities (Simatupang & Sridharan, 2002).
3.1.1 Vertical Supply Chain Collaboration Practices

The concept of VSCC can be classified into five common practices which further represent VSCC within this research project. These practices are information sharing, joint decision making, incentive sharing, goal congruence and joint knowledge creation (Cao & Zhang, 2011; Wee et al., 2016). Besides, common measurements for the five practices are given at the end of each chapter which are needed for the operationalization of the key concepts.

3.1.1.1 Information Sharing

Information sharing refers to the action of capturing and transferring relevant information on time in order to manage business operations (Cao & Zhang, 2011; Wee et al., 2016). It implies that available data is retained and shared among the supply chain partners in order to improve the information flow in the SC, improve the effectiveness and efficiency of the SC, and respond quicker to customers (Lee & Whang, 1998). Various types of shared information exist: inventory level, sales data, order status for tracking/tracing, sales forecast, production and delivery schedule, and other information (Lee & Whang, 1998).

*Information Sharing Types*

Inventory level is the most common data shared within the SC. In general, these data are implemented in the shape of replenishment programs such as continuous replenishment programs or vendor-managed inventory. The access to these data can help to lower the total inventory level in the SC by eliminating duplicate safety inventories or stockout at various locations. The sharing of inventory levels further leads to cost reductions due to better inventory levels (Lee & Whang, 1998).

In a traditional supplier-buyer relationship the demand is solely communicated in terms of orders. Due to demand or price variations an order can distort from the reality of the market and misguide the upstream partners in their production and inventory decisions. Therefore, shared sales data help to reduce the bullwhip effect with true data that are not distorted. Moreover, the sharing of sales data helps suppliers to be better prepared for changing market demands and thereby provide a better customer service (Lee & Whang, 1998).
Diverse actors with different functions are involved in supply chains, thus it is difficult for a customer to find the status of an order due to ignorance of where the order is being processed in the SC. Allowing the access of this information for other partners helps to improve the quality of customer service, reduce the payment cycle and save labor cost (Lee & Whang, 1998).

Sales forecast information is based on sharing sales information with suppliers to plan future market demands. It helps suppliers to define a production plan and better respond to future commands (Lee & Whang, 1998).

Finally, the production and delivery schedule within the SC is shared in order to improve the production plan and enable partners to work more efficiently (Lee & Whang, 1998).

Other Information
In addition, other types of information that can be shared within a SC are performance metrics and capacity. Performance metrics includes indicators such as lead times, service performance and product quality data. Capacity information allows partners to be prepared against possible shortages and variable demand (Lee & Whang, 1998).

To manage the information flow and communication, companies usually use tools and software such as enterprise resource planning (ERP) that support the collaboration between partners (Kelle & Akbulut, 2005). According to Kelle and Akbulut (2005), the ERP system helps organizations to improve information sharing, cooperation and cost optimization.

Measurement
Information sharing can be measured with variables that examine the level and quality of information shared such as demand forecast, on-hand inventory levels, order status and order tracking, delivery schedules, prices changes, promotional events, points-of-sale data, inventory-holding costs, inventory policy, and supply disruptions (Simatupang & Sridharan, 2005). Other authors like Wee et al. (2016) measure information sharing with its results on the SC such as new product development or new technology acceptance. Lastly, Zhou and Benton (2007) directly
evaluate the performance of the information with variables such as information accuracy, lead time information for product and performance evaluation information.

3.1.1.2 Joint Decision Making

Joint decision making relates to the process of synchronizing decisions on planning and operation issues between supply chain partners (Cao & Zhang, 2011; Wee et al., 2016). According to Cao and Zhang (2011), decisions within the SC include information and plans like sales and order forecast, conflicts, procedures, customer service level and rules. Each SC partner possesses different decision rights within the SC and this emphasizes the importance of joint decision making in order to achieve collective goals of the SC (Simatupang & Sridharan, 2005). Against this background, conflicts can occur in the decision making process and affect the entire SC with issues such as distorted information or unclear structures of decision processes (Hudnurkar et al., 2014). In order to solve these issues and implement an effective joint decision making process, the most common way is to organize face-to-face meetings and virtual forums (Wee et al., 2016). Besides, Simatupang and Sridharan (2005, p. 264) state that joint decision making “helps the chain members to carry out productive actions associated with integrated supply chain processes such as replenishment, transportation and customer service”.

Measurement

An evaluation of joint decision making can be conducted with variables that measure common planning activities between SC partners such as joint plan on product assortment, joint plan on promotional events, joint development of demand forecasts, joint resolution of forecast exceptions and consultation on pricing policy. Other variables that measure common decision activities within the SC are joint decision on availability level, joint decision on inventory requirements, joint decision on optimal order quantity and joint resolution on order exceptions (Simatupang & Sridharan, 2005).

3.1.1.3 Incentive Sharing

Incentive sharing, also called incentive alignment, represents costs, benefits and risks that are shared between supply chain partners (Cao & Zhang, 2011; Wee et al., 2016). This VSCC practice aims to motivate SC partners to reach their strategic objectives and simultaneously considering the objectives of the whole SC. An
effective incentive sharing is constituted by the collective alignment of partners to reach common objectives. Incentive sharing includes two techniques to motivate SC members called pay-for-performance and pay-for-effort (Cao & Zhang, 2012). Pay-for-performance links payment to performance and supposes that offering rewards for performance will motivate SC partners to reach a specific level of performance. Pay-for-effort links payment to effort assuming that offering rewards for effort will motivate partners to perform a stated amount of effort. This stated amount of effort in turn refers to a particular level of performance (Cao & Zhang, 2012).

Measurement
Incentive sharing can be measured with variables that examine the level of sharing between supply chain partners and its effects within the SC such as joint frequent shopper programs, shared saving on reduced inventory costs, delivery guarantee for a peak demand, allowance for product defects, subsidies for retail price markdowns and agreement on order changes (Simatupang & Sridharan, 2005).

3.1.1.4 Goal Congruence
Goal congruence refers to the degree of joint involvement of partner firms in the achievement of a goal (Samaddar et al., 2006). As stated by Wee et al. (2016, p. 4), “goal congruence includes the defining roles and responsibilities of each partner, development of objectives, common goals, performance measures, standardization of information technology, formalization of shared information, and jointly implement the plan”. In order to create a clear strategy for the whole supply chain, each partner has to know and understand the needs and capabilities of other partners (Poirier & Houser, 1993). As a result, SC members can create and implement a strategy for the entire SC in accordance with the objectives of each partner (Wee et al., 2016).

Measurement
An evaluation of goal congruence can be performed with variables that measure the involvement of each SC partner in order to achieve SC objectives such as duration of the shared goal relationship, level of strategic information shared (Samaddar et al., 2006) or agreement on the goal of the SC (Cao & Zhang, 2011).
3.1.1.5 Joint Knowledge Creation

The last practice, joint knowledge creation, is “the extent to which supply chain partners develop a better understanding of and response to the market and competitive environment by working together” (Cao et al., 2010, p. 6618). Several authors point out the fact that collaboration within the SC helps to create organizational knowledge (Dodgson, 1993; Gulati, 1999). According to Wee et al. (2016, p. 4), two types of knowledge creation exist, called “knowledge exploration” and “knowledge exploitation”. The first one, knowledge exploration, corresponds to the search and acquisition of new knowledge. The second one, knowledge exploitation, relates to the exploitation of this new knowledge in order to learn relevant knowledge (Wee et al., 2016). Hence, the development of a common base of knowledge between SC partners helps to improve the effectiveness of the SC and can create a competitive advantage (Wee et al., 2016).

Measurement

Joint knowledge creation can be measured with variables that analyze the level of joint knowledge creation with its results within the SC such as new ideas accepted by SC members, development of new insights within the SC or between partners, confidence in partner’s motives, the involvement of partner personnel in product design or whether the structure of the SC supports the development of new ideas (Spekman et al., 2002).

3.2 Sustainability

Sustainability is a holistic approach and can be described as the organizing concept of sustaining available but limited resources in order to provide the needs for resources and preferable living conditions of the present and future generations. The resources can either be natural, social or economic, and all resources must be considered together to achieve sustained prosperity (Bell & Morse, 2013; Musson, 2013). Likewise, the Brundtland Commission defines sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland, 1987, p. 8). Brundtland (1987) successfully united environmental with economic and social concerns and the three related basic dimensions of sustainability are economic growth, environmental protection and social equity (Behrends et al., 2008). These three dimensions, referred
to as pillars of sustainability (see Figure 5), are interrelated and changes in one dimension affect the other dimensions, which further imply that sustained prosperity requires respect for profits, the planet and people (Elkington, 1998b; Kajikawa, 2008).

Figure 5: Dimensions of sustainability (Dyllick & Hockerts, 2002)

Economic sustainability relates to the ability to ensure unlimited access to resources required to meet human needs and independence (Harris, 2001). Economic systems are intact, ensure a defined level of economic production, and work on a continuing basis with sustained levels of economic growth, development, productivity and consumption. The economic growth has a trickle-down effect to the poor people and disadvantages nobody (Basiago, 1998). In addition, the economic system is capable to keep a defined level of government, avoid extraordinary imbalances within specific industries which might impair the economic situation and lead to external debt (Holmberg, 1992).

Environmental sustainability encompasses ecosystem integrity, carrying capacity as well as the maintenance of biodiversity and atmospheric stability (Holmberg, 1992; Basiago, 1998). It requires an environmentally sustainable system that is in balance, and has a stable resource base (Holmberg, 1992) where natural capital is maintained as a source of economic input and as a sink for waste (Basiago, 1998). The environmental system prevents an over-exploitation of environmental sink functions and the exhaustion of non-renewable resources (Holmberg, 1992). Besides, the depletion of renewable resources should be avoided and the consumption of natural resources should be not faster than its regeneration. Lastly, wastes should be emitted at a rate where the natural assimilation by the environment keeps up (Basiago, 1998).
Social sustainability comprises equity, empowerment, participation, sharing and cultural identity (Basiago, 1998). Socially sustainable systems are stable, function constantly and allocate sufficiently social services including health, education, gender equity and political accountability (Holmberg, 1992). The social system thereby protects people from discrimination and a social well-being is existent where labor and cultural rights are respected and ensured (Harris, 2001). Finally, equality and human rights as well as basic necessities are accessible by all humans in order to ensure security and quality of life (Harris, 2003).

3.2.1 Triple Bottom Line

The triple bottom line (TBL) is an accounting framework that measures sustainability performance and incorporates and attempts to balance the three dimensions/pillars of economic, environmental and social sustainability (Elkington, 1998b). Firms often struggle to be competitive and sustainable at the same time (Mota et al., 2015). TBL focusses on long-term strategies and challenges firms to move beyond the traditional measures of profit and address environmental and social measures, however the environmental and social dimensions are difficult to grasp in means of their measurement. The TBL framework can be a valuable tool to achieve sustainability goals by incorporating comprehensive measures of profits, people and the planet which are called the three P’s (Elkington, 1998b; Hall, 2011). Many businesses, nonprofit organizations and governments have adopted the TBL accounting framework to assess their sustainability performance (Hall, 2011). In order to evaluate the bottom line performance of a firm, plenty of numerical data need to be recorded and analyzed by firm’s accountants (Elkington, 1998a). However, the variables or criteria for the measurement differ across industries and countries (Jung, 2017). Common measurements for the three sustainability dimensions are given at the end of each chapter which are needed for the operationalization of the key concepts.

3.2.1.1 Economic Sustainability Dimension

The economic dimension of the TBL refers to the economic performance and financial stability of companies (Labuschagne et al., 2005) as well as their performance towards their shareholders and markets (Ahmed & McQuaid, 2005). Companies pursue an economical longevity of their operations in terms of long-term
profitability, liquidity and a high market share (Ahmed & McQuaid, 2005; Jamali, 2006). Besides, they strive for the satisfaction of their shareholder with high returns and simultaneously serve the markets without disruptions (Labuschagne et al., 2005). The financial viability is thereby vital within the economic dimension and competitiveness, job and market creation are related targets (Jamali, 2006). In order to achieve these objectives, firms have to ensure a balance between value and costs, but also constantly consider the requirements of their customers (Mota et al., 2015), innovation, investments made and associated risks within the competitive environment (Labuschagne et al., 2005; Erol et al., 2011).

Measurement
An evaluation of economic sustainability can be performed with economic variables that examine the bottom line and cash flow of firms such as revenue, costs, taxes, business diversity factors and business climate factors (Hall, 2011). Likewise, sales growth, profit growth, return on sales, return on assets, return on equity, continuity of operations and gearing are additional common measurements (Hubbard, 2009).

3.2.1.2 Environmental Sustainability Dimension
The environmental dimension of the TBL “focuses on an organization’s impact on living and non-living natural systems, including ecosystems, land, air and water” (Jamali, 2006, p. 812). Environmental sustainability goes beyond the fulfillment of governmental regulations or environmentally friendly efforts such as recycling or pollution control. It implies the minimization of organizations’ negative impact on the environment caused by resource utilization (Elkington, 1998b), operations, products and facilities (Jamali, 2006). Therefore, firms have to consider the impacts of their business activities in order to operate in an environmental and sustainable way. At first, the efficiency and productivity of firm’s assets and resources should be developed to the maximum by a precise assessment of own products, processes and services (Jamali, 2006). Secondly, emissions and waste should be eliminated if possible or reduced to an adequate level to enable a natural depletion by the environment (Kleindorfer & Saad, 2005; Jamali, 2006). Furthermore, the use of scarce natural resources should be reduced with regard to the effects on the environment. The level of usage should be below the resources’ regeneration rate; otherwise substitutes need to be found that replace the scarce resources (Dyllick & Hockerts, 2002; Jamali, 2006). Lastly, companies should implement safety
precautions to avoid environmental accidents and harms the ecosystem by companies’ activities (Kleindorfer & Saad, 2005; Chien, 2014).

**Measurement**
An assessment of environmental sustainability can be conducted with variables that measure natural resources and contemplate potential impacts to its viability such as air and water quality, electricity consumption, fossil fuel consumption, solid and toxic waste management and land use/land cover (Hall, 2011). In the same way, key material consumption, emissions, impact on ecosystems, spillages (Hubbard, 2009) as well as water and energy consumption, number of certified suppliers, use of renewable energy, use of recycled material, and effectiveness of reverse logistics system and monitoring (León-Bravo et al., 2017) are possible variables for assessing environmental sustainability.

3.2.1.3 Social Sustainability Dimension
The social dimension of the TBL is concerned with an organization’s impact on the social system in which it conducts operations (Jamali, 2006; Mani et al., 2016). The social dimension relates to social aspects such as social justice, public health, skills and education, working conditions, human and labor rights, and equal opportunities (Jamali, 2006). Organizations have actively promoted and invested in social aspects for their workforce such as better working conditions, enhanced health and safety, or education and training (Cho et al., 2014). However, the scope of the social dimension is not only restricted to employees; it concerns expectations of both internal and external stakeholder, but also interest groups and communities that need to be well-considered and balanced by companies (Jamali, 2006; Cho et al., 2014). Additionally, the current and the future generations are included within the social bottom line (Cho et al., 2014). Recently, stakeholders have an increased awareness about the social sustainability and in particular regarding the origin and destination of products, as well as the circumstances under which the products are produced and delivered (Jung, 2017).

**Measurement**
Social sustainability can be measured with social variables that address social dimensions of an entity including the measurement of education, unemployment rate, relative poverty, health and quality of life, social capital, and female labor force.
participation rate (Hall, 2011). León-Bravo et al. (2017) list labor practices, work safety procedures, diversity, fair pay systems, investments in social projects and code of conduct as further performance areas for social sustainability. Additionally, other performance measurements for social sustainability are philanthropy, safety, equity, ethics, wages, gender non-discrimination and human rights (Mani et al., 2016). Finally, Hubbard (2009) mentions employee satisfaction, lost time injury frequency, reliability of supply, responsiveness, overall customer satisfaction and sponsorships as further examples of social measurements.

3.2.2 Sustainability at LSPs
Logistics service providers increasingly try to enhance their sustainability capabilities and launch new sustainable solutions in order to attract new customer and fulfill the demanded requirements from their existing manufacturers and customers (Colicchia et al., 2013). Logistics services are an integral part of supply chains and the central role of LSPs within supply chains enables them to reduce the carbon footprint of the whole SC by adopting environmentally sound initiatives (Colicchia et al., 2013; Centobelli et al., 2017). However, the resources for sustainable innovation and solutions are limited due to comparatively low profit margins in the third-party logistics market. Additionally, achieving sustainability at LSPs is challenging as many players are involved in the SC, customers have individual preferences that require customized solutions and network effects are complex (Busse & Wallenburg, 2011; Piecyk & Björklund, 2015).

Various authors have predominantly researched environmental sustainability within the logistics service industry as it is crucial for the reduction of costs by access to financial incentives, tax reliefs by the government and energy efficiency, and the increase of sales through the involvement in sustainability programs, satisfaction of customer demand for green products/services and improvement of customer relations (van Hoek & Johnson, 2010; Colicchia et al., 2013; Piecyk & Björklund, 2015; Centobelli et al., 2017). Besides, social sustainability at LSPs is concerned with the execution of activities considering their impact on internal and external stakeholders such as the society and employees with respect to health and safety (Jung, 2017). Labor rights and the safety of workers are two basic concerns of governments; hence LSPs increasingly engage and invest in social aspects of their workforce consisting
of many people in pick-up and delivery jobs. Besides, LSPs are interested in the safety and maintenance of their transport vehicles as trucks and ships are their essential asset (Jung, 2017). Lastly, according to Kudla and Klaas-Wissing (2012), LSPs conduct economic sustainable activities in order to enhance the efficiency of their processes relating to cost reductions, quality improvements and technological innovations. However, their study revealed that firms understand sustainability differently; environmental and social sustainability activities are regarded as more critical and respected. Therefore, firms want to increasingly focus on these two dimensions, whereas “economic activities are understood as fundamental entrepreneurial actions” (Kudla & Klaas-Wissing, 2012, p. 225).

3.3 Vertical Supply Chain Collaboration for Sustainability

Recently, researchers are increasingly claiming that supply chain collaboration, especially vertical SCC, has an essential role for the attainment of sustainability and has a bottom-line influence on firm performance; however, the combination of SCC for sustainability is a relatively new subject in literature (Blome et al., 2014; Chen et al., 2017; Hubeau et al., 2017; León-Bravo et al., 2017; Pero et al., 2017). The issue of attaining sustainability is no longer practicable for a single organization at its organizational level, but rather all involved member of a supply chain must approach the issue (Pero et al., 2017). Besides, collaboration for sustainability incorporates sustainable practices along the supply- and demand-side, thus supplier and customer of an organization are directly involved in planning and conducting joint sustainable solutions (Vachon & Klassen, 2008; Chen et al., 2017). The execution of joint sustainable solutions requires a good understanding of the partner’s responsibilities and capabilities, a mutual willingness to provide the required resources, and a high level of knowledge exchange among the SC partners (Vachon & Klassen, 2006; Vachon & Klassen, 2008). Correspondingly, environmental collaboration rather focuses on long-term relationships with SC partners in order to effectuate an enhanced performance of supply chains and sustainability-oriented solutions in terms of environmentally friendly products and processes (Vachon & Klassen, 2006). Especially, collaboration with other partners can help companies to develop specific resources and competences, and can lead to a competitive advantage in the long term that otherwise an individual firm would not be able to achieve (Pero et al., 2017). Key factors of external collaboration with suppliers and customers that positively
influence sustainability are information sharing, enhanced communication, logistic integration, technological integration with common IT interfaces and database structures, and joint development such as green products (Beske & Seuring, 2014; Pero et al., 2017).

4 Frame of Reference

*Based on the theoretical framework, five different VSCC practices are identified that build the frame of reference for the projected research and might improve economic, environmental or social sustainability at LSPs.*

4.1 Research Model

In order to answer the research questions concerning improving economic, environmental and social sustainability by VSCC, empirical data is gathered and analyzed. The corresponding research model (see Figure 6) represents the tentative formulation of propositions based on the research question structure and acts as a framework for the operationalization.

![Figure 6: Research model (Own illustration)](image)

4.2 Operationalization

Aiming to explore VSCC practices that might improve economic, environmental and social sustainability at LSPs, the key concepts of this research need conceptual and operational definitions. Therefore, in Table 3 the key concepts are defined, as well as summarized and adapted measurements of these key concepts presented that are used for the analysis.
<table>
<thead>
<tr>
<th>Concept</th>
<th>Conceptual Definition</th>
<th>Operational Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information sharing</td>
<td>Information sharing refers to the action of capturing and transferring relevant information on time in order to manage the business operations (Cao &amp; Zhang, 2011; Wee et al., 2016).</td>
<td>Demand forecast; Points-of-sale data; On-hand inventory levels; Supply disruptions; Order status and order tracking; Delivery schedules (Simatupang &amp; Sridharan, 2005). Lead time information (Zhou &amp; Benton, 2007).</td>
</tr>
<tr>
<td>Joint decision making</td>
<td>Joint decision making relates to the process of synchronizing decisions on planning and operation issues between supply chain partners (Cao &amp; Zhang, 2011; Wee et al., 2016).</td>
<td>Joint plan on product assortment; Joint development of demand forecasts; Joint resolution on forecast exceptions; Joint decision on inventory requirements, Joint decision on optimal order quantity (Simatupang &amp; Sridharan, 2005).</td>
</tr>
<tr>
<td>Incentive sharing</td>
<td>Incentive sharing represents costs, benefits and risks that are shared between the SC partners (Cao &amp; Zhang, 2011; Wee et al., 2016).</td>
<td>Shared saving on reduced inventory costs; Allowance for product defects; Agreements on order changes (Simatupang &amp; Sridharan, 2005).</td>
</tr>
<tr>
<td>Goal congruence</td>
<td>Goal congruence is the degree of joint involvement of partner firms in the achievement of a goal (Samaddar et al., 2006).</td>
<td>Duration of the shared goal relationship; Intensity of the collaboration; Level of strategic information shared (Samaddar et al., 2006).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Agreement on the goal of supply chain (Cao &amp; Zhang, 2011).</td>
</tr>
<tr>
<td>Joint knowledge creation</td>
<td>Joint knowledge creation is “the extent to which supply chain partners develop a better understanding of and response to the market and competitive environment by working together” (Cao et al., 2010, p. 6618).</td>
<td>Structure of the supply chain supports the development of new ideas; New ideas accepted by supply chain members; Development of new insights within the supply chain or between partners (Spekman et al., 2002).</td>
</tr>
</tbody>
</table>
Economic sustainability
The economic dimension of the TBL refers to the economic performance and financial stability of companies (Labuschagne et al., 2005) as well as their performance towards their shareholders and markets (Ahmed & McQuaid, 2005).

Revenues; Costs (Hall, 2011).
Sales growth; Profit growth; Continuity of operations (Hubbard, 2009).

Environmental sustainability
The environmental dimension of the TBL “focuses on an organization’s impact on living and non-living natural systems, including ecosystems, land, air and water” (Jamali, 2006, p. 812).

Fossil fuel consumption (Hall, 2011).
Emissions; Impact on ecosystems (Hubbard, 2009).
Use of renewable energy; Recycled material (León-Bravo et al., 2017).

Social sustainability
The social dimension of the TBL is concerned with an organization’s impact on the social system in which it conducts operations (Jamali, 2006; Mani et al., 2016).

Philanthropy; Safety; Equity; Ethics; Wages; Human rights (Mani et al., 2016).
Employee satisfaction (Hubbard, 2009).

5 Empirical Findings
This chapter gives an empirical description of three cases that are investigated consisting of three European logistics service providers and their key supplier and key customer. Likewise, the individual compositions of each case are characterized and the outcomes of the interviews concerning VSCC and sustainability presented. Besides, additional empirical information about specific measurements and the contribution of the VSCC practices on sustainability can be found in Appendix A. The information within each case study is organized based on the questions of the interview guide.

5.1 Case A
5.1.1 General Description
Case A consists of a French LSP and one of its key suppliers as well as one key customer within the food industry. The LSP is a full service provider, its supplier a
manufacturing company and its customer a retailer. The LSP is located in France and offers road freight logistics in France (Interviewee A, 2018). The related offered services are road cargo transport, supply chain management, track and trace services, temperature-controlled transport, inventory management, and assembly of products (Case Company A, 2018).

5.1.2 VSCC between LSP and Supplier

Information Sharing

The information shared with the key supplier are about product and the delivery conditions such as the quantity of products, product reference lists, the inventory level, delivery schedules and lead time information. This information is directly sent by the LSP via electronic data interchange (EDI) which allows constant communication with the supplier. Information that the key supplier shares with the LSP via EDI are likewise the quantity of products, product reference lists, the inventory level and delivery schedules. Both the LSP and the supplier share similar information to reinforce the control of information and ensure a constant information flow. Lastly, the information sent by the supplier is integrated into the warehouse management system (WMS) and transport management system (TMS) of the LSP (Interviewee A, 2018).

Joint Decision Making

Decisions jointly made between the LSP and its key supplier are decisions about changes in operations such as the date of change of a product line, product changes, product references or modifications on delivery schedules. These decisions are jointly made during monthly operations meetings between the LSP and its key supplier where they jointly analyze the activity of the month and vital indicators for service quality (Interviewee A, 2018).

Incentive Sharing

For the transport activity of the LSP, there are no incentives shared. Hence, the LSP and the supplier assume full responsibility during their own operations (Interviewee A, 2018).
**Goal Congruence**

The intensity of the collaboration between the LSP and its supplier is regarded as medium due to a relationship that lasts more than three years and indicates the goal congruence between these partners. However, the information shared is solely on an operational level, but not on a strategic level. Moreover, agreements on common goals between the partners exist and include mutual obligations, an operational system and a pricing list. These agreements are negotiated at the beginning of the relationship and may change depending on the progression of the two companies (Interviewee A, 2018).

**Joint Knowledge Creation**

Lastly, joint knowledge creation is of vital importance for the LSP and its supplier because it basically helps to create new ideas and insights in order to optimize their collaboration, improve processes and mutually get an enhanced performance. The creation of joint knowledge between these two partners is feasible thanks to their monthly operations meetings and constant communication (Interviewee A, 2018).

### 5.1.3 VSCC between LSP and Customer

**Information Sharing**

The LSP shares with its key customer information about the transport of products and their quality. The main information shared is the level of service quality, delivery schedules, lead time information, order status and order tracking. The LSP also shares good practices and its action plan with the key customer in order to reach company’s objectives. This information is mainly transferred by EDI but also during the monthly operations meetings. In contrast, the customer shares information about its operations and planning such as demand forecast, operation planning, order planning, inventory level and likewise good practices. Likewise, this information is shared by the customer via EDI and then integrated into the WMS and TMS of the LSP (Interviewee A, 2018).

**Joint Decision Making**

Jointly made decisions between the LSP and its key customer are usually on an operational level such as the date of change of a product line, product references, modifications on delivery schedules or changes on action plans. These decisions are
made during monthly operations meetings between the LSP and its key customer (Interviewee A, 2018).

**Incentive Sharing**
For the transport activity of the LSP, incentives are not shared between the partners. Thus, the LSP and its key customer assume full responsibility during their own operations (Interviewee A, 2018).

**Goal Congruence**
The intensity of the collaboration between the LSP and its key customer is high. The duration of collaboration is more than three years and agreements on common goals are made including objectives on the service quality level. In contrast to the supplier, the LSP and customer share strategic information about their strategic vision and goals for the upcoming two years. Consequently, both companies can prepare for future investments which further indicate the significance of goal congruence between the two partners (Interviewee A, 2018).

**Joint Knowledge Creation**
Finally, during monthly operations meetings, the LSP and its key customer create joint knowledge in the form of new ideas and new processes whose objectives are to optimize the collaboration and get an enhanced performance (Interviewee A, 2018).

### 5.1.4 Measurement of VSCC at LSP
The LSP of this case considers VSCC as very important due to its central position between a manufacturer and a retailer. Indeed for the LSP, VSCC helps to improve processes and flexibility in cases of issues within the supply chain, but also to develop a superior service quality level. With respect to the five VSCC practices, the LSP uses several specific measurements (Interviewee A, 2018).

**Information Sharing**
Information sharing is measured within the service quality level, which is influenced by the quality of information. The associated indicators used are the fluidity of information, the quality of this information, the quality of shared files and the forecast accuracy (Interviewee A, 2018).
Joint Decision Making
Joint decision making as well as goal congruence are measured by the level of achievement of the objectives set in the agreements between the LSP and its key supplier/customer (Interviewee A, 2018).

Incentive Sharing
The LSP does not share any incentives with its supplier/customer and thus specific measurements for incentive sharing do not exist at the LSP (Interviewee A, 2018).

Joint Knowledge Creation
Finally, the LSP does not measure joint knowledge creation because it is considered as a participatory process without set goals (Interviewee A, 2018).

5.1.5 Sustainability Measurement at LSP

Economic Sustainability
Economic sustainability is one of the most important aspects for the LSP relating to the firm’s financial stability and economic performance. The economic sustainability goal is to increase the turnover by 20% over the next five years. For now, the LSP has invested in a new TMS and WMS in partnership with its customer in order to improve the economic sustainability. The actual measurement of economic sustainability for the LSP is composed of the economic KPIs: turnover, margin, maintenance costs of the vehicle fleet and fuel consumption. Moreover, the company highly considers sales growth, profit growth and continuity of operations for its economic sustainability (Interviewee A, 2018).

Environmental Sustainability
The LSP highly cares about its environmental sustainability as it can be a selection criterion for various potential partners. Besides, the company takes renewable energy, recycling, emissions and impact on ecosystems into account in its operations. The LSP owns a fleet of 250 vehicles which impact the environment. For the purpose of improving its environmental sustainability, the LSP is testing the use of city gas vehicles with two new vehicles in its fleet to reduce the impact on living and non-living natural systems. The company is also investing in a training center for its drivers to achieve cleaner and more responsible driving. Moreover, to ensure an
efficient environmental management, the LSP is certified by an international standard that specifies requirements for an effective environmental management system. In order to measure the company’s environmental sustainability, the LSP mainly uses the fuel consumption of its fleet of vehicles (Interviewee A, 2018).

Social Sustainability
Social sustainability, like the two previous pillars, is important for the LSP. Employee satisfaction, ethics, safety and human rights are highly considered within the company. In order to improve the LSP’s social sustainability, the LSP organizes meetings with its employees concerned with the quality of life at work several times a year. Furthermore, the new investments in a training center will help the company to reduce the level of accidents at work by offering training to its employees of about 150 hours. The common measurements for the LSP’s social sustainability are employee satisfaction, the level of accidents at work and feedback during the meetings on the quality of life at work (Interviewee A, 2018).

5.2 Case B
5.2.1 General Description
Case B consists of an internationally active LSP and one of its key suppliers as well as one key customer. The LSP is a traditional freight forwarder, its supplier is a shipping line and its customer a manufacturing company. The LSP is located in France and offers air freight, ocean freight, logistics and manufacturing solutions all over the world (Interviewee B, 2018). The related offered services are air and ocean cargo, supply chain management, track and trace services, temperature-controlled transport, fiscal custom services and design of supply chains (Case Company B, 2018).

5.2.2 VSCC between LSP and Supplier
Information Sharing
The information shared to the key supplier by the LSP is related to their operations. All necessary details about products and transportation are shared such as product references, the amount of products and containers, the documentation needed for customs, the point of origin and destination of containers as well as the financial information linked to these operations. The information is shared via an ERP system
between the two partners which they developed in partnership to fit their operations and needs. While against that, the key supplier shares with the LSP all information related to transportation such as transport schedules, ship reservations, confirmations of transport, tracking of containers and lead time information (Interviewee B, 2018).

**Joint Decision Making**

On an operational level, the LSP and its key supplier do not make joint decisions other than negotiations on pricing. On a strategic level, the key supplier and the LSP jointly make decisions on projects related to their key customer such as adding a stopover in a port close to the customer’s location. In this case, the two partners jointly define the feasibility and minimum volumes for this project. Lastly, they jointly made decisions on the development and implementation of the common ERP system as well as make continuing joint decisions on its maintenance procedures (Interviewee B, 2018).

**Incentive Sharing**

Incentive sharing between the LSP and the key supplier is represented by the international commercial term ‘free on board’ (FOB) which determines the responsibility of each partner in terms of risks and costs. However, there are no direct benefits shared between the LSP and its key supplier, but a good relationship can have an impact on pricing negotiations (Interviewee B, 2018).

**Goal Congruence**

The intensity of the collaboration between the LSP and its key supplier is considered as high due to a duration of the relationship over three years and a strategic level of information shared. They possess a common ERP system, which involved large investments for the installation and requires the share of strategic information. Moreover, common goals and set objectives are parts of the agreements between the two partners. At least once a year, the LSP and its key supplier negotiate these agreements anew including the pricing for each operational activity (Interviewee B, 2018).
Joint Knowledge Creation

Lastly, the LSP and its key supplier create joint knowledge in the form of new ideas and performance indicators which enable to develop new information systems and create or improve processes. For example the dematerialization of documents such as contract of affreightment helps the LSP and its key supplier to share information faster and reduce paper use. Besides, the two partners create and develop new performance indicators adapted to both companies. The structure of this relationship supports the development of new ideas thanks to quarterly meetings between the LSP and its key supplier (Interviewee B, 2018).

5.2.3 VSCC between LSP and Customer

Information Sharing

The LSP shares with its key customer all information related to the cargo and containers such as delivery schedules, on time tracking, lead time information, location and customs information. The information is shared between the LSP and its key customer via an ERP system. In contrast, the key customer shares all information related to products such as dimensions, features and necessary documentations for the international transport and customs. In order to achieve an efficient SC and anticipate future customer needs, the key customer shares its full order portfolio and its commercial information as a forecast with the LSP (Interviewee B, 2018).

Joint Decision Making

The LSP and its key customer organize operations meetings every month to analyze the performance of the collaboration and jointly decide on improvements and optimizations of the SC and common activities. The two partners make joint decisions on operational changes such as a modification of routes, the creation of a new route or the adding of a new stopover but also on strategic visions for future investments like the creation of a warehouse dedicated to the key customer that is close to a particular port (Interviewee B, 2018).

Incentive Sharing

Incentives between the LSP and its key customer are shared in two ways. Firstly, the responsibilities to costs and risks of each partner are defined and shared by the international commercial term FOB. Besides, insurances and legal responsibilities
are specified within the contract between the partners. Secondly, benefits are shared. For some projects, such as a new supply chain solution, the LSP can be paid according to the benefits realized by the key customer with the new solution. Furthermore, the improvement and optimization of the customer’s transport help to reduce the costs of the customer, and also benefits to the LSP as it implies a growth of sales volume with the customer (Interviewee B, 2018).

**Goal Congruence**

The intensity of the collaboration between the LSP and its key customer is high. The duration of the collaboration is over three years and represented within agreements and contracts with common goals and set objectives of each partner. These contracts are renegotiated at least once a year between the LSP and its key customer and include the pricing of operations. Lastly, in order to offer an effective service to its customer and optimize the SC, strategic information is shared between the partners (Interviewee B, 2018).

**Joint Knowledge Creation**

Finally, the LSP and its key customer create joint knowledge in the shape of ideas and performance indicators during their monthly operations meetings. Firstly, these meetings enable both companies to generate ideas such as adding a stopover in a port closely related to the customer in order to improve processes and better coordinate operations. Secondly, the creation of relevant performance indicators related to their operations enables additional measurements and further improve performance (Interviewee B, 2018).

**5.2.4 Measurement of VSCC at LSP**

Vertical supply chain collaboration is considered as very important for the LSP as it is necessary to coordinate supply chain members and is essential for the efficiency of the whole SC. With respect to the five VSCC practices, several measurements are used by the LSP (Interviewee B, 2018).

**Information Sharing**

Information sharing is measured by the quality of the data sent and received by the LSP. It includes the data accuracy, which represents the differences between the real
information and the information sent or received. Likewise, it includes data timeliness, which represents the time to capture data (Interviewee B, 2018).

**Joint Decision Making**
Joint decision making is measured by the pricing determined by the supplier since successful collaboration between the LSP and its supplier leads to lower prices for the LSP. Additionally, it is measured by the results and benefits of the implemented ERP system with the supplier. In contrast, joint decision making with the customer is measured by customer’s performance indicators (Interviewee B, 2018).

**Incentive Sharing**
Incentive sharing with the customer is measured by the LSP with the profitability and the return of investments of their common projects. With the supplier, incentive sharing is measured by the profitability achieved through the collaboration (Interviewee B, 2018).

**Goal Congruence**
Goal congruence is only measured by the LSP for specific projects with its supplier or customer. In this case, the LSP analyzes the efficiency and profitability of the specific project (Interviewee B, 2018).

**Joint Knowledge Creation**
Lastly, joint knowledge creation is not measured at the LSP because the LSP consider creativity as difficult to measure and evaluate (Interviewee B, 2018).

**5.2.5 Sustainability Measurement at LSP**

**Economic Sustainability**
As a private company, economic sustainability is the most important aspect for the LSP and its primary goal is to improve its economic performance and financial stability. In order to improve its economic sustainability, the LSP has invested in and developed various information systems as a start. These information systems are developed together with its customer and supplier and aim to improve the efficiency of the SC with an enhanced coordination and communication. Thus, in order to measure its economic sustainability and related improvements, the LSP uses
following specific measurements: market penetration rate, market share, profitability, turnover, continuity of operations and sales growth in price and volume (Interviewee B, 2018).

**Environmental Sustainability**

For the LSP, environmental sustainability is crucial because the transport and especially air and ocean freight have an important impact on the environment. According to the LSP, it is likewise important for its customers as it can be considered as a selection criterion. To improve its environmental sustainability, the LSP has established a partnership with an environmental foundation that offers tools to measure and control the emissions and energy consumption of the LSP’s operations. The foundation also analyzes this environmental information, which enables the LSP to obtain a better visibility and ability to quantify its improvement in environmental sustainability. Even if technological improvements in fuel for air and ocean freight remain low in the future, the goal of the LSP is to reduce the emissions and energy consumption of its activities by 10% in the next two years. For this purpose, sea freight is favored over air freight as air freight is causing more pollution (Interviewee B, 2018).

**Social Sustainability**

Social sustainability is considered as important for the LSP because employees are the basis of the company and have a major impact on the profitability of the company. The main social goal of the company is to improve the level of training of its employees and improve the employee satisfaction. On this account, the LSP has developed an internet training platform in order to facilitate the access to training for employees and improve their skills, but also hired a professional trainer for individual training. In addition, employee satisfaction, ethics, safety and human rights are highly considered within the company. In order to measure its social sustainability, the LSP executes a satisfaction survey with its employees and analyzes their level of training once a year (Interviewee B, 2018).
5.3 Case C

5.3.1 General Description
Case C consists of a German LSP and one of its key supplier as well as one key customer. The LSP is a traditional freight forwarder, its supplier a shipping line and its customer a manufacturing/retailing company (Interviewee C, 2018). The LSP is located in Germany and offers air and ocean freight logistics all over the world. The related offered services are fiscal customs services, hinterland transportation services, air cargo, project logistics, ocean cargo, supply chain management, temperature-controlled transport, track and trace, supervised transport, handling, and customs clearance (Case Company C, 2018).

5.3.2 VSCC between LSP and Supplier

Information Sharing
Information that the LSP shares with its key supplier are all details relating to the cargo such as how much cargo, the number of booked containers, the kind of containers, as well as the destination and origin of containers. The operations department of the LSP is responsible for the information sharing and is constantly in contact with the shipping line. It shares order status and order tracking via EDI and supply disruptions via e-mail. In contrast, information that the key supplier shares with the LSP are lead times, prices, schedules, available capacities, specialties such as dangerous goods (Interviewee C, 2018).

Joint Decision Making
Decisions that are jointly made between the LSP and the key supplier are rather negotiations about prices and fixed allocations on a ship. Other decisions are not jointly made because there is no possibility to influence a big shipping line with its fixed schedules (Interviewee C, 2018).

Incentive Sharing
Incentive sharing, in other words the sharing of costs, benefits and risks depends on the international commercial term FOB, meaning that for example when something goes wrong from the moment the container is on the ship, it is the problem of the supplier. Besides, the supplier offers some incentives in terms of paying money back as a bonus to the LSP when the LSP reaches a specific cargo level. Therefore, the
LSP concentrates on few suppliers and simultaneously tries to achieve a high cargo volume with them (Interviewee C, 2018).

**Goal Congruence**

When it comes to goal congruence, the intensity of the collaboration between the LSP and key supplier needs to be considered. In this case, the intensity is high due to a duration of collaboration with the supplier over three years and a high level of shared strategic information. This is also reflected in the LSP’s policy to stick with the same suppliers. Moreover, agreements on goals have been made for costs and they relate to the number of shipped containers. The supplier decides on the price for the usage of its containers depending on the utilized capacity of containers by the LSP within one month. Generally, the duration of the partners’ shared goal relationships is long-term but can also depend on the kind of agreement. It can either be a base rate or long-term based on and adapted to a specific customer (Interviewee C, 2018).

**Joint Knowledge Creation**

Finally, the creation of joint knowledge with the key supplier is not prevalent in this case and is limited to the determination of new key performance indicators (KPI) such as new transit times of ships. This is done within a yearly main negotiation where both partners renegotiate the KPI based on previous performances, followed by additional negotiations if needed. However, the structure of the relationship to the key supplier does not truly support the development of new ideas because it is not applicable for the LSP as the company is active in air and ocean freight logistics and is in the buying position (Interviewee C, 2018).

**5.3.3 VSCC between LSP and Customer**

**Information Sharing**

The LSP shares as much information with the customer as the customer wants except for the actual shipping details. Information that is always shared is details about the cargo: location, time of delivery, time of security check, status of loaded/unloaded and custom clearance. However, the LSP does not directly share information about the actual shipping line, the ship and the container number of the cargo. This information is only shared when the customer explicitly wants to know it. On the
contrary, the customer shares all documentations such as invoices, export/import declarations or dangerous goods declarations with the LSP as well as notifies the LSP when the cargo is ready for pickup via EDI or e-mail (Interviewee C, 2018).

**Joint Decision Making**

Joint decisions between the two partners are here again rather negotiations about prices and service level related to the cargo than actual joint decisions. The customer indicates a demand and the LSP reacts and makes an offer. Thus, both partners frequently meet halfway and find a mutual consent (Interviewee C, 2018).

**Incentive Sharing**

Incentives that are shared between the LSP and the key customer are costs and risks. These are defined in the international commercial terms or/and within the contract. The contract covers the majority of cases and situations. However, sometimes risky situations occur with problems where it is unclear who has to pay and which international law to follow. Small problems such as damaged pallets are normally covered by the insurances of the partners. For serious problems it can differ from case to case depending on the situation; sometimes the partners must negotiate or their insurance carry the costs (Interviewee C, 2018).

**Goal Congruence**

The LSP and its customer have agreements on goals with regards to KPI such as the quantity, accuracy of delivery (aiming at 95% on time delivery) and price. These agreements on goals with the customer are basically designed to be long-term because over time the processes are running smoother and lead to a win-win situation for both partners. Furthermore, the intensity of collaboration is high due to a duration of collaboration with the customer around two years and a high level of shared strategic information (Interviewee C, 2018).

**Joint Knowledge Creation**

Lastly, joint knowledge creation within the investigated relationship is not existent as the partners rather negotiate about services than creating new joint knowledge. Once the LSP knows how things work, they can offer additional services to its key customer. Nonetheless, knowledge is generally shared because both partners want to
save money, and knowledge sharing is considered as possibility to save costs by the LSP (Interviewee C, 2018).

5.3.4 Measurement of VSCC at LSP
Vertical supply chain collaboration is highly considered at the LSP because the LSP is a customer company and has to collaborate with other firms in order to conduct business. Hence, several VSCC measurements are in place at the LSP with regards to the five VSCC practices jointly carried out by the LSP and its key supplier and customer (Interviewee C, 2018).

Information Sharing
Information sharing is measured by the overall supplier/customer satisfaction, profitability and transparency, meaning who said what and sent what. Another measure is the labor intensity, which is the measuring if information was shared well by how much the employees have to work (Interviewee C, 2018).

Joint Decision Making
Joint decision making is measured by the customer satisfaction for the customer and for the supplier by the pricing. The pricing refers to the quality of work executed by the LSP; when the LSP does a good job, the supplier sets a good price (Interviewee C, 2018).

Incentive Sharing
Incentive sharing is measured by the profitability and duration of relationship for the customer indicating if the customer is happy about the collaboration. For the supplier the LSP consider possible paybacks at the end of the year received from shipping lines (Interviewee C, 2018).

Goal Congruence
Goal congruence is difficult to measure for the LSP since the customer decides on the measurements and they might change after time when the circumstances change or the LSP is doing a good job. However, the customer demands an accuracy of 95% and thus the LSP measurements its level of accuracy and if they fulfill the service level demanded by the customer. Likewise, the measurement of goal congruence
with the supplier is complex because the supplier might demands the LSP to give a specific number of containers within a year, and when the LSP complies with that number, the supplier sets a better price and as a consequence the LSP might acquire new customers due to lower prices (Interviewee C, 2018).

Joint Knowledge Creation
Finally, the LSP do not measure joint knowledge creation because it is not existent within its supplier and customer collaboration relationship. Nevertheless, little evidence suggests the direction and success of operations such as a smooth workflow of processes, supplier/customer satisfaction and contribution of staff knowledge (Interviewee C, 2018).

5.3.5 Sustainability Measurement at LSP
Economic Sustainability
Economic sustainability viz. the economic performance and financial stability is highly important for the LSP and therefore the sales growth, profit growth and continuity of operations are accurately considered. To further improve it the company invests in new products such as the creation of a hub or an automated ordering platform, in its own staff and in its facilities. The measurements in place for the economic sustainability are gross margin to costs of sales over gross margin, gross margin over employees and gross margin over overall costs (Interviewee C, 2018).

Environmental Sustainability
The environmental sustainability is important for the LSP, but it depends whether greener options such as the usage of renewable energy are reasonable in order to increase efficiency and save money. The LSP invests in greener solutions when it saves money at the same time, but not just for the sake of being green. Even though the company does not have specific environmental sustainability goals, various steps and investments have been made to enhance the environmental sustainability of the company. Solar roofs are installed in some warehouses, sports-utility vehicles are forbidden, company cars must be diesel vehicles, electric trucks are employed for local deliveries and the office is paperless. The LSP considers renewable energy usage, recycling, fossil fuel consumption, emissions and its impact on ecosystems to
some extent. Besides, the firm makes allowance for its material consumption and waste management. Nevertheless, the LSP does not measure the organization’s direct impact on the ecosystem because the LSP itself does not own trucks, ships or planes (Interviewee C, 2018).

**Social Sustainability**

Social sustainability is very important for the LSP because the company views themselves as a social responsible company. The satisfaction of its own employees is crucial as well as the public image of the company. Therefore, labor unions are in place, as well as the firm offers staff training, staff benefits, staff initiatives, transparent contracts, an own company pension scheme and family events. Moreover, the management has a yearly compliance seminar, every employee has to sign a non-corruption agreement and attend a health and safety training. Besides, in warehouses everyone has to wear special shoes and high visibility jackets in order to guarantee safety and human rights. Lastly, the LSP measures social sustainability by its employee satisfaction and public image (Interviewee C, 2018).

5.4 Summary of Empirical Findings

5.4.1 VSCC between LSP and Partners

Table 4 illustrates an overview of the VSCC practices that are applied between the LSPs and their key supplier as well key customers.

<table>
<thead>
<tr>
<th>VSCC Practices</th>
<th>Case A</th>
<th>Case B</th>
<th>Case C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Sharing</td>
<td>Supplier: Yes Customer: Yes</td>
<td>Supplier: Yes Customer: Yes</td>
<td>Supplier: Yes Customer: Yes</td>
</tr>
<tr>
<td>Joint Decision Making</td>
<td>Supplier: Yes Customer: Yes</td>
<td>Supplier: Yes Customer: Yes</td>
<td>Supplier: No Customer: No</td>
</tr>
<tr>
<td>Incentive Sharing</td>
<td>Supplier: No Customer: No</td>
<td>Supplier: Yes Customer: Yes</td>
<td>Supplier: Yes Customer: Yes</td>
</tr>
<tr>
<td>Goal Congruence</td>
<td>Supplier: Yes Customer: Yes</td>
<td>Supplier: Yes Customer: Yes</td>
<td>Supplier: Yes Customer: Yes</td>
</tr>
<tr>
<td>Joint Knowledge Creation</td>
<td>Supplier: Yes Customer: Yes</td>
<td>Supplier: Yes Customer: Yes</td>
<td>Supplier: No Customer: No</td>
</tr>
</tbody>
</table>
5.4.2 Measurement of VSCC between LSPs and Partners

Based on the empirical findings specific measurements for the five VSCC practices between LSPs and suppliers as well as customers are shown in Table 5. These specific measurements can help to deepen the existing theoretical knowledge of VSCC as in order to achieve an improvement of sustainability, LSPs need to insert applicable measurements of their VSCC practices.

Table 5: Measurement of VSCC between LSPs and partners (Own illustration)

<table>
<thead>
<tr>
<th>VSCC Practice</th>
<th>Measurement of VSCC between LSPs and Supplier</th>
<th>Measurement of VSCC between LSPs and Customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information sharing</td>
<td>Quality of shared data/information (fluidity, accuracy and timeliness); Supplier satisfaction; Profitability; Labor intensity; Transparency</td>
<td>Quality of shared data/information (fluidity, accuracy and timeliness); Forecast accuracy; Customer satisfaction; Profitability, Labor intensity; Transparency</td>
</tr>
<tr>
<td>Joint decision making</td>
<td>Level of achievement of the set objectives with supplier; Pricing by supplier; Results and benefits of the implemented ERP system</td>
<td>Level of achievement of the set objectives with customer; Customer performance indicators; Customer satisfaction</td>
</tr>
<tr>
<td>Incentive sharing</td>
<td>Profitability; Paybacks</td>
<td>Profitability; Return of investments of common projects; Duration of relationship</td>
</tr>
<tr>
<td>Goal congruence</td>
<td>Level of achievement of the set objectives with supplier; Efficiency and profitability of projects; Pricing by supplier; New customer acquisition</td>
<td>Level of achievement of the set objectives with customer; Efficiency and profitability of projects; Accuracy/service level; New customer acquisition</td>
</tr>
<tr>
<td>Joint knowledge creation</td>
<td>Supplier satisfaction</td>
<td>Customer satisfaction</td>
</tr>
</tbody>
</table>

5.4.3 Sustainability Measurement at LSPs

On the basis of the empirical outcomes, particular measurements for sustainability at LSPs are presented in Table 6. Likewise, these particular measurements can help to deepen the existing theoretical knowledge of sustainability at LSPs as in order to achieve an improvement of sustainability, LSPs need to insert applicable measurements of their sustainability dimensions.
Table 6: Sustainability measurement at LSPs (Own illustration)

<table>
<thead>
<tr>
<th>Sustainability Dimension</th>
<th>Sustainability Measurement at LSPs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic</td>
<td>Turnover; Maintenance costs of the vehicle fleet; Profit growth; Market penetration rate; Market share; Profitability; Sales growth in price and volume; Gross margin over employees</td>
</tr>
<tr>
<td>Environmental</td>
<td>Fuel consumption; Emissions; Energy consumption; Material consumption; Waste management</td>
</tr>
<tr>
<td>Social</td>
<td>Employee satisfaction; Level of accident at work; Public image</td>
</tr>
</tbody>
</table>

6 Data Analysis

Based on the theoretical framework, empirical findings and subjective explanations, this chapter analyzes data in two steps i.e., within the cases and with a cross-case method in order to answer the research questions RQ 1 and RQ 2. Firstly, single cases are analyzed with the aim to build an explanation of how VSCC between LSPs with partners can improve sustainability at LSPs. Then, the cases are investigated and generalized by means of a cross-case analysis. At last, two figures based on the research model are presented that summarize the results of the analysis.

6.1 Case Analysis of VSCC for Sustainability

6.1.1 Case Study A

6.1.1.1 VSCC between LSP and Supplier for Sustainability

Information Sharing

With its key supplier, the LSP shares information about product details and delivery conditions via EDI. The sharing of this information via EDI can improve the LSP’s economic sustainability through a better information flow and therefore a more efficient SC (Interviewee A, 2018). Moreover, as stated by Lee and Whang (1998), it improves the efficiency of other partners. Furthermore, the specific information shared with its supplier enables the LSP to better plan its future strategy and investments (Cao & Zhang, 2011; Wee et al., 2016). In addition, the LSP and its supplier share good practices such as the successful implementation strategy of a radio-frequency identification (RFID) system as well as experiences on how to save money and time (Interviewee A, 2018). Thus, the sharing of good practices between
the LSP and its supplier may positively contribute to the LSP’s economic sustainability as it improves the performances among the partners. Besides, the environmental sustainability may be improved by the reduction of paper usage caused by the use of EDI to share information. However, the question of how information sharing between the LSP and its key supplier can improve the social sustainability at the LSP remains unanswered (Interviewee A, 2018).

Joint Decision Making
The LSP and its key supplier make joint decisions about modifications on operational activities during monthly operations meetings. These common decisions can improve the economic sustainability at the LSP by improving processes and mutually coordinating operations (Interviewee A, 2018). As stated by Simatupang and Sridharan (2005), joint decision making helps partners to implement more productive actions within the SC. Thus, these more productive actions reduce the waste of time and repetitive tasks which further can improve economic sustainability at the LSP. Moreover, during the monthly operations meetings the LSP and its key supplier analyze KPIs such as fuel consumption in order to reduce it and improve the environmental sustainability at the LSP (Interviewee A, 2018). In fact, by analyzing the fuel consumption, the LSP and its supplier can propose joint decisions to implement new environmentally friendly solutions such as the use of city gas trucks to reduce the LSP’s fuel consumption. Lastly, the relation of how this VSCC practice can improve the social sustainability at the LSP remains unexplained (Interviewee A, 2018).

Incentive Sharing
The LSP solely operates on national transport and in this case both the LSP and key supplier are responsible for their own operations in terms of costs, benefits and risks. Therefore, the question of how incentive sharing can improve the LSP’s three dimensions of sustainability is uncertain because the partners do not share incentives among each other (Interviewee A, 2018).

Goal Congruence
As stated by Samaddar et al. (2006), goal congruence refers to the degree of involvement of each partner in the achievement of common goals. The goal
congruence between the LSP and its supplier is represented by agreements on common goals with mutual obligations and set objectives (Interviewee A, 2018). These mutual agreements may positively contribute to LSP’s economic sustainability by encouraging the LSP and its supplier to reach their own and mutual objectives simultaneously but also by improving the relationship between the two partners (Wee et al., 2016). By trying to reach the own and mutual objectives, the LSP needs to improve its logistics operations by increasing its productivity and efficiency, which effectuate cost savings. Moreover, the issue of how goal congruence can improve the environmental sustainability at the LSP cannot be explained within this case. Finally, the LSP’s social sustainability can be negatively impacted due to a constant pressure to achieve the set objectives and KPIs that increases the workload and decreases employee satisfaction (Interviewee A, 2018).

**Joint Knowledge Creation**

The LSP and its supplier create joint knowledge during their monthly operations meetings by exchanging and creating ideas and insights to optimize common processes. Besides, it reinforces the existent relationship between the LSP and its supplier by promoting the team spirit and trust. Mutually creating new ideas such as the implementation of a new route leads to more orders for the LSP, a higher cargo quantity, and higher payments by the supplier (Interviewee A, 2018). In the same way, by optimizing processes like a modified and amended route, the economic sustainability at the LSP may be improved as the transport is more efficient, time and costs are saved, and a better utilization of capacities is achieved (Cao et al., 2010; Wee et al., 2016). In contrast, new routes with greater cargo quantities cause more emissions and a larger fuel consumption which can harm the environmental sustainability at the LSP. Nonetheless, amended and optimized routes imply for the LSP less kilometers to drive for its trucks and less emissions. At last, the relation of how joint knowledge creation between the partners can enhance the social sustainability at the LSP cannot be ascertained in this case (Interviewee A, 2018).

**6.1.1.2 VSCC between LSP and Customer for Sustainability**

**Information Sharing**

The LSP and its customer share information about the delivery and product quality with a constant communication via EDI (Interviewee A, 2018). This sharing of
relevant data between the LSP and its customer may positively contribute to the LSP’s economic sustainability by improving the efficiency and effectiveness of the supply chain (Lee & Whang, 1998; Cao & Zhang, 2011; Wee et al., 2016). Moreover, it helps the LSP to create a better understanding of the needs of its customer in order to keep and improve its competitive advantage. Likewise, the LSP and its customer share good practices in order to learn from each other. The sharing of good practices between the LSP and its customer may improve the economic sustainability at the LSP as it can improve processes, save time and money, and avoid repetitive tasks. Besides, the usage of EDI to share information may positively impact the LSP’s environmental sustainability as it involves the reduction of paper use. At last, the issue of how information sharing between the LSP and its customer can improve the social sustainability at the LSP remains without reply (Interviewee A, 2018).

Joint Decision Making

As stated by Wee et al. (2016), for the purpose of implementing an effective joint decision making process, it is important to organize face-to-face meetings between partners. Therefore, in order to discuss and take decisions, the LSP and its customer meet once a month within their operations meetings. The two partners take decisions about process improvements such as the utilized capacity of trucks and its optimization or responsiveness to operational changes such as public holiday. The optimization of the utilized capacity of trucks leads to an increased quantity of goods per truck and therefore reduced logistics costs which may positively affect the LSP’s economic sustainability. Furthermore, the LSP and its customer jointly analyze performance indicators such as fuel consumption of the vehicle fleet in order to set new environmental objectives to improve the environmental sustainability (Interviewee A, 2018). By analyzing and fixing the fuel consumption, the LSP and its customer can decide to implement new solutions such as the use of gas city truck or the training of drivers to a cleaner and environmental driving to reduce fuel consumption and reach their environmental objectives. The responsiveness to operational changes such as during public holiday helps to better structure the organization of the workforce in order to save time and avoid repetitive tasks. In fact, both partners decide on the optimal utilization of the workforce in order to ensure the continuity of operations but also to offer a day off to their employees. It can therefore
lead to an increased employee satisfaction and may improve the LSP’s social sustainability (Interviewee A, 2018).

**Incentive Sharing**

During its operations the LSP is fully responsible in terms of costs, benefits and risks. As the partners do not share incentives, the question of how incentive sharing can enhance the LSP’s economic, environmental and social sustainability remains unknown for this case (Interviewee A, 2018).

**Goal Congruence**

The collaboration between the LSP and its customer has a high intensity, and strategic information is shared such as the vision and goals of both companies for the next two years. Common goals, objectives and the service quality level of each partner are stated within common agreements between the LSP and its customer (Interviewee A, 2018). As stated by Poirier and Houser (1993), these clear agreements enable to create a clear strategy within the whole SC. The elaboration of a clear strategy for the SC can positively contribute to LSP’s economic sustainability as it helps to improve the efficiency of operations, reduce costs, and in the process increasing the profitability of each partner (Wee et al., 2016). Additionally, goal congruence facilitates the development of new environmental and sustainable processes such as product recycling. As a matter of fact, product recycling helps both partners to reduce the amount of waste and pollution. Goal congruence facilitates the development and implementation of those environmental processes which can enhance the environmental sustainability at the LSP by coordinating partners’ objectives in same green direction and reduce their impact on the environment. However, the permanent pressure to reach common objectives and improve processes can negatively contribute to the LSP’s social sustainability by increased stress and workload for employees that decrease the employee satisfaction (Interviewee A, 2018).

**Joint Knowledge Creation**

The LSP and its customer jointly create knowledge in the form of new ideas and insights during their operations meetings. The goal of these operations meetings is to analyze, optimize and improve common activities between the LSP and its customer
such as delivery conditions, fuel consumption, inventory management or employees schedules (Interviewee A, 2018). In fact, Wee et al. (2016) stated in their research that joint knowledge creation can improve the efficiency of these activities. These common activities are enriched with new ideas such as a RFID system in order to improve the LSP’s inventory management by accelerating scanning procedures. Hence, the economic sustainability at the LSP may be improved as the RFID system effectuates time savings. Environmental sustainability may also be improved by new ideas such as the use of city gas for trucks which is a greener solution and considerably reduces the environmental impact of trucks. However, the question of how joint knowledge creation between the LSP and its customer can increase social sustainability cannot be responded in this case (Interviewee A, 2018).

6.1.2 Case Study B

6.1.2.1 VSSC between LSP and Supplier for Sustainability

Information Sharing

Between the LSP and its key supplier, all information related to their operations are shared via their ERP system. This ERP system has been developed together and adapted to both the LSP and its supplier (Interviewee B, 2018), and can in turn improve the LSP’s economic sustainability as it ensures a constant information flow with accurate data and an improved responsiveness (Cao & Zhang, 2011; Wee et al., 2016). Lee and Whang (1998) agree on it by stating that the sharing of available data among the SC partners improves the effectiveness and efficiency of the SC. The improvement of information sharing processes further leads to money savings by ensuring a steady communication and continuity of operations. Besides, the environmental sustainability at the LSP may be positively impacted by information sharing since it induces a dematerialization of documents and thus a minimized paper usage. Lastly, the issue of how information sharing can enhance the social sustainability at the LSP remains unexplored (Interviewee B, 2018).

Joint Decision Making

The LSP and its key supplier make joint decisions about pricing or common projects. Firstly, joint decisions on pricing take place once a year in the form of negotiations between the LSP and its supplier and lead to fixed prices enabling the LSP to plan its operations and activities with the supplier in order to save money and
In addition, the more intense the collaboration, the lower the prices set by the supplier (Simatupang & Sridharan, 2005), which can be beneficial for the LSP’s economic sustainability. Secondly, decisions on common projects are made between the two partners on the feasibility of each project for each company. Thus, for projects such as adding a new stopover in a port both partners analyze beforehand the minimum volumes that are necessary for reaching operations profitability which may positively contribute to the economic sustainability at the LSP as it leads to more secure investments. However, the question of how joint decision making between the LSP and its key supplier can improve the LSP’s environmental or social sustainability cannot be answered because no direct impact is detected in this case (Interviewee B, 2018).

**Incentive Sharing**

Within the collaboration between the LSP and its supplier, the sharing of risks and costs is determined within the international commercial terms. The sharing of risks and costs with the supplier do not directly impact the LSP’s sustainability as the LSP is only responsible of risks and costs with its customer. However, a high cargo volume and smooth operations positively impact the negotiation between the LSP and its supplier by leading to reduced costs in the long term (Interviewee B, 2018). Thus, the LSP will be motivated to achieve better objectives and increase its number of containers with this supplier. This technique called pay-for-performance helps to motivate SC partners to reach a specific level of performance (Cao & Zhang, 2012). As a matter of fact, incentive sharing may improve the LSP’s economic sustainability by increasing its productivity and reducing costs. Nevertheless in this case, the relation of how incentive sharing can enhance the environmental and social sustainability at the LSP remains unacknowledged (Interviewee B, 2018).

**Goal Congruence**

Goal congruence is represented within the collaboration between the LSP and its supplier by mutual agreements including the responsibilities of each partner and their common goals (Interviewee B, 2018). These mutual agreements enable each partner to create a better understanding of the needs and capabilities of its partners in order to create a clear and efficient strategy for the SC (Poirier & Houser, 1993; Wee et al., 2016). Thus, a clear strategy and high collaboration intensity can improve the
economic sustainability at the LSP. In fact, a long-lasting collaboration enables a better efficiency of operations and smoother processes thanks to a constant communication and continuity of operations. Moreover, the LSP and its supplier have agreements on environmental aspects such as consumption objectives for required ships and planes in order to reduce fuel consumption and emissions together. The LSP manages the logistics in a way that may improve its environmental sustainability by identifying the most efficient routes as well as best situated ports to use, and primarily utilizing ships instead of planes because ships are considered as more environmentally sound. At last, the question of how goal congruence between the LSP and its supplier can improve the social sustainability at the LSP remains unsought in this case (Interviewee B, 2018).

Joint Knowledge Creation
The LSP and its supplier create joint knowledge during their quarterly meetings in the shape of performance indicators and ideas to improve processes. Performance indicators implemented between the two partners are related to economic concerns such as continuity of operations (Interviewee B, 2018). These new performance indicators enable the LSP to identify, control and measure its processes and to be able to propose target-oriented improvements (Wee et al., 2016). Indicators on profitability help the LSP and its supplier to identify new solutions to improve their profitability such as the optimization of capacity utilization for containers which leads to reduced logistics costs and therefore can improve the LSP’s economic sustainability. Furthermore, the joint creation of new ideas such as the dematerialization of documents helps to reduce paper use and can be beneficial to the LSP’s environmental sustainability by improving common processes. Nevertheless, issue of how joint knowledge creation between the LSP and its supplier can enhance the social sustainability at the LSP stays unexplained in this case (Interviewee B, 2018).

6.1.2.2 VSCC between LSP and Customer for Sustainability
Information Sharing
Firstly, the information shared between the LSP and its key customer is related to the transportation such as delivery schedule, order tracking, or lead-time information (Interviewee B, 2018). As stated by Lee and Whang (1998), the sharing of this type
of information helps to improve the quality of customer service, reduce the payment cycle and save labor cost but also enable partners to work more efficiently. Secondly, the information shared between the two partners is related to products such as features, sales forecast and order portfolio (Interviewee B, 2018). This information enables the LSP to be prepared for changing markets and better respond to future demands (Lee & Whang, 1998; Cao & Zhang, 2011; Wee et al., 2016). In summary, the sharing of these two types of information can improve the economic sustainability at the LSP by increasing the efficiency of the SC and offering a superior service to its customer which leads to a gain in market shares. Additionally, environmental sustainability at the LSP may be positively impacted by information sharing with the use of an ERP system that considerably reduces the paper usage. At last, the pointed question of how information sharing can improve the LSP’s social sustainability remains without reply (Interviewee B, 2018).

**Joint Decision Making**

The LSP and its key customer make joint decisions on operational and strategic changes during their monthly operations meetings (Interviewee B, 2018). These meetings aim to coordinate partners and implement an effective joint decision making process (Wee et al., 2016). The coordination of the LSP and its customer on changes or specific projects such as the creation of a new route allows adjusting the project with the needs and capabilities of each partner, and improving its efficiency and the implementation of the project. Likewise, in order to make secure investments, both partners decide on common investments with the help of analyses of feasibility and possible returns on investments. These steps of coordinating, adjusting and analyzing the joint decision making processes may enhance the economic sustainability at the LSP as the capabilities of both partners are fully exploited and an increased efficiency is achieved. Nonetheless, the relation of how joint decision making between the LSP and its customer can enhance the environmental and social sustainability at the LSP cannot be constituted in this case (Interviewee B, 2018).

**Incentive Sharing**

The incentives shared between the LSP and its customer are defined within the contract and/or the international commercial term. The sharing of risks and costs can
be beneficial for the LSP’s economic sustainability as the LSP does not bear the risks and costs alone. Besides, in some cases the LSP and its key customer directly share monetary benefits. In fact, for some projects the LSP gets paid according to the benefits realized by the project (Interviewee B, 2018). The applied technique pay-for-performance helps to motivate partners to reach a particular level of performance (Cao & Zhang, 2012), and thereby may improve the economic sustainability at the LSP. Lastly, the issue of how incentive sharing between the LSP and its customer can improve the environmental or social sustainability at the LSP cannot be answered in this case (Interviewee B, 2018).

**Goal Congruence**

The LSP and its customer have a high intensity of collaboration and share relevant and strategic information (Interviewee B, 2018). It enables both partners to create a clear strategy by knowing and understanding needs and capabilities of the other partner (Poirier & Houser, 1993) as well as implementing this strategy in accordance with the objectives of each partner (Wee et al., 2016). Goal congruence is important for the improvement of the LSP’s economic sustainability as it allows the creation of a clear strategy and reinforces the collaboration and communication, leading to improved operations efficiency. In addition, the long-lasting collaboration relationship and high intensity between the LSP and its customer lead to smoother and standardized processes in the long term, enhanced efficiency, and cost and time savings. Furthermore, the LSP and its customer have the existing mutual agreements which represent environmental objectives such as the fuel consumption. These objectives can positively contribute to the environmental sustainability at the LSP because it motivates the LSP to reach the environmental objectives set with its customer in order to continue the collaboration. The customer wants a logistics provider that cares about the environment and hence, the LSP make an effort to configure its operations as green and environmentally-friendly as possible. Finally, the contribution of how goal congruence can improve the social sustainability at the LSP is inexplicit (Interviewee B, 2018).

**Joint Knowledge Creation**

The creation of joint knowledge between the LSP and its customer occurs during monthly operations meetings where both companies generate ideas or insights in
order to improve processes and better coordinate partners. These ideas such as the
adding a stopover in a port close to the customer’s location can positively impact the
economic sustainability. After checking the feasibility of the idea and agreeing on
minimum cargo volumes required by the port owner, the LSP and its customer can
ensure the economic viability of the new stopover which aims to reduce logistics
costs and satisfy the customer, and therefore may increase the profitability of the
LSP (Interviewee B, 2018). Moreover, it reinforces the relationship between the LSP
and its customer and increase customer satisfaction by answering customer needs.
Besides during the monthly operations meetings, the LSP and its customer analyze
and define performance indicators related to their economic performance
(Interviewee B, 2018) that enable the LSP to offer specific and adapted solutions to
its customer that may improve the economic sustainability at the LSP (Cao et al.,
2010). However, the relation of how joint knowledge creation between the LSP and
its customer can improve the environmental or social sustainability at the LSP
remains unknown for this case (Interviewee B, 2018).

6.1.3 Case Study C
6.1.3.1 VSCC between LSP and Supplier for Sustainability

Information Sharing

The operations department of the LSP shares all cargo details with its key supplier
via EDI (Interviewee C, 2018). This sharing of available data with the supplier may
improve the LSP’s economic sustainability because the information flow in the SC is
improved, the effectiveness and efficiency of the SC are improved, and the LSP is
able to respond quicker to customers (Lee & Whang, 1998; Cao & Zhang, 2011;
Wee et al., 2016). The sharing of order status, order tracking and supply disruptions
with its supplier helps to improve the quality of customer service, reduce the
payment cycle and save labor cost (Lee & Whang, 1998). Additionally, the
information shared about available capacities by the supplier allows the LSP to be
prepared against possible shortages and variable demand (Lee & Whang, 1998).
Furthermore, the company’s environmental and social sustainability can be enhanced
by information sharing and the exchange of information by EDI. Thus, the paper
usage is almost avoided and all information is transferred in real-time leading to time
savings and a prevention of time-consuming phone calls as well as e-mail writing by
the staff. As a consequence, the employees do not need to spend much time on the
exchange of information and can use their time for other issues. Information sharing also causes smooth and standardized processes at the LSP which in turn result in further time savings, work safety and employee satisfaction. Accordingly, the employees have their assigned tasks, feeling safer and know what to do (Interviewee C, 2018).

**Joint Decision Making**

The LSP and its key supplier solely negotiate about prices and fixed allocations of cargo on ships, but do not jointly make decisions. The supplier thereby has a more powerful position and LSP has no possibility to influence its supplier’s fixed shipping schedules (Interviewee C, 2018). Consequently, the holistic contribution of how joint decision making can improve the economic, environmental and social sustainability at the LSP is unknown by reason of absence of actual joint decisions. However, joint decision making in the form of conducting negotiations might improve the LSP’s economic sustainability. The LSP and its supplier conduct negotiations and then jointly act upon the outcomes of the negotiations. The negotiated and synchronizing decisions on prices and cargo allocations on ships effectuate planning reliability for the LSP. The LSP knows about fixed prices and their assigned cargo capacity on the supplier’s ships. By operating correspondingly, the LSP saves time and money (Interviewee C, 2018).

**Incentive Sharing**

The international commercial term and the stipulated contact between the LSP and its supplier determine the incentive sharing within this collaboration relationship. The supplier exercises a pay-for-performance technique where incentives are linked to performance. The incentives, in the form of paybacks, for performance offered by the supplier motivate the LSP to reach a certain cargo level (Interviewee C, 2018). Through this incentive alignment both partners are motivated to reach their strategic objectives and simultaneously considering the objectives of the whole supply chain (Cao & Zhang, 2012). These potential paybacks may improve the economic sustainability at the LSP. The LSP tries to reach the given cargo level by concentrating on few suppliers and striving for high cargo volumes with them. This provokes stability and leads to productivity and cost advantages in the long run. The stability thereby increases the employee satisfaction as it causes serenity within the
LSP. Besides, the firm enhances its efficiency and effectiveness in order to accomplish the set volume, and in this process the economic performance of the company is improved. On the one hand, the incentive sharing practice may improve the economic and social dimensions of sustainability, but on the other hand it may downgrade the environmental and social sustainability at the LSP. The practice leads to narrow-mindedness aiming at the fulfillment of set volumes and as a consequence, the environment and own staff suffer. The employees are under constant and considerable strain, and greener solutions are avoided in order to achieve the given volumes (Interviewee C, 2018).

*Goal Congruence*

Goal congruence amongst others includes the development of objectives and common goals (Wee et al., 2016). Besides, it is crucial that partners know and understand the needs and capabilities of other parties in order to create appropriate objectives for the whole SC (Poirier & Houser, 1993; Wee et al., 2016). This is given within the collaboration of the LSP and its supplier as they agreed on common goals for costs and have a high intensity of collaboration (Interviewee C, 2018). In this regard, the company’s policy to stick with the same supplier can be seen as an advantage because the longer the collaboration lasts, the better the partners know each other, and procedures can be refined. Appropriate and shared goals are developed and set up with a long-term orientation, and hence the achievement of these common goals may improve the economic sustainability at the LSP. By reaching the set goals, better rates are offered by the supplier and the LSP’s public reputation is enhanced. Costs savings and a boost of the acquisition of a new customer base are the consequences. Nevertheless, the efforts and sole concentration by the LSP on reaching the settled goals in order to gain better rates may impair the LSP’s environmental sustainability. Costly investments in environmental initiatives are omitted, the ecosystem is less considered and potential environmental pollutions are accepted. Even though, the LSP gets an enhanced public reputation as a reliable forwarder, its employees are stressed and drilled to reach the given goals. This negatively influences the employee satisfaction, and therefore may decline the social sustainability at the LSP (Interviewee C, 2018).
Joint Knowledge Creation

Within this case, the issue of how joint knowledge creation between the LSP and its key supplier can enhance the LSP’s three dimensions of sustainability remains unanswered as the partners do not create joint knowledge together (Interviewee C, 2018).

6.1.3.2 VSCC between LSP and Customer for Sustainability

Information Sharing

The LSP and its key customer share all relevant information among each other via EDI (Interviewee C, 2018). The sharing of relevant information with the key customer and a steady information flow ensured by the EDI may augment the economic sustainability at the LSP by means of generating time and cost savings, raised productivity, effectiveness and efficiency, and a faster reaction time (Lee & Whang, 1998; Cao & Zhang, 2011; Wee et al., 2016). Likewise, the LSP’s environmental and social sustainability can be improved in a similar way by this VSCC practice. The real-time information exchange via EDI induces smooth and standardized processes, reduces the paper usage dramatically, and phone calls and e-mails between the partners become redundant. Hence, safety at work is upgraded, the employees are more content and can use the valuable saved time for other activities (Interviewee C, 2018).

Joint Decision Making

The accurate relation of how joint decision making between the LSP and its key customer can improve the three sustainability dimensions at the LSP is uncertain because both firms solely negotiate about prices and cargo service level (Interviewee C, 2018). The outcomes of these negotiations however might enhance the economic sustainability at the LSP. By finding a mutual and reasonable consent regarding prices and service level, the partners operate upon the results of the negotiation. These synchronized decisions secure stability, time and money savings, and planning reliability for the LSP by adapting to the set prices and cargo service level. In order to avoid conflicts that can occur in the decision making process and affect the entire SC, the LSP organizes face-to-face meetings (Hudnurkar et al., 2014; Wee et al., 2016), pursues clear communication, and refer to realistic values. Furthermore, the
LSP sends managers to the customer’s factory and let them occasionally work from there to solve logistics issues (Interviewee C, 2018).

_Incentive Sharing_

The applied sharing of costs and risks between the LSP and its key customer may have a positive influence on the economic sustainability at the LSP. When both partners absorb possible accidents, the LSP does not carry arising expenses alone, and thus it enhances the firm’s profitability. This collective alignment of partners motivates both partners to achieve their strategic objectives and simultaneously consider the objectives of the other party (Cao & Zhang, 2012). Nevertheless, an answer of how incentive sharing between the LSP and its key customer can improve the environmental or social sustainability at the LSP cannot be found in this case (Interviewee C, 2018).

_Goal Congruence_

The LSP and its customer have a high intensity of collaboration and share relevant strategic information (Interviewee C, 2018). By knowing and understanding the needs and capabilities of each other, the partners were able to create a clear strategy (Poirier & Houser, 1993; Wee et al., 2016) and agree on long-term goals (Samaddar et al., 2006) concerning KPIs (Interviewee C, 2018). The goal adherence may improve the economic sustainability at the LSP in the long run. By complying with quantities, accuracy of delivery and prices, the LSP gets planning accuracy and its operations can be arranged. Full utilization rates, smooth processes, and time and money savings are the consequences. Another positive outcome of the fulfillment of the goals by the LSP is a public recommendation by its customer to other potential clients. The public reputation of the LSP is revised which is regarded as an aspect of social sustainability at the LSP. In contrast, the LSP’s social sustainability may be negatively affected at the same time. There is a constant pressure to comply with the KPIs and in particular the on time delivery accuracy of 95% (Interviewee C, 2018). At last, the constant strain to satisfy the customer with set quantities, accuracy and prices causes a possible impairment of the environmental sustainability at the LSP. In the same manner as for the goal congruence between the LSP and its key supplier, costly investments in environmental initiatives are omitted, the ecosystem is less considered and potential environmental pollutions accepted (Interviewee C, 2018).
Joint Knowledge Creation

As the LSP and its key customer do not create joint knowledge, a profound decision about how joint knowledge creation can improve the LSP’s economic, environmental or social sustainability cannot be made (Interviewee C, 2018). However, two related practices executed by the LSP and its customer might positively increase the economic sustainability at the LSP. The general sharing of knowledge between the partners creates an organizational knowledge base and thereby the effectiveness of the SC is improved, a competitive advantage can be created (Dodgson, 1993; Gulati, 1999; Wee et al., 2016) and money is saved. Additionally, on the basis of the partners’ negotiations about services, the LSP creates an understanding about the operations and the customer’s needs. With this new knowledge, the LSP can offer individually adjusted services to its key customer. The LSP, as a relative small company, has the flexibility to create individual solutions for its customer. Customer service is crucial for the LSP and individually adjusted personal services for its key customer effectuate customer satisfaction, and thus profit (Interviewee C, 2018).

6.2 Cross-Case Analysis of VSCC for Sustainability

6.2.1 VSCC between LSPs and Suppliers for Sustainability

In order to answer the first research question (RQ 1), the five VSCC practices are cross-case analyzed with regards to how VSCC between LSPs and its key suppliers can improve the three sustainability dimensions at LSPs. The table below shows a summary and comparison of the three case analyses stating which VSCC practice executed by the LSPs and their key suppliers can improve sustainability dimensions at the LSPs. The symbol ‘+’ indicates an improvement, ‘-’ a negative effect, ‘?’ that the relation is unknown and ‘O’ an undetermined relation.

<table>
<thead>
<tr>
<th>VSCC Practice</th>
<th>Sustainability Dimension</th>
<th>Case A</th>
<th>Case B</th>
<th>Case C</th>
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<tbody>
<tr>
<td>Information sharing</td>
<td>Economic</td>
<td>+</td>
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<td>Environmental</td>
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<td>Social</td>
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<td>+</td>
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<tr>
<td>Joint decision making</td>
<td>Economic</td>
<td>+</td>
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</table>
Information Sharing - Economic

The sharing of crucial operations information and good practices via EDI or ERP systems such as product details, delivery conditions, implementation strategy of a RFID system, cargo details, order status, order tracking, supply disruptions and available capacities between LSPs and their suppliers can improve economic sustainability at LSPs by a constant information flow with accurate data, improved responsiveness and steady communication. Future strategies and investments can be better planned, money saved, and the effectiveness and efficiency in the SC is improved. The LSPs can quicker response to their customers, the quality of customer service is enhanced, the payment cycle reduced and labor cost saved. Lastly, the firms are prepared against possible shortages and variable demand (Interviewee A, 2018; Interviewee B, 2018; Interviewee C, 2018).

Information Sharing - Environmental

The use of EDI and an integrated ERP system to exchange information between LSPs and their key suppliers can improve the environmental sustainability at LSPs as it induces a dematerialization of documents and reduces the material consumption within the company (Interviewee A, 2018; Interviewee B, 2018; Interviewee C, 2018).

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<th>Economic</th>
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<td>Incentive sharing</td>
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<td>Economic</td>
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<td>Goal congruence</td>
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<td>Joint knowledge creation</td>
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<tr>
<td>Economic</td>
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<td>Environmental</td>
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</table>
Information Sharing - Social
No generalizations can be drawn for the relation of how incentive sharing between LSPs and their key suppliers can improve social sustainability at LSPs as the cases yield different outcomes. Nonetheless, the exchange of information via EDI between LSPs and their key suppliers might improve the social sustainability at LSPs as it leads to real-time information sharing, smooth and standardized processes, a prevention of time-consuming tasks for the exchange of information, work safety, and employee satisfaction (Interviewee C, 2018).

Joint Decision Making - Economic
Joint and synchronized decisions within regular meetings on pricing, common projects, modifications on operational activities and cargo allocations on ships as well as mutually coordinated operations between LSPs and their key suppliers can improve the economic sustainability at LSPs by planning reliability of operations and activities, and more secure investments. Besides, the firm’s actions are more productive, and money and time can be saved (Interviewee A, 2018; Interviewee B, 2018; Interviewee C, 2018).

Joint Decision Making - Environmental
No generalizations can be drawn for the relation of how joint decision making between LSPs and their key suppliers can improve environmental sustainability at LSPs. Nevertheless, joint decisions on fuel consumption between LSPs and their key suppliers might improve the environmental sustainability at LSPs by proposing an implementation strategy of new environmentally friendly solutions such as the use of city gas trucks to reduce the fuel consumption of vehicles (Interviewee A, 2018).

Joint Decision Making - Social
The question of how joint decision making between LSPs and their key suppliers can improve social sustainability at LSPs remains unknown as within all cases the partners do not jointly make decisions and hence, no generalizations can be drawn.

Incentive Sharing - Economic
The sharing of risks and costs determined within contracts and the application of the technique pay-for-performance where incentives are linked to performance in order
to motivate SC partners to reach a specific level of performance between LSPs and their key suppliers can improve economic sustainability at LSPs by cost advantages in the long run, stability, as well as increased productivity, efficiency and effectiveness in order to accomplish the required performance (Interviewee B, 2018; Interviewee C, 2018).

_Incentive Sharing - Environmental_

No generalizations can be drawn for the relation of how incentive sharing between LSPs and their key suppliers can improve environmental sustainability at LSPs as the pointed question cannot be answered. Contrariwise, incentive sharing and especially the related pay-for-performance technique might downgrade the environmental sustainability at LSPs as it may lead to willful ignorance concerning the environment. The solely objective is to fulfill the set performance level given by the supplier, and thereby the environment may suffer and greener solutions are avoided (Interviewee C, 2018).

_Incentive Sharing - Social_

The issue of how incentive sharing between LSPs and their key suppliers can improve social sustainability at LSPs remains unacknowledged, and no generalizations can be drawn for the relation of how incentive sharing between LSPs and their key suppliers can improve social sustainability at LSPs. However in one case, incentive sharing between LSPs and their key suppliers might improve social sustainability at LSPs as the concentration on few suppliers, the pursuit of having high cargo volumes with them and the task to reach given cargo levels, provoke stability in the long run and increase the employee satisfaction as it causes serenity within the LSP. In contrast, incentive sharing and in particular the related pay-for-performance technique might degrade the social sustainability at LSPs due to a constant pressure and considerable strain for the employees of LSPs to comply with the required performance level which negatively affect the employee satisfaction (Interviewee C, 2018).

_Goal Congruence - Economic_

Mutual agreements on common goals and responsibilities of each partner set up with a long-term orientation, and a high intensity of collaboration between LSPs and their
key suppliers can improve economic sustainability at LSPs by means of a creation of a better understanding of the needs and capabilities of partners in order to create a clear and efficient strategy for the SC. The longer the collaboration lasts, the better the partners know each other and hence, procedures can be refined and an increased operations efficiency and smoother processes achieved. Furthermore, LSPs and their key suppliers are encouraged to reach their own and mutual objectives at the same time in order to continue the collaboration. By reaching these mutual objectives, the public reputation of LSPs may be enhanced and suppliers may offer better rates. This in turn may imply cost savings as well as new customer acquisitions (Interviewee A, 2018; Interviewee B, 2018; Interviewee C, 2018).

**Goal Congruence - Environmental**

A clear answer to the question of how goal congruence between LSPs and their key suppliers can improve environmental sustainability at LSPs cannot be made, and no generalizations can be drawn for the relation. Nonetheless, defined agreements on consumption objectives by identifying the most efficient routes as well as best situated ports to use between LSPs and their key suppliers might improve environmental sustainability at LSPs by the reduction of fuel consumption and emissions. In contrast, the unique concentration by the LSP on reaching the settled goals with the supplier might impair the LSP’s environmental sustainability. In order to gain better rates and make more profits, costly investments in environmental initiatives are omitted, the ecosystem is less considered and potential environmental pollutions are accepted (Interviewee B, 2018; Interviewee C, 2018).

**Goal Congruence - Social**

The question of how goal congruence between LSPs and its key suppliers can improve social sustainability at LSPs remains without reply, and no generalizations can be drawn. However, the congruence and compliance with agreed goals between LSPs and their key suppliers might improve social sustainability at LSPs by an enhanced public reputation as a reliable forwarder ascribed by the supplier. On the contrary, the regular pressure to comply with set objectives might worsen the social sustainability at LSPs by a decreased employee satisfaction as the employees are stressed and drilled to reach the given objectives (Interviewee A, 2018; Interviewee C, 2018).
Joint Knowledge Creation - Economic

The exchange and creation of new performance indicators within regular meetings related to profitability between LSPs and their key suppliers can improve economic sustainability at LSPs as it allows the LSPs to identify new solutions to improve their profitability such as an optimized capacity utilization for containers which leads to reduced logistics costs. In addition, the exchange and creation of new ideas and insights to optimize common processes between LSPs and their key suppliers can improve economic sustainability at LSPs. The idea of an implementation of a new route causes more orders for the LSPs, a higher cargo quantity and higher payments by the supplier. Besides, the idea of a modified and amended route makes the transport more efficient, effectuate a better utilization of capacities is achieved, and time and cost savings (Interviewee A, 2018; Interviewee B, 2018).

Joint Knowledge Creation - Environmental

Generalizations cannot be drawn for the relation of how joint knowledge creation between LSPs and their key suppliers can improve environmental sustainability at LSPs as the cases yield different outcomes. Anyhow, newly created ideas such as the dematerialization of documents and amended routes between LSPs and their suppliers may improve the environmental sustainability at LSPs by reducing the material consumption, making the transport more efficient as well as discharging less emissions obtained by a better utilization of capacities and less kilometers to drive for deployed vehicles. On the contrary, newly created ideas such as the acceptance of new routes between LSPs and their suppliers may impair the environmental sustainability at LSPs as new routes imply greater cargo quantities, more emissions and increased fuel consumption (Interviewee A, 2018; Interviewee B, 2018).

Joint Knowledge Creation - Social

The question of how joint knowledge creation between LSPs and its key suppliers can improve social sustainability at LSPs remains unanswered, and no generalizations can be drawn because within all cases the partners do not create joint knowledge together.
6.2.2 VSCC between LSPs and Customers for Sustainability

For the purpose of answering the second research question (RQ 2), the five VSCC practices are cross-case analyzed with regards to how VSCC between LSPs and its key customers can improve the three sustainability dimensions at LSPs. Table 8 shows a summary of the three case analyses stating which VSCC practice executed by the LSPs and their key customer can improve the sustainability dimensions at the LSPs. The meanings of the symbols are explained in Chapter 6.2.1.

Table 8: Improvement of sustainability by VSCC between LSPs and customers (Own illustration)

<table>
<thead>
<tr>
<th>VSCC Practice</th>
<th>Sustainability Dimension</th>
<th>Case A</th>
<th>Case B</th>
<th>Case C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information sharing</td>
<td>Economic</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Environmental</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Social</td>
<td>?</td>
<td>?</td>
<td>+</td>
</tr>
<tr>
<td>Joint decision making</td>
<td>Economic</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Environmental</td>
<td>+</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td></td>
<td>Social</td>
<td>+</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Incentive sharing</td>
<td>Economic</td>
<td>?</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Environmental</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td></td>
<td>Social</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Goal congruence</td>
<td>Economic</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Environmental</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Social</td>
<td>-</td>
<td>?</td>
<td>O</td>
</tr>
<tr>
<td>Joint knowledge creation</td>
<td>Economic</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Environmental</td>
<td>+</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td></td>
<td>Social</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>

Information Sharing - Economic

The sharing of information between LSPs and their key customers such as lead-time information, order status/tracking, delivery schedules and the status of loaded/unloaded containers via EDI or an ERP system can improve economic sustainability at LSPs by ensuring an efficient information flow, continuity of
operations, but also a better responsiveness to operational changes or issues. Additional, information shared by key customers about their products and operation planning can improve economic sustainability at LSPs by offering a better understanding of customer needs and a better responsiveness to answer it. Thus, the LSP can offer a better service to its customer with an improved efficiency of the SC and reduced operational costs (Interviewee A, 2018; Interviewee B, 2018; Interviewee C, 2018).

**Information Sharing - Environmental**
The sharing of information between LSPs and their key customers by EDI or an ERP system can improve the environmental sustainability at LSPs by reducing the material consumption, and more precisely the use of paper, between partners and within the company (Interviewee A, 2018; Interviewee B, 2018; Interviewee C, 2018).

**Information Sharing - Social**
The question of how information sharing between LSPs and their key customer can improve social sustainability remains uncertain. In fact, no direct link between information sharing and social sustainability can be found within the cases. However, the implementation of EDI or an ERP system assures continuity of operations and smooth processes, and hence a reduction of waste of time is achieved, and work safety and employee satisfaction increased, which in turn might improve social sustainability at LSPs (Interviewee C, 2018).

**Joint Decision Making - Economic**
Joint decisions made between LSPs and their key customers within regular meetings on an operational level such as modifications of activities or on a more strategic level such as future investments or negotiations on pricing can improve economic sustainability at LSPs by adapting each decision to LSPs and their key customers. Decisions fitted with LSPs and their key customers certainly enable saving time and money as well as increasing the productivity of joint activities (Interviewee A, 2018; Interviewee B, 2018; Interviewee C, 2018).
**Joint Decision Making - Environmental**

Generalizations cannot be drawn for the relation of how joint decision making between LSPs and their key customers can improve environmental sustainability at LSPs. Nonetheless, by analyzing and fixing performance indicators like fuel consumption, LSPs and their key customers can propose adapted and specific solutions to reach performance objectives. These solutions such as driver training for cleaner driving or the use of new energies to reduce fuel consumption might improve social sustainability at LSPs (Interviewee A, 2018).

**Joint Decision Making - Social**

The question of how joint decision making between LSPs and their key customers can improve joint decision making remains uncertain as the cases have different outcomes. Nevertheless, jointly coordinated operations by LSPs and their key customers lead to structured processes with reduced waste of time and repetitive tasks as well as increased safety at work which can improve employee satisfaction, and therefore might improve the social sustainability at LSPs (Interviewee A, 2018).

**Incentive Sharing - Economic**

Incentive sharing between LSPs and their key customers in the form of risks and costs determined in contracts can improve the economic sustainability at LSPs as expenses are not only carried by LSPs. Moreover, the use of pay-for-performance techniques can improve economic sustainability at LSPs by motivating LSPs to reach the set objectives by increasing its productivity and efficiency in order to achieve potential financial advantages in the long run (Interviewee B, 2018; Interviewee C, 2018).

**Incentive Sharing - Environmental**

Generalizations cannot be drawn for the relation of how incentive sharing between LSPs and their key customers can improve environmental sustainability at LSPs as within all cases no direct link between incentive sharing and environmental sustainability can be found.
Incentive Sharing - Social

The question of how incentive sharing between LSPs and their key customers can improve social sustainability at LSPs remains unanswered as there is no direct link between the variables in the investigated cases.

Goal Congruence - Economic

High intensity of collaboration between LSPs and their key customers with the sharing of strategic and relevant information as well as mutual agreements on common goals can improve the economic sustainability at LSPs. In fact, these agreements and an intense collaboration enable to understand the needs and capabilities of each partner in order to create a clear strategy adapted to LSPs and their key customers. By creating a clear and adapted strategy, its implementation is facilitated and its structure is in line with all partners which lead to an improved efficiency of operations and increased profitability. In addition, mutual agreements arranged between LSPs and their key customers motivate the partners to reach the common goals in order to better plan their operations, and save money and time. Moreover, a long-lasting and high intensity of collaboration between LSPs and their key customers based on the fulfillment of common objectives can induce public recommendations to the LSPs from their key customers. Other potential customers may be interested to establish a business relationship with the LSPs which implies a development of its customer portfolio and therefore increase LSPs’ activities (Interviewee A, 2018; Interviewee B, 2018; Interviewee C, 2018).

Goal Congruence - Environmental

Goal congruence between LSPs and their key customers can improve environmental sustainability at LSPs by coordinating partners and creating a clear strategy. The implementation of environmental processes is accordingly facilitated such as product recycling which can be adapted to each partner in order to reduce the negative impact on the environment. Furthermore, in order to continue long-lasting and successful collaboration between LSPs and their key customers, each partner is aiming at reaching own and common objectives that can be related to the environment such as fuel consumption which can further lead to reduced emissions. In contrast, in order to reach defined economic objectives, the ecosystem might be less considered and
environmental investments omitted (Interviewee A, 2018; Interviewee B, 2018; Interviewee C, 2018).

**Goal Congruence - Social**

Generalizations cannot be drawn for the relation of how goal congruence between LSPs and their key customers can improve social sustainability at LSPs. However, the constant pressure on LSPs to reach common and mutual agreements can be reflected on employee satisfaction by increased stress and workload, and thereby might negatively impact social sustainability at LSPs. Contrariwise, the successful fulfillment of mutual agreements may increase the public reputation of LSPs which is considered as an positive aspect of social sustainability at LSPs (Interviewee A, 2018; Interviewee B, 2018; Interviewee C, 2018).

**Joint Knowledge Creation - Economic**

Joint knowledge creation between LSPs and their key customers within regular meetings in the form of new ideas and insights can improve economic sustainability at LSPs by optimizing and improving common processes. As a matter of fact, partners can propose solutions to make operations more efficient as it is the case for inventory management with the implementation of a RFID system which leads to time and costs savings, or the implementation of a new stopover in a port in order to reduce logistics costs. These solutions are based on performance indicators jointly analyzed between LSPs and their key customers in order to detect possible issues or future improvements (Interviewee A, 2018; Interviewee B, 2018; Interviewee C, 2018).

**Joint Knowledge Creation - Environmental**

The question of how joint knowledge creation between LSPs and their key customers can improve environmental sustainability at LSPs remains unacknowledged. Nonetheless, the creation of new ideas such as the use of new sources of energy like city gas for trucks aims to reduce emissions of the fleet and the overall impact on the environment, and therefore might improve environmental sustainability at LSPs (Interviewee A, 2018).
Joint Knowledge Creation - Social

Generalizations cannot be drawn for the relation of how joint knowledge creation between LSPs and their key customers can improve social sustainability at LSPs because no direct link between joint knowledge creation and social sustainability exists within all cases.

6.3 Summary of Data Analysis

Based on the results of the case analyses and cross-case analysis, Figure 7 depicts a model for how to improve sustainability at LSPs by VSCC between LSPs and suppliers (RQ 1).

![Figure 7: Model ‘how to improve sustainability at LSPs by VSCC with suppliers’ (Own illustration)](image)

Figure 8 illustrates a model for how to improve sustainability at LSPs by VSCC between LSPs and customers (RQ 2) on the basis on the results of the case analyses and cross-case analysis.
7 Discussion

This chapter discusses the generated findings in a critical way, compares these findings with previous theory and expected outcomes, and considers societal aspects connected to VSCC and sustainability.

7.1 Critical Reflections of Findings

Taking into consideration the generated findings, some critical reflections need to be noted. Even though the defined delimitations cover various critical remarks, additional reflections can be acquired from the empirical findings and analyses.

The accurate extent of improvement of sustainability by VSCC between LSPs and partners remains unclear due to an insufficient access to data. In addition, the fact that not every VSCC practice is suitable for and applied at every LSP prevents a holistic examination of VSCC for all dimensions of sustainability. In fact, the executed VSCC practices mostly have the potential to improve economic sustainability at LSPs, however environmental and social sustainability are less addressed and improved at the case companies or sometimes even negatively
affected. Thus, strong interdependencies between the three dimensions are noticeable as they overlap in-between. Similarly, the extent of application of VSCC practices between the partners is hard to grasp and compare. Therefore, a differentiation between categories stating the degree of the VSCC application within each company is desirable.

Furthermore, the potential to build generalizations for the relation of how VSCC between LSPs and partners can improve sustainability at LSPs based on the findings is rather low. Even though several similarities are detected between the cases, the gathered data is not sufficient, and the location and type of LSPs differ to some extent.

### 7.2 Comparing Findings with Theory and Expected Outcome

The comparison of the gained findings with the theory and expected outcomes reveals that some findings correspond to the theory and others deviate from the common state of knowledge. Thereby, it needs to be highlighted that generally few literature on VSCC for sustainability (at LSPs) exists and little is known about the phenomenon.

Several concordances between the theory and findings could be identified within this research project. Supply chain collaboration has a vital role for the attainment of sustainability and a bottom-line influence on firm performance (Blome et al., 2014; Chen et al., 2017; Hubeau et al., 2017; León-Bravo et al., 2017; Pero et al., 2017). Moreover, the suppliers and customers of an organization should be directly involved in planning and conducting joint sustainable solutions in order to attain sustainability (Vachon & Klassen, 2008; Chen et al., 2017). Therefore, a good understanding of the partner’s responsibilities and capabilities, and a high level of knowledge exchange among the SC partners are required (Vachon & Klassen, 2006; Vachon & Klassen, 2008). Furthermore, long-term relationships between the SC partners are favored in order to develop and optimize sustainability-oriented solutions or competences in terms of environmentally friendly products and processes (Vachon & Klassen, 2006; Pero et al., 2017).

Based on the present theory, the expected outcomes were that all sustainability dimensions are improved by the execution of VSCC practices, and thus the research
questions were aimed at answering how an improvement of sustainability by VSCC at LSPs can be achieved. However, the findings reveal that not all sustainability dimensions are always enhanced by every of the five VSCC practices. This might be explainable by the interdependencies and overlaps in-between economic, environmental and social sustainability. The effect of these interdependencies combined with the execution of VSCC practices is not explored. The outcome of this is that the executed VSCC practices mostly can improve economic sustainability at LSPs, but environmental can be sometimes and social sustainability barely improved at the case companies.

7.3 Societal Considerations

Beside the discussed business implications arising from VSCC for sustainability, it is also important to consider particular societal aspects. In respect thereof, three societal aspects that are impacted by the implementation of VSCC for sustainability need to be considered by the society and companies: employees, education and the earth.

The first challenge for the society is the replacement of employees caused by the application of VSCC practices within supply chains in order to improve sustainability. The sharing of resources and implementation of new technologies such as EDI or ERP systems between companies will implicate a decreased need for labor. Even though it has several advantages related to the workforce such as the amendment of work safety and less administrative tasks, it also implies that easy tasks currently performed by humans will be increasingly performed by technologies. Especially low-skilled workers will be impacted as they often work on easy tasks. Thus, education will become even more important in the future and needs to be provided by the society and companies in order to avoid a social divide and a two class society. Besides, a successful realization of process improvements within supply chains in order to enhance sustainability requires specific employee training. Therefore, LSPs should offer training to their employees to develop sector relevant skills and capabilities.

Another challenge for the society is the depletion of the earth strengthened by the existing interdependencies between the three sustainability dimensions. Due to the interests of stakeholders, companies often concentrate on their economic sustainability and occasionally disregard environmental and social environment. One
accruing problem is that a neglected environmental sustainability might imply a
declined quality of life for humans that live in polluted areas. Therefore, the society
and in particular LSPs should make an effort to find a balance between the three
sustainability dimensions as well as find reliable and sustainable solutions in order to
ensure an intact earth for future generations.

8 Conclusion

The following chapter firstly summarizes the findings and results of the study with
regard to the two research questions. Secondly, theoretical and practical
contributions of this thesis are presented. Finally, limitations of the study are
outlined and suggestions for further research presented.

8.1 Answering the Research Questions

Aiming to answer the research questions, the analyses enable some insights.
Improvement of economic, environmental and social sustainability can be associated
to some of the VSCC practices jointly conducted by LSPs and their partners.

Referring to the first research question of how vertical supply chain collaboration
between LSPs and their suppliers can improve sustainability at LSPs, the following
findings are obtained. At first, information sharing between LSPs and suppliers can
improve sustainability at LSPs by the sharing of relevant and crucial operations
information as well as good practices via information sharing technologies such as
EDI or ERP systems. Secondly, joint decision making between LSPs and suppliers
can enhance the sustainability at LSPs by coordinating and synchronizing decisions
between partners during regular meetings on pricing, common projects and
modifications on operational activities. Thirdly, incentive sharing between LSPs and
suppliers can increase the sustainability at LSPs by the sharing of risks and costs
included in contracts, the pay-for-performance technique but also by concentrating
on few key suppliers. Fourthly, goal congruence between LSPs and suppliers can
improve the sustainability at LSPs by setting up mutual agreements on common
goals including the responsibilities of each partner with a long-term orientation as
well as a high intensity of collaboration with strategic information shared. Fifthly and
finally, joint knowledge creation between LSPs and suppliers can enhance the
sustainability at LSPs by creating and exchanging new performance indicators as well as ideas for optimization of processes during regular meetings.

With reference to the second research question of how vertical supply chain collaboration between LSPs and their customers can improve sustainability at LSPs, the results are similar to the first research question but differ to some extent. Firstly, information sharing between LSPs and their customers can improve sustainability at LSPs by sharing relevant and vital information via ERP systems or EDI. Secondly, joint decision making between LSPs and customers can enhance the sustainability at LSPs by making joint decisions during regular meetings on an operational and strategic level, but also by jointly analyzing and fixing performance indicators. Thirdly, incentive sharing between LSPs and customers can improve the sustainability at LSPs by the sharing of risks and costs determined in contracts and also with the pay-for-performance technique. Fourthly, goal congruence between LSPs and customers can enhance the sustainability at LSPs by enabling the creation of a clear strategy and setting up mutual agreements on common goals together with a high intensity of collaboration and sharing of strategic and relevant information. Fifthly and lastly, joint knowledge creation between LSPs and customers can improve sustainability at LSPs by the creation of new ideas during regular meetings aiming to optimize SC operations.

8.2 Theoretical and Practical Contributions
This thesis permits to contribute to theory concerning different aspects. At first, there is no existing theoretical research about the relation between the five VSCC practices and the three sustainability dimensions. Thus, the authors of this thesis believe to contribute new insights on VSCC between LSPs and suppliers as well as customers and its impact on economic, environmental and social sustainability at LSPs. Secondly, based on the empirical findings, the authors come up with new specific measurements for VSCC between LSPs and their suppliers and customers as well as sustainability measurements at LSPs.

The practical contribution of this thesis is the generation of knowledge to LSPs in order to reach efficient VSCC with their suppliers and customers. The generated knowledge is in the form of guidance and recommendations for LSPs on how to improve their sustainability by VSCC with their suppliers and customers. By
examining the findings and applying the recommendations, LSPs are able to improve their economic performance and financial stability, organization’s impact on living and non-living natural systems, and organization’s impact on the social system in which it conducts operations. Finally, the specific measurements offer a valuable support to develop adapted solutions for VSCC and sustainability at LSPs.

8.3 Limitations and Future Research

Beyond the determined delimitations, additional occurred limitations within this master thesis need to be reviewed. The type of data analysis is based on subjective explanations as the causal relationship between VSCC and sustainability at LSPs is unexplored. The authors attempt to establish a cause and effect relationship between the variables VSCC and sustainability, however it cannot be proven. Due to missing access to data, the extent of applied VSCC practices and a comparison of the firms’ situations before and after executing VSCC practices is not possible. Besides, the research is restricted to the individual contemplation of the relationship LSPs with its key suppliers as well as LSPs with its key customer. Furthermore, the database consists of three LSPs, and more participants are needed in order to cover all VSCC practices in detail. As not all VSCC practices are fully deployed at the different LSPs, the authors also use related types of these practices in order to link VSCC to sustainability such as negotiations for joint knowledge creation. Lastly, the three investigated LSPs represent two different types of LSPs (freight forwarder and full service provider) and are located in different countries (France and Germany) which might lead to problems when comparing them.

Further research needs to be carried out to investigate horizontal supply chain collaboration including external collaboration with competitors as well as external collaboration with non-competitors. Likewise, the whole SC should be considered at once as this thesis is limited to the perspective of LSPs and its economic, environmental and social sustainability, but not the other involved partners. Lastly, parameters should be developed for the degree of VSC application within companies in order to categorize them.
Bibliography


Oral Sources

Interviewee A. (2018, April 9). Semi-structured interview with representative of case company A.

Interviewee B. (2018, April 20). Semi-structured interview with representative of case company B.

Appendix A: Empirical Findings

Measurements

**Table 9: Measurement of VSCC between LSP and supplier (Own illustration)**

<table>
<thead>
<tr>
<th>VSCC Practice</th>
<th>Case</th>
<th>Measurement of VSCC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information sharing</td>
<td>A</td>
<td>Fluidity of information; Quality of information; Quality of shared files</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>Quality of data (data accuracy and data timeliness)</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>Supplier satisfaction; Profitability; Labor intensity; Transparency</td>
</tr>
<tr>
<td>Joint decision making</td>
<td>A</td>
<td>Level of achievement of the set objectives with supplier</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>Pricing by supplier; Results and benefits of the implemented ERP system</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>Pricing by supplier</td>
</tr>
<tr>
<td>Incentive sharing</td>
<td>A</td>
<td>/</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>Profitability</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>Paybacks</td>
</tr>
<tr>
<td>Goal congruence</td>
<td>A</td>
<td>Level of achievement of the set objectives with supplier</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>Efficiency and profitability of projects</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>Pricing by supplier; New customer acquisition</td>
</tr>
<tr>
<td>Joint knowledge creation</td>
<td>A</td>
<td>/</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>/</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>Supplier satisfaction</td>
</tr>
</tbody>
</table>

**Table 10: Measurement of VSCC between LSP and customer (Own illustration)**

<table>
<thead>
<tr>
<th>VSCC Practice</th>
<th>Case</th>
<th>Measurement of VSCC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information sharing</td>
<td>A</td>
<td>Fluidity of information; Quality of information; Quality of shared files; Forecast accuracy</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>Quality of data (data accuracy and data timeliness)</td>
</tr>
</tbody>
</table>
### Joint decision making

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of achievement of the set objectives with customer</td>
<td>Customer performance indicators</td>
<td>Customer satisfaction</td>
<td></td>
</tr>
</tbody>
</table>

### Incentive sharing

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>/</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Profitability; Return of investments of common projects</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Profitability; Duration of relationship</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Goal congruence

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of achievement of the set objectives with customer</td>
<td>Efficiency and profitability of projects</td>
<td>Accuracy/service level; New customer acquisition</td>
<td></td>
</tr>
</tbody>
</table>

### Joint knowledge creation

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>/</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>/</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customer satisfaction</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**Table 11: Sustainability measurement at LSP (Own illustration)**

<table>
<thead>
<tr>
<th>Sustainability Dimension</th>
<th>Case</th>
<th>Sustainability Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic</td>
<td>A</td>
<td>Turnover; Margin; Maintenance costs of the vehicle fleet; Fuel consumption; Profit growth</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>Market penetration rate; Market share; Profitability; Turnover; Continuity of operations; Sales growth in price and volume</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>Gross margin to costs of sales over gross margin; Gross margin over employees; Gross margin over overall costs</td>
</tr>
<tr>
<td>Environmental</td>
<td>A</td>
<td>Fuel consumption</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>Emissions; Energy consumption</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>Material consumption; Waste management</td>
</tr>
</tbody>
</table>
VSCC between LSP and Partners for Sustainability

**Case A**

*Information Sharing*

Information sharing between the LSP and its key supplier and customer has a contribution on the LSP’s economic sustainability as it helps to better understand customer needs and improve the efficiency to answer these needs. Furthermore, the LSP can better anticipate future needs and therefore make investments that may be needed in the future. Information sharing also impacts the environmental sustainability at the LSP due to the sharing of good practices such as an implementation strategy of a radio-frequency identification (RFID) system that helps to improve processes and reduce the waste of time. In addition, the use of EDI to share information affects the environmental sustainability with regards to the reduction of paper usage (Interviewee A, 2018).

*Joint Decision Making*

The LSP considers joint decision making as beneficial for its economic sustainability as it provides new ideas and insights for the improvement of processes and efficiency of the company. Besides, joint decision making contributes to social sustainability by improving employee satisfaction with regards to jointly coordinating operations which leads to a reduction of waste of time and repetitive tasks (Interviewee A, 2018).

*Incentive Sharing*

The contribution of incentive sharing to the economic, social and environmental sustainability is unknown because in the national transport activity of the LSP no incentives are shared with its supplier and customer (Interviewee A, 2018).

*Goal Congruence*

Goal congruence with the key supplier and customer is considered as crucial for the economic and environmental sustainability by the LSP. Existing mutual agreements
with set objectives between the LSP and its supplier and customer encourage each partner to reach its economic objectives, offer the best available service and improve the relationship. Moreover, goal congruence facilitates environmental processes by coordinating partners in a common way which enables processes to fit within each partner’s organization (Interviewee A, 2018).

*Joint Knowledge Creation*

For the LSP, joint knowledge creation with its partners contributes to economic, social and environmental sustainability as it helps to create and optimize the company’s processes with new ideas and insights. Additionally, the process of jointly creating knowledge reinforces the relationship between the LSP and its supplier as well as customer by promoting the team spirit and trust (Interviewee A, 2018).

**Case B**

*Information Sharing*

Information sharing between the LSP and its key supplier and customer contributes to the LSP’s economic sustainability as constant communication improves the efficiency of operations, ensures the continuity of operations and saves money. Moreover, the strategic level of shared information between the LSP and its partners enables the LSP to anticipate future investments and have higher reliability and trust with its partners. Besides, the development of new technologies to share information such as ERP system or the dematerialization of documents impacts the LSP’s environmental sustainability by reducing paper usage. Finally, the continuity of operations and the speed of information exchange contribute to the social sustainability at the LSP by saving time for employees (Interviewee B, 2018).

*Joint Decision Making*

Joint decision making between the LSP and its key supplier and customer contributes to the LSP’s economic sustainability because it improves decision making process by considering every partner in each decision. In fact, it enables an enhanced coordination between the LSP and its supplier and customer, which improves the efficiency of common processes. However, joint decision making does not directly impact environmental or social sustainability at the LSP (Interviewee B, 2018).
Incentive Sharing
According to the LSP, incentive sharing with its supplier and customer contributes only to its economic sustainability. Incentive sharing with the supplier can result in lower prices for the LSP, and incentive sharing with the customer to monetary benefits on customer’s projects (Interviewee B, 2018).

Goal Congruence
For the LSP, goal congruence is important and the intensity of the collaboration one of its main components. In fact, a long-lasting collaboration with its supplier or customer increases trust and brings benefits such as a smooth information flow and increased communication as well as a better operations efficiency, which contribute to the LSP’s economic sustainability. Moreover, mutual agreements on common goals between the partners including economic, environmental and social criteria are beneficial for the economic, social and environmental sustainability at the LSP since each partner wants to achieve these goals in order to continue a successful and effective collaboration (Interviewee B, 2018).

Joint Knowledge Creation
In order to improve the LSP’s performance, it is necessary to measure its actual firm performance. In this context, the creation of joint knowledge between the LSP and its supplier and customer is based on performance indicators adapted to each company and to the reality of operations. Thereby, these indicators contribute to the LSP’s economic, environmental and social sustainability by enabling measurements to further increase firm performance. Lastly, the ideas generated during the meetings with the supplier and customer help to create and optimize processes, and improve the efficiency of the SC (Interviewee B, 2018).

Case C
Information Sharing
Information sharing between the LSP and its key supplier and key customer has a contribution on the LSP’s economic sustainability as a matter of fact that a steady information flow saves money. Once collaboration has started, it is like a domino effect and everything starts working. Employees cost money, and if the LSP has all data on its hands and data is given in a good way, the LSP saves time and money. Besides,
information sharing affects the company’s environmental and social sustainability because when data and information are exchanged via EDI, the usage of paper is reduced and no phone calls as well as no e-mails are needed. Smooth and standardized processes lead to further time savings and employee satisfaction as the employees know what they need to do (Interviewee C, 2018).

**Joint Decision Making**

The contribution of joint decision making to the sustainability at the LSP is unknown because the partners rather negotiate than make actual joint decisions (Interviewee C, 2018).

**Incentive Sharing**

Incentive sharing with the supplier/customer mainly influences the economic sustainability at the LSP. With regards to incentive sharing with the supplier, the LSP might get paybacks when reaching set cargo volumes, and with regards to the customer, profitability of the LSP is enhanced due to the sharing of costs and risks (Interviewee C, 2018).

**Goal Congruence**

Goal congruence, viz. agreeing on mutual goals, with the key supplier/customer contributes to the LSP’s economic, environmental and social sustainability. When the customer gives clear goals, such as a truck has to be available at a specific time, the LSP organizes it for that time. Complying with the time schedule and goals in general, lead to a full utilization rate, time and money savings. The supplier’s trucks drive less, fewer emissions are discharged and fuel is saved. Furthermore, if the LSP achieves the mutual goals agreed with its customer, the customer would recommend the LSP to other potential clients. Likewise, the shipping line would offer better rates and state that the LSP is a good and reliable forwarder. Accordingly, the LSP gets a better public reputation which further might lead to new customers (Interviewee C, 2018).

**Joint Knowledge Creation**

The contribution of joint knowledge creation with the key supplier/customer to the LSP’s sustainability is uncertain due to the fact that the type of relationship between the
partners does not support the creation of joint knowledge, and hence no joint knowledge is created (Interviewee C, 2018).

Appendix B: Interview Guide

Introduction and Terminology

**Purpose**
The purpose of this interview is to explore how vertical supply chain collaboration between logistics service providers and partners (suppliers and customers) can improve sustainability for logistics service provider.

**Vertical Supply Chain Collaboration**

*Vertical supply chain collaboration:* Two or more organizations (e.g. manufacturer, LSP, customer) share responsibilities, risks, resources and information within a supply chain in order to improve customer satisfaction and successfully serve the end customer.

*Information sharing:* Capturing and transferring relevant information on time in order to manage the business operations.

*Joint decision making:* Synchronizing decisions on planning and operation issues between supply chain partners.

*Incentive sharing:* Sharing costs, benefits and risks between supply chain partners.

*Goal congruence:* Degree of joint involvement of partner firms in the achievement of a goal.

*Joint knowledge creation:* Extent to which supply chain partners develop a better understanding of and response to the market and competitive environment by working together.

**Sustainability**

*Economic sustainability:* Economic performance and financial stability of companies.

*Environmental sustainability:* Organization’s impact on living and non-living natural systems, including ecosystems, land, air and water.
Social sustainability: Organization’s impact on the social system in which it conducts operations.

Semi-Structured Interview Guide

General Questions
G1: What is your actual position in the company?
G2: How would you describe your main responsibilities?

VSCC between LSP and Supplier
Information Sharing
SI1: Which information do you share with your key supplier and how is it shared (e.g. demand forecast, order status/order tracking, supply disruptions, on-hand inventory level, delivery schedules, or lead time information)?
SI2: Which information does your key supplier share with you and how is it shared (e.g. demand forecast, order status/order tracking, supply disruptions, on-hand inventory level, delivery schedules, or lead time information)?

Joint Decision Making
SD1: Which decisions do you jointly make with your key supplier and how are they made (e.g. synchronized decisions on planning and operations, plans on product assortment, development of demand forecasts, resolutions of forecast exceptions, decisions on inventory requirements, or decisions on optimal order quantity)?

Incentive Sharing
SIS1: Which incentives do you share with your key supplier and how are they shared (e.g. costs, benefits, risks, saving on reduced inventory costs, allowances for product defects, or agreements on order changes)?

Goal Congruence
SG1: What is the intensity of the collaboration with your key supplier (less than one year, one to three years, or more than three years)?
SG2: Are there any agreements on the goals with your key supplier? If so, what is the duration of the shared goal relationship?
SG3: What is the level of strategic information that you share with your key supplier?

*Joint Knowledge Creation*

SK1: Do you create joint knowledge with your key supplier (e.g. new ideas or insights)? If so, how is it created?

SK2: Does the structure of the relationship to your key supplier support the development of new ideas?

*VSCC between LSP and Customer*

*Information Sharing*

CI1: Which information do you share with your key customer and how is it shared (e.g. demand forecast, order status/order tracking, supply disruptions, on-hand inventory level, delivery schedules, or lead time information)?

CI2: Which information does your key customer share with you and how is it shared (e.g. demand forecast, order status/order tracking, supply disruptions, on-hand inventory level, delivery schedules, or lead time information)?

*Joint Decision Making*

CD1: Which decisions do you jointly make with your key customer and how are they made (e.g. synchronized decisions on planning and operations, plans on product assortment, development of demand forecasts, resolutions of forecast exceptions, decisions on inventory requirements, or decisions on optimal order quantity)?

*Incentive Sharing*

CIS1: Which incentives do you share with your key customer and how are they shared (e.g. costs, benefits, risks, saving on reduced inventory costs, allowances for product defects, or agreements on order changes)?

*Goal Congruence*

CG1: What is the intensity of the collaboration with your key customer (less than one year, one to three years, or more than three years)?

CG2: Are there any agreements on the goals with your key customer? If so, what is the duration of the shared goal relationship?
CG3: What is the level of strategic information that you share with your key customer?

*Joint Knowledge Creation*

CK1: Do you create joint knowledge with your key customer (e.g. new ideas or insights)? If so, how is it created?

CK2: Does the structure of the relationship to your key customer support the development of new ideas?

*Measurement of VSCC at LSP*

M1: To what extent is (vertical) supply chain collaboration considered in your company?

M2: Do you measure relevant information shared with your key supplier/customer? If so, what measures do you use for information sharing?

M3: Do you measure joint decisions made with your key supplier/customer? If so, what measures do you use for joint decision making?

M4: Do you measure incentives shared with your key supplier/customer? If so, what measures do you use for incentive sharing?

M5: Do you measure existent goal congruence with your key supplier/customer? If so, what measures do you use for goal congruence?

M6: Do you measure the joint knowledge created with your key supplier/customer? If so, what measures do you use for joint knowledge creation?

*Sustainability Measurement at LSP*

*Economic*

SEC1: How important is economic sustainability (economic performance and financial stability) for your company?

SEC2: What steps and investments have you taken to improve the economic sustainability of your company?

SEC3: What are the economic sustainability goals of your company?

SEC4: Do you consider sales growth, profit growth and continuity of operations in your company?

SEC5: Do you measure the economic performance and financial stability of your company? If so, what measures do you use for economic sustainability?
Environmental

SEN1: How important is environmental sustainability (organization’s impact on living and non-living natural systems) for your company?
SEN2: What steps and investments have you taken to improve the environmental sustainability of your company?
SEN3: What are the environmental sustainability goals of your company?
SEN4: Do you consider renewable energy usage, recycling, fossil fuel consumption, emissions and impact on ecosystems in your company?
SEN5: Do you measure your organization’s impact on living and non-living natural systems? If so, what measures do you use for environmental sustainability?

Social

SS1: How important is social sustainability (organization’s impact on the social system in which it conducts operations) for your company?
SS2: What steps and investments have you taken to improve the social sustainability of your company?
SS3: What are the social sustainability goals of your company?
SS4: Do you consider employee satisfaction, ethics, safety and human rights in your company?
SS5: Do you measure your organization’s impact on the social system in which it conducts operations? If so, what measures do you use for social sustainability?

VSCC between LSP and Partners for Sustainability

Information Sharing - Economic

IEC1: Which contribution do you think information sharing with your key supplier has to your company’s economic sustainability (economic performance and financial stability)?
IEC2: Which contribution do you think information sharing with your key customer has to your company’s economic sustainability?

Information Sharing - Environmental

IEN1: Which contribution do you think information sharing with your key supplier has to your company’s environmental sustainability (organization’s impact on living and non-living natural systems)?
IEN2: Which contribution do you think information sharing with your key customer has to your company’s environmental sustainability?

Information Sharing - Social
IS1: Which contribution do you think information sharing with your key supplier has to your company’s social sustainability (organization’s impact on the social system in which it conducts operations)?
IS2: Which contribution do you think information sharing with your key customer has to your company’s social sustainability?

Joint Decision Making - Economic
DEC1: Which contribution do you think joint decision making with your key supplier has to your company’s economic sustainability (economic performance and financial stability)?
DEC2: Which contribution do you think joint decision making with your key customer has to your company’s economic sustainability?

Joint Decision Making - Environmental
DEN1: Which contribution do you think joint decision making with your key supplier has to your company’s environmental sustainability (organization’s impact on living and non-living natural systems)?
DEN2: Which contribution do you think joint decision making with your key customer has to your company’s environmental sustainability?

Joint Decision Making - Social
DS1: Which contribution do you think joint decision making with your key supplier has to your company’s social sustainability (organization’s impact on the social system in which it conducts operations)?
DS2: Which contribution do you think joint decision making with your key customer has to your company’s social sustainability?
Incentive Sharing - Economic
ISEC1: Which contribution do you think incentive sharing with your key supplier has to your company’s economic sustainability (economic performance and financial stability)?
ISEC2: Which contribution do you think incentive sharing with your key customer has to your company’s economic sustainability?

Incentive Sharing - Environmental
ISEN1: Which contribution do you think incentive sharing with your key supplier has to your company’s environmental sustainability (organization’s impact on living and non-living natural systems)?
ISEN2: Which contribution do you think incentive sharing with your key customer has to your company’s environmental sustainability?

Incentive Sharing - Social
ISS1: Which contribution do you think incentive sharing with your key supplier has to your company’s social sustainability (organization’s impact on the social system in which it conducts operations)?
ISS2: Which contribution do you think incentive sharing with your key customer has to your company’s social sustainability?

Goal Congruence - Economic
GEC1: Which contribution do you think goal congruence with your key supplier has to your company’s economic sustainability (economic performance and financial stability)?
GEC2: Which contribution do you think goal congruence with your key customer has to your company’s economic sustainability?

Goal Congruence - Environmental
GEN1: Which contribution do you think goal congruence with your key supplier has to your company’s environmental sustainability (organization’s impact on living and non-living natural systems)?
GEN2: Which contribution do you think goal congruence with your key customer has to your company’s environmental sustainability?
Goal Congruence - Social

GS1: Which contribution do you think goal congruence with your key supplier has to your company’s social sustainability (organization’s impact on the social system in which it conducts operations)?

GS2: Which contribution do you think goal congruence with your key customer has to your company’s social sustainability?

Joint Knowledge Creation - Economic

KEC1: Which contribution do you think joint knowledge creation with your key supplier has to your company’s economic sustainability (economic performance and financial stability)?

KEC2: Which contribution do you think joint knowledge creation with your key customer has to your company’s economic sustainability?

Joint Knowledge Creation - Environmental

KEN1: Which contribution do you think joint knowledge creation with your key supplier has to your company’s environmental sustainability (organization’s impact on living and non-living natural systems)?

KEN2: Which contribution do you think joint knowledge creation with your key customer has to your company’s environmental sustainability?

Joint Knowledge Creation - Social

KS1: Which contribution do you think joint knowledge creation with your key supplier has to your company’s social sustainability (organization’s impact on the social system in which it conducts operations)?

KS2: Which contribution do you think joint knowledge creation with your key customer has to your company’s social sustainability?

Other VSCC Practices

PS1: Can you think of other collaboration practices with your key supplier that have a contribution to your company’s economic sustainability?

PS2: Can you think of other collaboration practices with your key supplier that have a contribution to your company’s environmental sustainability?
PS3: Can you think of other collaboration practices with your key supplier that have a contribution to your company’s social sustainability?

PC1: Can you think of other collaboration practices with your key customer that have a contribution to your company’s economic sustainability?

PC2: Can you think of other collaboration practices with your key customer that have a contribution to your company’s environmental sustainability?

PC3: Can you think of other collaboration practices with your key customer that have a contribution to your company’s social sustainability?

Measurement of VSCC between LSP and Partners for Sustainability

MVS1: Do you have specific measures for the contribution of vertical supply chain collaboration with your key supplier/customer to your company’s economic sustainability?

MVS2: Do you have specific measures for the contribution of vertical supply chain collaboration with your key supplier/customer to your company’s environmental sustainability?

MVS3: Do you have specific measures for the contribution of vertical supply chain collaboration with your key supplier/customer to your company’s social sustainability?
Appendix C: Consent Form

Declaration:
I agree to be interviewed to provide an empirical foundation for the Master Thesis on Improving Sustainability by Vertical Supply Chain Collaboration at Logistics Service Providers composed by Malo Joly and Malte Heuer under supervision of Professor Helena Forslund at Linnaeus University, Sweden.

I herewith certify that I was informed about the publication of the Thesis and am aware that the results will be shared with all research participants.

I hereby permit that (please mark corresponding boxes):
- The interview will be audio recorded
- Notes will be taken
- Notes will be shared with the supervisor and examination team
- My name will be mentioned
- My position will be described
- The organization’s name will be stated

Additional remarks by the interviewee:

..................................................................................................................
..................................................................................................................
..................................................................................................................

__________________
Name, Company, Date

Thank you very much for your participation in our research!
Malo Joly & Malte Heuer