



**SUPPLY CHAIN COLLABORATION: MATURITY AND PERFORMANCE OF  
PROCESSES FROM SALES PERSPECTIVE**

Case: Finnish international trade agency

Lappeenranta–Lahti University of Technology LUT

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## ABSTRACT

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### **Supply Chain Collaboration: Maturity and performance of processes from sales perspective**

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Supply chain collaboration between companies has grown its importance in the last decades. Companies invest significant resources in developing their partnerships, however, the results of previous research on performance of supply chain collaboration are inconsecutive. Maturity models enable comparison of process development in different comparison targets.

The purpose of this bachelor's thesis is to study the relationship between the maturity of processes in supply chain collaboration and the performance of sales processes through an embedded case study. This research examines the maturity of collaboration in seven partnerships of a Finnish SME operating in agency business by utilizing a maturity model for supply chain collaboration (MM-SCC). In addition, the performance of sales processes is measured by sales volumes and the number of working hours spent on the sales processes.

The results of this study indicate a link between the maturity of collaboration and the overall performance of sales processes. The volume of sales and ratio of working hours and generated sales revealed improved performance at higher levels of maturity in supply chain collaboration. However, the research could not find a relationship between collaboration maturity and working time.

## TIIVISTELMÄ

Lappeenrannan–Lahden teknillinen yliopisto LUT

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Kauppätieteet

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### **Toimitusketjuyhteistyö: Maturiteetti ja prosessien suorituskyky myynnin näkökulmasta**

Kauppätieteiden kandidaatintyö

52 sivua, 5 kuvaa, 5 taulukkoa ja 3 liitettä

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Avainsanat: Toimitusketjuyhteistyö, Maturiteettimalli, Myynnin tehokkuus, PK-yritykset

Yritystenvälinen yhteistyö toimitusketjuissa on kasvattanut merkitystään viimeisten vuosikymmenten aikana. Yritykset panostavat yhteistyösuhteiden kehittämiseen huomattavia resursseja, mutta aikaisemmat tutkimustulokset toimitusketjuyhteistyön tehokkuudesta ovat vaihtelevia. Maturiteettimallit mahdollistavat prosessien kehitystason vertailun myös keskenään suuresti eroavissa vertailukohteissa.

Tämän kandidaatintutkielman tarkoitus on tutkia toimitusketjuyhteistyön prosessien maturiteetin vaikutusta myyntiprosessien tehokkuuteen upotetun tapaustutkimuksen (embedded case study) avulla. Tutkimuksessa tarkastellaan toimitusketjuyhteistyöhön tarkoitettua maturiteettimallin (MM-SCC) avulla suomalaisen agentuuriliiketoimintaa harjoittavan PK-yrityksen yhteistyön maturiteettia seitsemässä liiketoimintasuhteessa. Lisäksi myyntiprosessien tehokkuutta mitataan myyntimäärien sekä myyntiprosesseihin käytetyn työajan määrän avulla.

Tutkimuksessa löydettiin yhteys myyntiprosessien kokonaistehokkuuden sekä yhteistyön maturiteetin välillä. Myynnin määrä sekä työtuntien ja syntyneen myynnin suhde viittasivat parempaan suorituskykyyn korkeamman maturiteetin toimitusketjuyhteistöissä. Yhteistyön maturiteetilla ei kuitenkaan havaittu merkittävää vaikutusta myyntiprosesseissa käytetyn työajan määrään.

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# 1 Introduction

Globalization has made international business vital for many companies. Through collaboration, even small and medium-sized enterprises (SMEs) are able to enter new markets across geographical borders. (Puthusserry et al. 2017, 891) Supply chain collaboration is a competitive instrument that companies use to increase the performance of their supply chain as a part of supply chain management (SCM). Popularity of SCC has been increasing in the last decades as the pioneering companies, such as Wal-Mart and Proctor & Gamble, have achieved remarkable results by utilizing it in their business. (Ho, Kumar and Shiwakoti, 2020) Business relationships and networks play a central role in supply chain collaboration (Im, Rai and Lambert, 2019, 656-657). To date, academia has produced inconclusive results in research about business network characteristics and performance. Since the 1980s, numerous researchers have claimed that networks, more precisely the combination of relationships held by entrepreneurs, are in a key position for the success of the company (Aldrich, Rosen and Woodward, 1987; Hoang and Antoncic, 2003; Stuart & Sorenson 2007). Due to this conception, many entrepreneurs and companies attempt to increase the size and quality of their network as much as possible. However, according to a study by Semrau and Thorsten (2014), increasing the overall size and quality of the network often leads to diminishing resource returns, while the focus should be on developing and improving the quality of the relationships with only the essential partners.

This bachelor's thesis examines whether supply chain collaboration (SCC) influences the performance of sales by assessing the maturity of collaborative processes between a Finnish international trade agency and its supply chain partners. As the benefits of SCC have been debated largely in the last decades, utilization of maturity models (MMs) offers a systematic approach to performance measurement of the complex and variable business structures. Partnership maturity will be examined from limited dyadic upstream perspective, which includes separate assessment of seven upstream relationships of the focal company. Moreover, maturity models have been spoken for and against since their introduction, and this study aims to provide insights to their usability under the terms of academic empirical research. Two maturity models, four-level Collaboration maturity model (CollabMM) and

five-level Maturity Model for SCC (MM-SCC) are introduced and their suitability for this thesis is compared. Finally, the link between partnership maturity and sales related performance measures (PM) sales volume by representative and the quantity of downstream working hours spent on the sales will be further reviewed.

## 1.1 Previous research

Performance in supply chain relationships has been extensively studied using various models and scenarios in the last decades, however, mainly quantitative research methods have been used. According to some researchers, the gap in quantitative studies should be supplemented with qualitative empirical research. (Fabbe-Costes and Jahre, 2008, 133-144) Moreover, Ellram (1996, 97-99) and Dubois & Araujo (2004) claim that further insights on complicated relationships and interactions in can be provided by conducting qualitative case studies.

Lockamy and McCormack (2004) examined the relationship between the maturity and performance of supply chain management but did not find significant dependence. However, the researchers suggested more specific performance measurement methods in future research. McCormack, Ladeira and Valadares de Oliveira (2008) conducted quantitative research on supply chain maturity and performance in 478 Brazilian companies, which indicated a strong link between maturity and performance in supply chain processes. Moreover, the researchers used process-oriented performance measures to ensure that the performance effects were related to maturity of the supply chain processes. Meng, Sun and Jones (2011) researched construction supply chain relationship maturity in a case study using their own maturity model and emphasized the positive performance effects of higher process maturity in their results.

In a recent study, Ho et al. (2020) studied performance of supply chain collaboration in two case companies using a maturity model for supply chain collaboration (MM-SCC). The case companies were found to have a big difference in process maturity, which was visible in the results as better downstream performance in the higher maturity company. However, the

research only assessed the general maturity level of the collaborative processes in case companies instead of comparing the maturities of individual collaboration partners. With only two maturities assessed, it is difficult to prove whether the increased performance was in fact from higher maturity or from some other factor. In addition, the researchers used manufacturer-centric performance measures of quality level, on-time-delivery and production capacity utilization, but the results may vary significantly in further studies using alternative performance measures.

Regardless of sales agencies having a remarkable impact on numerous industries, little research has been conducted involving the business sector. Sales agencies are companies that act in a central role in supply chains managing the sales and sales-related tasks for their representatives within a geographic, product or business area. In some studies franchising is labeled as a form of agency relationships in consumer markets. However, as there are some remarkable differences and characteristics such as franchise fees that do not necessarily apply to business-to-business sales agencies, the two must be separated. (Mukhopadhyay, Su and Ghose 2009, 197; Yan and Wang 2012, 1165) Some direction about the number of active sales agencies can be derived from a study by Merritt and Newell (2001), which estimated that around 50 000 sales agencies existed, serving hundreds of thousands of manufacturers.

## 1.2 Research questions and objective of the study

Higher maturity is associated with expectations for higher performance - furthermore, it has been confirmed by scholars that supply chain collaboration has a remarkable connection to the performance of companies. (Bitici, Garengo, Ares and Nudurupati, 2015, 3063-3066; Ho et al. 2020, 1) Nevertheless, most attempts of SCC fail to meet the expectations of the participants (Cao, Vonderembse, Zhang and Ragu-Nathan, 2010, 6614). It is therefore important to do further research on whether the actions that take place in SCC have an impact on the efficiency of downstream activities and, if so, to examine the weight of individual factors. Some studies utilizing maturity models have failed to find significant dependence between process maturity and performance. As performance indicators and researched

industry have been found to have a direct impact on the results of the study, particular attention will be set on them in this study. The object of this bachelor's thesis is to examine the link between maturity of the processes in supply chain collaboration and the performance of downstream actions. Therefore, the main research question is formed as follows:

*“How does the maturity of collaborative supply chain processes influence the performance of sales processes?”*

To understand and study the broad entity of the main research question, two sub-questions have been made. Performance of a company can be measured in several ways, however, due to the characteristics of the available data and the case industry, volume of sales and number of working hours have been chosen as the measures of performance in this paper. The sub-questions are formed as:

*“How is the maturity of collaborative processes related to the volume of generated sales?”*

*“Does upstream collaboration maturity have a connection to the required downstream input?”*

### 1.3 Limitations for the study

The research area is limited by several factors to focus on the essential matters for this study. All the data will be collected from the case company and its concern, a Finland-headquartered trade agency operating internationally through several office locations. Therefore, some of the sales data can be collected from the daughter companies of the case company. This does not affect the results or interpretation of the study, as the information is collected in the same form as from the mother company. No data or questionnaires are collected from the partnering companies, and the names of the partners will not be revealed in this study for privacy purposes. The case company is in size class of small and medium-sized enterprises (SMEs) and represents manufacturers from various industries. The case data is collected from transactions and projects completed within one year from the writing of this thesis (2021) to ensure its timeliness. In addition, up-to-date data reduces the risk of

process maturities having changed after the collection of performance data. Maturities of the collaborative relationships are being assessed for the first time, and therefore, historical data of the maturities of the relationships is not available for comparison. The fact that the maturities are only assessed at the end of the performance data collection period slightly reduces the reliability of this research. Thereby regular maturity assessment can provide more data resources in future research.

#### 1.4 Methodology

This bachelor's thesis is conducted as a qualitative case study. Two structured questionnaires are used to collect the required information from the case company, and the set of answers is collected from a key individual in the case company. The first questionnaire (appendix 1) identifies the maturity levels of each relationship. To suit the context of this thesis, the questions are modified by utilizing the findings in the literature review. In the second questionnaire (appendix 3), the input of working hours on sales processes will be estimated separately for each relationship. In addition, the sales data for the research period will be obtained from the case company and accounted for all relationships included in the research. Finally, all the data is listed in tables for better readability.

#### 1.5 Structure of the thesis

The research can be divided in two main parts. The first part consists of a literature review which explains some of the relevant theories and findings of previous research. The second part introduces the data collection and research methods and seeks to answer the research questions by further examining the observations.

The theories and literature in the first part of the thesis are used to clarify the phenomena, measure units and interdependencies that affect this paper. First, research on business relationships, supply chain management and supply chain collaboration will be examined. Second, maturity models are reviewed and some of the previous studies and claims for and against are introduced. Third, a look at performance measurement and different

measurement levels will be provided. The structure of this thesis is pictured in Figure 1 below.

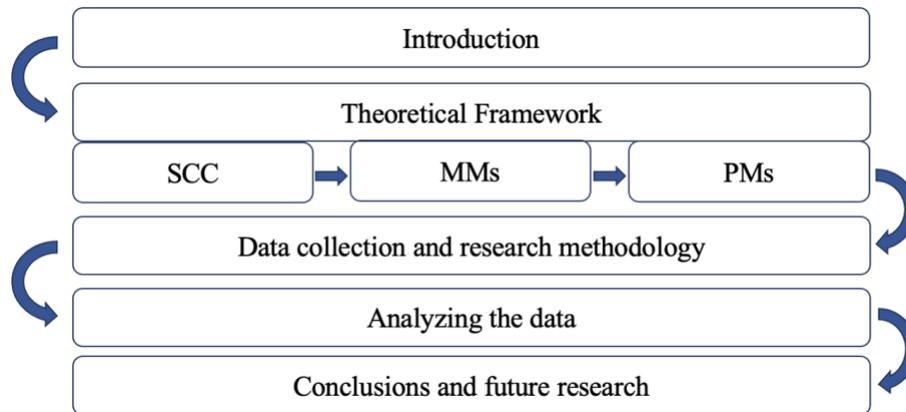


Figure 1. Structure of the thesis

As visualized in figure 1, the theoretical framework is followed by a detailed review of the data collection and research methodology. The essential terms and characteristics of the data will be briefly explained before the analysis. The analysis forms the core of the empirical research, with the object of answering the research questions. Last, the findings of this research are summarized in the discussion chapter, and future research opportunities are considered.

## 2 Theoretical framework

Theories from the fields of business relationships, maturity models and performance measurement will be used in this bachelor's thesis. This section briefly explains the main theories that are topical for this paper. Mostly peer-reviewed pieces were used to ensure the credibility and objectiveness in this review. To understand the motives and cause-effect relationships that affect supply chain collaboration and agency business, a review of various theories and studies in the field is required. Moreover, the widely debated maturity models are examined critically from different aspects. Finally, the basics of performance measurement and different measurement levels are explained.

### 2.1 Business relationships

Business relationships form a background to many business theories. The motives and characteristics of business relationships will be explained in this section, which simplifies further investigation of supply chain management and supply chain collaboration discussed in subsections 2.1.1 and 2.1.2.

Ritter, Wilkinson and Wesley (2004, 176-177) explain business relationships, or business relations, essentially as processes where companies form ties with the intent of achieving mutual benefits such as lowering costs and increasing value. Relationships are also formed between the company and people around it, such as consumers and employees (Bhattacharya and Sen 2003, 76-77). In general, these people and organizations that are involved in some function are termed as stakeholders (Eur Ing 2017, 37). This paper, however, concentrates on the relationships between companies. According to Håkansson & Snehota (2006, 262), relationships are among the most important resources that companies have, as they make important resources and activities available for an organization to exploit to increase its own performance. Some researchers have claimed that invisible assets that are mainly created through external relationships, such as knowledge, potential and reputation, act as differentiating factors and therefore create a distinctive identity to the organization,

producing consequently competitive advantage (Håkansson & Snehota 2006, 262). Moreover, when business relationships are combined, they form interconnected entities known as business networks. In fact, business relations never function or develop in isolation, instead they affect each other in networks evolving together over time (Huang & Wilkinson 2013, 455, 460).

With some variations according to the contexts of studies, academics have often named trust and commitment as fundamental characteristics for successful business relationships (Wulf & Butel 2017, 1416; Haas, Snehota and Corsaro, 2012, 102). A key construct in relationship marketing study, the Commitment-Trust theory by Morgan and Hunt (1994) is centrally built around commitment and trust, using the two as key-mediating variables. The theory suggests that trust leads to commitment through the idea of a trusted partner being worth the greatest efforts to maintain the valuable relationship (Brown, Crosno and Tong 2018, 155). Commitment and trust are affected by interdependent drivers such as relationship termination costs, relationship benefits, shared values and communication, which act an intrinsic role in the relationship since its establishment. On the other hand, opportunistic behavior can be poison for trust, damaging the endurance of the relationship. (Friman, Gärling, Millett, Mattsson and Johnston, 2002, 403-404)

Researchers have provided numerous definitions for trust. Essentially these definitions have contained the belief that the other party acts in the best advantage of its partner as a central quality of trust. Ulaga & Eggert (2006, 315) and Morgan & Hunt (1994, 23) explained trust as existing when a party has confidence in the reliability and integrity of the counterpart. Moreover, trust has a significant effect in forming and maintaining long-term collaborative business relationships: lack of trust can cause partners to reduce their commitment to the relation, which subsequently often leads to gradual disappearance of the entire relationship (Huang & Wilkinson 2013, 455-457).

Commitment is the second key variable in successful relationships. Like trust, literature has produced numerous definitions for commitment and its role in relationships. According to Friman et al. (2002, 405), commitment can be defined as the comprised importance of the

relationship. In addition, Ulaga and Eggert (2006, 316) state that relationship partners who are committed are unlikely to switch to a competitor even if the established partner's value offer is outperformed. Morgan and Hunt (1994, 23) summarize commitment as a way of achieving outcomes valuable for the exchange partners, which encourages them to develop and maintain it in the relationships.

### 2.1.1 Agency relationships

Agency relationships exist whenever two parties form a relationship, in which one party (The principal) depends on another party (The agent) to manage some action on behalf of the principal (Bergen, Dutta and Walker 1992, 1). Manufacturer's representative companies have been generally labeled as Independent Sales Organizations (ISO). With main business in sales, they mostly consist of professional salespeople, and rarely take possession of the products. Instead, the goods are usually shipped to the customers directly from the manufacturer. The income of ISOs is formed by commissions paid by the manufacturers they represent. (Novick 2000, 1-8) On the cost side, Heide and John (1988, 22) considered development efforts executed for the manufacturer's products on the sales territory as the most common transaction-specific investment for agents. Sales agencies are a type of independent sales organizations with particularly great authority over the sales, such as price, sales terms, territories and promotion (Palmatier, Stern and El-Ansary 2014, 345). Moreover, some of the responsibilities of sales agencies can also include inventory and other marketing functions (Manufacturer's Agents National Association 1990, 10).

### 2.1.2 Supply chains

Companies no longer compete as individual entities in modern-day global markets. Instead, they act as team players in supply chains competing against other supply chains. (Lambert and Cooper 2000, 65; Min and Zhou 2002, 231) Lambert and Cooper (2000, 65) state the phenomenon as the new era of internetwork competition. Supply chains are systems formed by all the elements and activities involved in supplying a product or service to the customer. Various models can be used to picture supply chains, and the forms vary greatly in different

business models and industries. Min and Zhou (2002, 231-232) divide supply chain in five main steps, referring to supply chain as an integrated system which combines the inter-related business processes executed by business entities. The model is shown in figure 2.

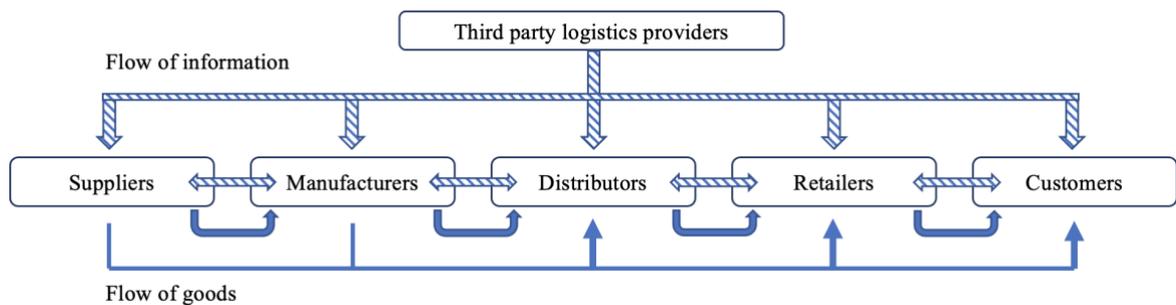


Figure 2. The supply chain process (Min and Zhou 2002, 232).

According to Seuring and Müller (2008, 1699), information, material and capital flows form a linkage in supply chain between the suppliers, focal companies and customers distributed around the globe. In the context, focal companies are defined as the organizations that rule or govern the supply chain, control the communication with the customer and design the outgoing product or service. In the supply chain process model (figure 2), flow of goods (filled arrows) is pictured going mainly downstream from the suppliers, ending to the customers through all the mediaries in supply chain process. Notably, information flow (striped arrows) is pictured going in all directions between the participants.

### 2.1.3 Supply chain management

Traditionally the focus of companies and their supply has been on purchasing and logistics, mainly seeking ways to reduce costs. However, with intensifying competition reducing profit margins and making cost leadership untenable, practices have evolved over time to a more integrated approach where the relationships have a more important role. Managing the complicated systems with a large number of variables highlighted the need for a systematic approach. (Kampstra, Ashayeri and Gattorna 2006, 312; Julka, Srinivasan, Karimi 2002, 1756) The term supply chain management (SCM) was first introduced in the 1980s, and

many theorists have attempted to give it a structure since (Lambert and Cooper 2000, 66). Global sourcing, increasing pressure on quick response times and quality-based competition are preponderant trends that contribute to environmental uncertainty, which has made SCM a hot topic in both academia and practice (Mentzer et al. 2001, 2). Cooper and Lambert (2000, 65) define SCM as a tool that creates an opportunity to manage relationships through the supply chain to capture the synergy of different business processes. However, the definitions for SCM vary between authors. Mentzer et al. (2001) recognized SCM being defined as a management philosophy, implementation of a management philosophy and a set of management practices, differing across writings.

Since its introduction, supply chain management has developed from a narrow perspective concentrating only on material flows into a holistic view covering flows of material, information, capital and technology. The functional goal of the concept of SCM is that it aims to enable frictionless and functional flow of goods, services and information across the organizations in the supply chain. (Pedroso and Nakano 2009, 376) According to a survey by Gibson, Mentzer and Cook (2005), the members of the Council of Supply Chain Management Professionals viewed supply chain management increasingly as a combination of strategy and activity, a cross functional effort which concerns all activities from the creation of demand until its fulfillment.

Emphasized by many scholars, information flow is a mechanism of coordination among the members of supply chain (Lee, Padmanabhan, Whang 2004, 1875). Information flow across the supply chain is required for planning and monitoring the processes (Mentzer et al. 2001, 8). Cooper et al. (1997, 8) underlined the role of information flow facilitation in the efficiency and performance of the supply chain. While lack of coordination and uncertain information flow can lead to inefficiencies in the supply chain, it also increases the risk of losing corporate competence (Cooper et al. 1997, 8). Lee et al. (2004) recognized the *bullwhip effect* as the phenomenon of demand information distortion propagating on the way from downstream to upstream. The research found information sharing of sell through data, inventory status, order coordination and simplified pricing systems as a way of moderating the effect. Another type of information flow aside demand information is technical

information flow, which has not received similar attention. However, according to Pedroso and Nakano (2009, 377), flow of technical information, which consists of delivering information and receiving feedback on quality and performance of the products, plays a major role in demand creation and avoidance of complaints and poor image caused by lack of knowledge in applications and limits of the product. Diverse results for improved information sharing have been represented, including faster response due to better coordination, increased agility and flexibility, and lower costs for inventory, transportation and manufacturing (Panahifar et al. 2017, 358).

#### 2.1.4 Supply chain collaboration

Supply chain collaboration is an area of supply chain management which, similarly to SCM, has been in the spotlight of academics for last decades. Simatupang and Sridharan (2005, 258) and Sheu, Yen and Chae (2006, 24) explained supply chain collaboration essentially as two or more autonomous companies forming a long-lasting relationship with mutual targets to plan and perform supply chain operations together, while achieving more advantage and higher profits than by working independently. As stated by Merritt and Newell (2001, 39), communication, collaboration and seller performance are in essence of developing successful partnerships between the chain members. Panahifar et al. (2017, 358) listed Efficient Consumer Response (ECR), Vender Managed Inventory (VMI) and Collaborative Planning Forecasting and Replenishment (CPFR) as some of the forms of collaboration practices, all of which encourage information sharing rather than holding it internal. The research also found significant link between effective collaborations and trust, information readiness or timeliness and information security.

Previous research has identified several motives and benefits related to collaboration between enterprises, the findings essential for this paper have been listed in table 1.

Table 1. Collaboration: motives and benefits, Modified from source: Bitici et al. (2004)

<i>Finding: motives and benefits</i>	<i>Study</i>
Increasing market size	Lewis, 1990
Increasing asset utilization	Lewis, 1990
Enhancing customer service	Lewis, 1990
Enhancing skills and knowledge	Lewis, 1990
Achieving economies of scale	Lewis, 1990
Reducing inventory to avoid obsolescence	Parker; 2000; Holton, 2001
Gaining rapid access to markets	Parker, 2000; McCarthy and Golicic, 2002

Bitici et al. (2004, 255-256) claim that companies do not initiate collaboration because of their desire to collaborate, but for the economic advantages that can be obtained through it. Moreover, companies are seeking ways to improve the areas furthest away from their core competences through collaboration (Krause, Handfield and Scannell 1998, 39-40).

## 2.2 Maturity Models

Maturity models are frameworks for organizations to evaluate the strengths and weaknesses in their processes and process management. The value of maturity models is their ease of use, which makes them independent from support of external consultants. (Albliwi, Anthony and Arshed 2014, 79) For business utilization, maturity models make it possible for companies to evaluate different sections of the business entity and improve those areas (Ronchi, Tontini and Carvalho 2021, 217). However, according to Röglinger, Pöppelbuß and Becker (2012) maturity models have been criticized by academics for their lack of empirical support and for simplifying reality. Moreover, maturity models tend to ignore the existence of other maturity paths (Teo and King 1997, 193). To overcome these issues, Röglinger et al. (2012) suggest that the criteria should be configured to match the situation and purpose of the target organization. While modifying the criteria can refine the focus of the model, the objectivity of the questions is important to maintain.

Albliwi et al. (2013) listed several maturity models that are applicable to measuring the maturity of business process management. From Crosby's Grid (1979) to Capability Maturity Model (CMM, 1987) to Business Process Maturity Model (BPMM, 2002), and various other models, academics have developed new maturity models attempting to supplement and improve the deficiencies of each other. Most maturity models can be modified for different purposes, such as for measuring the maturity of collaboration, by including and excluding features and criteria. Two models suitable for collaboration maturity evaluation can be compared. In context of supply chain collaboration, the maturity model for SCC (MM-SCC) developed by Ho et al. in 2020 is a recent contribution towards maturity measurement of collaborative processes. However, as Ho et al. (2020) conclude, due to the novelty of their model, the characteristics of each industry must be considered for its functional utilization. Additionally, Collaboration Maturity Model (CollabMM), proposed by Magdaleno, Cappelli, Baião, Santoro and Araujo (2008), is specifically designed for the evaluation of business processes while explicitly taking collaboration into account.

### 2.2.1 CollabMM and MM-SCC

Capability Maturity Model has been widely accepted as the base for the structures of maturity models. The levels are cumulative, with higher levels being built on the requirements of the lower levels. Maturity models often use a questionnaire which assesses the level of maturity, though other approaches to maturity assessment exist. (Magdaleno, de Araujo, Werner 2011, 105-107; Correia et al. 2017, 1-14) The CollabMM represents four levels of maturity, while the MM-SCC also includes a fifth level (figure 3).

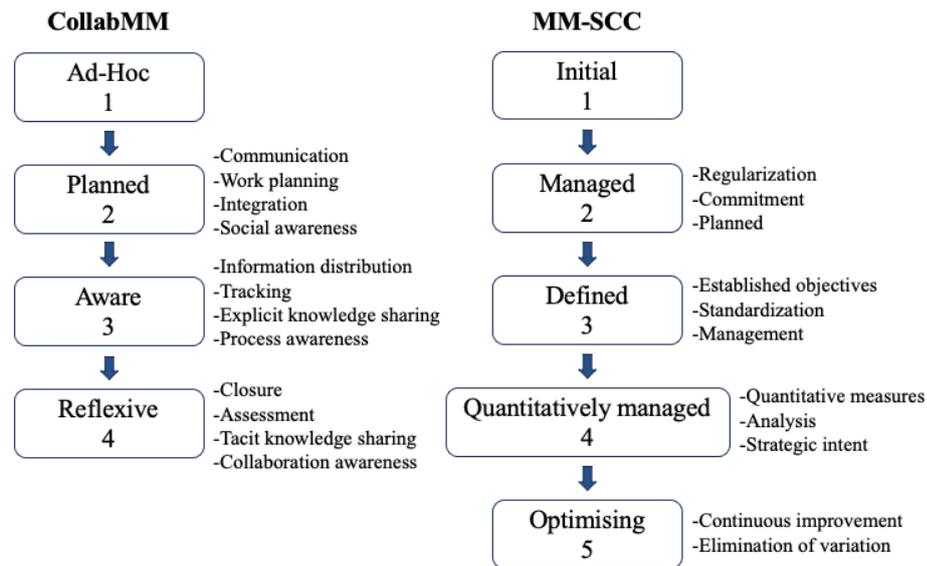


Figure 3. Overview of the maturity models (Magdaleno et al. 2008, Ho et al. 2020)

Although the models share some characteristics, they emphasize different issues. The levels of maturity in both models can be briefly recapitulated as follows.

**CollabMM Level 1 - Ad-Hoc.** Collaboration only happens incidentally, and it is not a planned component of business processes. Collaboration is dependent on individual contribution and skills, relying strongly on relationships between the actors. The stakeholders do not act as a group, but rather spend great efforts towards a common goal while working independently and sometimes overlapping with each other. (Magdaleno et al. 2011, 108)

**MM-SCC Level 1 – Initial.** Collaboration in supply chain processes is ad-hoc and chaotic and the environment is unstable. Sometimes the collaboration process can be successful, however, it strongly relies on individual contribution and skills. Proven processes are not implemented, and past successes cannot be repeated. (Ho et al., 2020)

**CollabMM Level 2 – Planned.** Some of the business processes are modified to include some of the basic collaboration activities. The communication is planned, process actors are aware

of each other under the same process, all the actors have roles and responsibilities, and the collaboration is overall coordinated. The process has a leader who assigns the roles and responsibilities to the process actors and manages their commitment to the projects. (Magdaleno et al. 2011, 108)

MM-SCC Level 2 – Managed. The SCC activities begin to be more regularized and repeatable. The requirements and activities involved in collaboration are planned, and the commitment of each stakeholder is established. Moreover, the processes are performed and controlled according to the documented plans. (Ho et al., 2020)

CollabMM Level 3 – Aware. Activities to monitor and control the collaboration are included. The actors understand what the process is that they are involved in, what is the purpose of the process and why they are involved in it. The process actors are aware of their tasks and responsibilities and have access to all the necessary information. The maturity level obviates the need for centralized coordination, as the group members work in a self-organized-manner and simultaneously to achieve the common goals. (Magdaleno et al. 2011, 108-109)

MM-SCC Level 3 – Defined. The objectives of the process are established and properly distributed. Attention to documentation, standardization, procedures, tools and methods is used to characterize, understand and describe the collaboration processes. The standard processes are coherently shared to different areas of the organization, and they are managed proactively. (Ho et al., 2020)

CollabMM Level 4 – Reflexive. The processes are designed to make the actors continuously evaluate their own actions. The stakeholders communicate actively using versatile knowledge. (Magdaleno et al. 2008, 306-309) The new information that is obtained through success and failure is captured and analyzed, and systems are used to assess the contribution of each actor. (Magdaleno et al. 2011, 109)

MM-SCC Level 4 – Quantitatively managed. The metrics for collaborative processes are determined and used for quantitative management. Performance measures of supply chain are collected in detail and analyzed, and the data is used to stabilize collaboration to avoid process variation. Collaboration process is also included at strategic level to achieve high performance across the supply chain. (Ho et al., 2020)

MM-SCC Level 5 – Optimising. Performance of collaborative processes are improved continuously towards the objectives set for the supply chain. Various actions to eliminate process variation are executed, and the interaction concerns all organizations of the chain with the target of collaboration maximizing the efficiency of the supply chain. (Ho et al., 2020)

In 2011 Magdaleno et al. suggested a roadmap to evolution of their CollabMM model. As CollabMM had been utilized in several studies attempting to identify the levels of collaboration in business processes, some improvement opportunities had been identified. Although the observations showed that CollabMM was suitable for improvement of collaboration in business processes, the researchers found increased collaboration sometimes causing the process to become more expensive and time consuming. Therefore, the authors state that the necessity of collaboration in processes must be critically estimated. The roadmap also suggested a fifth level, optimization, to be included in CollabMM. A framework for generic development phases of maturity models (table 2) proposed by de Bruin (2005), shows the developmental stages of both models.

Table 2. Maturity model development. Modified from source: (Magdaleno et al., 2011)

Development Phases	Requirements	CollabMM	MM-SCC
1. Scope	Model focus	Yes	Yes
	Stakeholders	Yes	Yes
2. Design	Needs of the target audience	Yes	Yes
	Balance reality and complexity	No	No
3. Populate	Measurement	No	Yes
4. Test	Model and instruments	Yes	Yes
5. Deploy	Use and validation	Yes	Yes
6. Maintain	Repository	No	No

As table 2 indicates, both models have a determined *scope*. De Bruin et al. (2005) underline *scope* as the focus of the model which distinguishes them from existing models, helping to identify the academic and practical stakeholders that assist in model development. Becker, Knackstedt and Pöppelbuß (2009, 217) included a similar phase in their summary of maturity model design processes as “comparison with existing maturity models”. Purpose of the *design* phase of development is to form an architecture for the model that best serves the needs of the target audience while maintaining the balance between simplicity and realism (de Bruin et al. 2005). Both Ho et al. (2020) and Magdaleno et al. (2011) state that their models would become over-complicated if all required knowledge was included in the model. Therefore, while both models are designed according to the needs of their target audience, the balance between reality and complexity is not achieved. Decisions of *scope* and *design* of the model are followed by *populate* phase, which identifies the matters that need to be measured in maturity assessment. De Bruin et al. (2005) and Becker et al. (2009) state that an extensive literature review can be used to implement the *populate* phase. Magdaleno et al. (2011, 111) identified the *populate* phase missing in their model. However, Ho et al. (2021) conducted the phase as a literature review of the relevant works. In *test* phase of development, the validity, reliability and generality of the model is tested with respect to the *scope* of the study. Testing aims to ensure that the model measures what it is intended to measure, and that the results are reliable and repeatable. (Magdaleno et al. 2011, 107) At the *deployment* stage, the model is made available for utilization and further validation first by the stakeholders involved in development of the model, and second to

independent entities. Becker et al. (2009, 217) identified the same developmental activities as evaluation stage. The final step of development, *maintain*, aims to enforce the longevity and relevance of the model. According to de Bruin et al. (2005), maintenance of a model would require a repository to track the development of the model. It is evident that both models are in deployment phase of development, with experimentation in various contexts being done. However, neither model has a blueprint for maintenance.

For systematic evaluation, the questionnaire in both CollabMM and MM-SCC consists of dichotomous (Yes/No) questions. In their research Ho et al. (2020) validated the MM-SCC model with support of relevant literature, in addition, a questionnaire with five-point Likert scale was used to review a panel of experts' agreement level with the questions in the model. The questionnaire was then modified according to the results of the validation. According to Magdaleno et al. (2011, 111), CollabMM was validated through evaluation and utilization in different and genuine contexts. Magdaleno et al. (2008) derived the set of questions from the practices of maturity levels, while Ho et al. (2020) used previous research as the source of questions. In both models the target company complies with the level of collaboration only if all questions of the level are affirmative. Moreover, Ho et al. (2020) and Magdaleno et al. (2008) emphasize that the model questionnaire should be answered by the manager of the process for realistic picture of which of the collaboration practises apply to the target company.

### 2.3 Performance measures

As stated by Anand and Grover (2013, 136), improving supply chain performance requires continuous evaluation through a logical performance measurement system which enables understanding of the objectives of key performance indicators (KPI). Moreover, Neely (1999) emphasized the growing importance of performance measurement as a key area of management. The three levels of performance measurement with examples are illustrated in figure 4.



Figure 4. Performance measurement levels

Parmenter (2007) identified three performance measure levels which can be used for different purposes in organizations and projects: Key Result Indicators (KRIs), Performance Indicators (PIs) and Key Performance Indicators (KPIs). KRIs, such as profitability of customers, give a superficial picture of the direction to which the actions are leading towards and are usually reviewed on a long period of time. PIs can be defined simply as KRIs that are defined in more detail, such as profitability of the top 10% of customers. In addition, PIs require more knowledge over the area and are more frequently reviewed than KRIs. The core of performance measures are KPIs, which represent the most critical aspects of organizational performance. (Parmenter 2007, 1-6) All the definitions for KPIs do not align in literature. Uddin, Papadaki and Wagner (2020, 376) and some other researchers have included both financial and non-financial measures as KPIs in their research. However, according to Parmenter (2007, 6) KPIs are nonfinancial measures that have a positive effect to all other performance measures.

### 3 Research methodology

This chapter concentrates on the research methodology and data collection for the empirical research on the case company. First, the methods of analysis and the data collection process will be briefly explained. Second, the measurement of the variables in this thesis and performance measure selections will be explained. In addition, an overview will be provided of the industry in which the case company operates.

The object of this study is to provide new in-depth and extensive information over the subject of supply chain maturity and performance, which is possible through a single case study. Single case studies distinctly focus on the units of analysis, offering thorough understanding over the phenomenon being researched. (Mills 2010, 869) Moreover, it is typical for case studies to combine multiple data collection methods (Eisenhardt 1989, 534). Researchers such as Bourgeois and Eisenhardt (1988), Backes-Gellner, Schneider and Veen (2011) and Battisti et al. (2020) combined quantitative data with qualitative evidence in their studies to supplement both methods. This research is conducted as a single case study, which utilizes both qualitative and quantitative evidence. Specifically, the research method can be defined as an embedded case study. Embedded case studies involve multiple units of analysis, and do not solely rely on qualitative approach. (Scholz and Tietje 2011, 9-14)

#### 3.1 Data collection

The data for this research was collected mainly with questionnaires and from the archives, documents and accounts of the case company. The relationship maturity was assessed by utilizing the questionnaire of the maturity model MM-SCC. Moreover, due to the multidimensionality of the questions in the model questionnaire, the answers could be used to provide insights to the effects of single factors to the performance of the case company. Quantitative data of sales volume and estimations of working hours (labor) spent on sales processes were partly derived from the archives of the case company and partly through questionnaires. The data was also modified and reported on scales in the tables due to its

sensitivity and to suit for the purposes of this thesis. The research data and questionnaire responses were collected in autumn of 2021 from an individual with extensive experience from managing the relationships and work force in the case company. Seven collaborative relationships were included for evaluation in the study.

## 3.2 Measurement

The following subsections introduce the research measurement process. The maturity assessment process, the maturity model questionnaire, and the factors that are emphasized will be reviewed and justified. Performance measurement selections will also be introduced, and their measurement levels are identified.

### 3.2.1 Maturity assessment

Two maturity models were introduced and compared in subsection 2.1.1; CollabMM, which concentrates on overall collaboration in processes, and MM-SCC, which has focus on supply chain collaboration. Though CollabMM was developed over a decade earlier and has been applied to a larger number of studies, the MM-SCC model will be utilized in this paper for several reasons. Firstly, maturity models require continuous maintenance to ensure they emphasize the correct issues. As MM-SCC has very recently been completed and peer reviewed, it can be expected to be more up to date than CollabMM. Secondly, MM-SCC includes a fifth maturity level which was also suggested to be included in CollabMM by Magdaleno et al. (2011). Adding a new level to a maturity model would require extensive literature review and expertise, which is out of the scope of this research. Finally, as table 2 indicates, MM-SCC can be concluded as further developed with populate-phase being implemented. Therefore, using the MM-SCC has significant advantages in implementation to this case.

Maturity model questionnaires are formed with the concept that the question criteria have a positive effect on performance. In addition, the criteria for the questions must be met for the

maturity to be classified to a higher level. On the same base is built the idea in field of supply chain management that a higher maturity level leads to a more efficient supply chain processes, which in turn reflects as improved financial performance (Söderberg and Bengtsson 2010, 90). However, it must be noted that in the case of sales agencies, the focus of supply chain performance is more on flow of information, while their responsibility in flow of goods is mainly as a facilitator in downstream operations of the supply chain. Therefore, the importance of trust and communication, which were earlier identified as some of the building blocks for successful relationships and partnerships, are emphasized in agency business.

The questionnaire which was used for maturity assessment was derived from MM-SCC model and modified for this research (Appendix 1.). Common, mutual, frictionless and continuous communication is emphasized at many different aspects on all maturity levels of the questionnaire. On the other hand, common goals and shared performance measures, which require and increase trust between the partners, are also visible in many questions. Increasing the level of maturity in supply chain collaboration requires mutual commitment from both process actors. Moreover, the characteristics can be thought of as feeding each other, as common financial and non-financial investments and openness require each other to be preserved. The questionnaire was divided in 16 main-questions and 35 sub-questions, all of which are focused on the supply chain processes. Some questions were removed from the original questionnaire as irrelevant for the case company, and some modifications were made to the forming and dividing of the questions. However, the modifications were minor and thus will not affect the reliability of the maturity assessment. The questionnaire was answered under the supervision of the author of this thesis, to ascertain that the criteria is correctly understood and responded.

### 3.2.2 Performance measure selections

Performance evaluation of sales can be based on a variety of KPIs and there are multiple sources for the information such as Customer Relationship Management (CRM) systems (Calixto and Ferreira 2020, 1). This research uses volume of sales and sales process working

hours as the performance measures. While the maturity model focuses more on qualitative aspects, quantitative measures ground the study to actual numbers. The measures are not key performance indicators, but rather PIs, as they do not measure the individual activities that affect the performance of the entire company. However, using KPIs would require extensive knowledge over the industry, which would overcomplicate the interpretation of the results. Performance indicators present more definite data than key result indicators while remaining easily understandable.

There are two different euro values that were collected as volume of sales (Appendix 3). Sales numbers are customer prices and describe the size of the transactions. Own turnover measures the part of sales which flows to the case company, as in agency business the capital does not necessarily flow through the sales agencies. In this research, the number of deals was used to calculate the average size of each sale and own turnover to improve the comparison of each manufacturer. There are significant differences between the partners in sales volumes and average sales, which can be explained by the type of product or project being sold. Therefore, the type of partner is mentioned as wholesale, large project (L. project) or small project (S. project). It must also be noted that some of the projects have required several years of work before the completion of the transaction. This is marked as average lead time in table 3. While profitability is another relevant measure of performance, in agency business it strongly depends on the contracts between the manufacturer and sales agency. Therefore, it does not tell the whole truth about the impact upstream collaborative processes on downstream performance. The profitability numbers of the case company are also confidential.

As labor expenses form a significant amount of the expenses in the case company, measuring the labor contribution provides valuable insights to the downstream performance (Figure 5). There are several definitions and models on the steps of sales processes. The traditional model of selling process consists of seven steps: 1. Prospecting, 2. Pre-approach, 3. Approach, 4. Presentation, 5. Overcoming objections, 6. Closing and 7. Follow-up. (Moncrief and Marshall 2005, 15) In this research, all seven steps of selling will be calculated as labor spent on the deals, as all the steps involve collaboration between the case

company and the manufacturer. In addition, a higher collaboration maturity can be expected to increase the performance of these steps. As the seven steps of selling only include the selling process, and a holistic picture of the working hour contribution is required, the exchange of background information and the background work required for the entry to new markets are also included as labor spent on deals. The measure of labor spent on sales will be classified to simplify the collection and examination of the data.

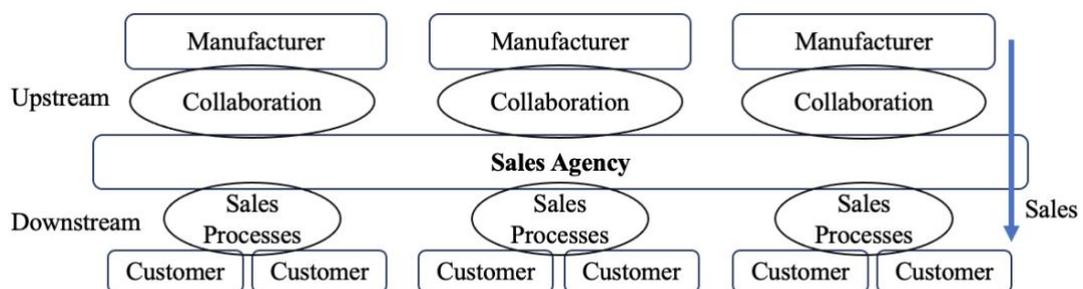


Figure 5. Agency sales process

Figure 5 visualizes the relationships and processes between the actors in agency business. The figure separates upstream and downstream processes and indicates the point where collaboration and processes to create sales take place.

### 3.3 International sales agency business

Theory on agency relationships was reviewed in subsection 2.1.1. International sales agency business is essentially built around those relationships. By utilizing sales agencies in their business, manufacturers get access to expertise and market knowledge in foreign areas, while maintaining focus in their other functions (Mukhopadhyay et al. 2009, 197). However, the responsibilities and services of sales agencies can vary greatly from company to company. The case company takes care of customer acquisition, communication between the parties, arranging the negotiations and managing the logistics to the customer. For the operations to run smoothly, the case company must make mutual decisions with the manufacturers over various processes in supply chain. On the other hand, SCC is a lifeblood for sales agencies,

as they rarely have any own production, making their business dependent on external manufacturers. Though similar terms, sales agencies must be distinguished from agent-based supply chain systems and intelligent agents, which are related to computer sciences.

The focal company of this research has several partnerships and relationships with both suppliers and buyers, which makes it possible to do diverse research and comparison. Some of the newest partnerships have been established only some months before this thesis is written, while several partnerships are already in their second decade. The seven manufacturers that were chosen for evaluation in this thesis work in the industries of technology and healthcare, and the products vary significantly in value. Two of the partnerships concentrate on wholesale products, while the five others are built around larger projects. Both industries require extensive knowledge over the customer needs and the products. It is important to understand, that the duration of the collaboration may have a big impact to its productivity, which can be visible as lower sales numbers in newer partnerships. At the beginning of a partnership, and in case of sales agencies, at the beginning of selling a new product, it often takes time for the first customer relationships to be built up. This is also evident from many marketing theories that deal with product lifecycle. (Stark 2015, 6-7)

## 4 Results of the empirical research

In this chapter, the collected material will be examined and synthesized with the object of answering the main research question and two sub-questions that were introduced in the introduction of this thesis. The topical literature, which was reviewed in theoretical framework, will be used to direct this research, and the link between upstream relationship maturity and downstream process performance will be examined. Finally, the reliability and validity of the research will be discussed along with future research opportunities.

### 4.1 Maturity of the representative relationships

The responses to the maturity questionnaire and the information gained from the respondent provide important insights for answering the research questions. The idea of maturity models is also visible from the distribution of the answers in the questionnaire, as it is clear that the question criteria are more difficult to fulfill at higher maturity levels (appendix 2). Most of the criteria in lower levels of maturity were met for each partnership, however, at higher maturity levels, the number of affirmative answers decreased for each partner.

It is in principle for maturity model questionnaires that all the criteria must be met for a company to be classified in a higher maturity level. In each collaboration that was taken to assessment, there was some criterion that did not get a positive answer; thus, all maturities were classified to level one, which is the lowest level of maturity. This also reflects the challenge of maturity models, as they emphasize very detailed issues which might not be seen important in all industries. Therefore, the maturity can be assessed to an unrealistically low level. In this case, however, all the questions were perceived as important for the case company by the interviewee, which eliminates the risk of emphasizing wrong matters in the questions. Since all maturities were assessed to level one, comparing the collaboration maturity levels would be impossible. Therefore, the total number of affirmative answers must be included in the analysis, as it allows comparison of the collaboration maturities within the same maturity level. It should also be noted that all collaborations which were in

the questionnaires also met some of the criteria in higher maturity levels, although there were significant differences.

The framework set by the maturity model questionnaire must be examined critically. The answering possibilities are limited to a very narrow range by the criteria set by the questions, and any alternative ways of performing the functions are not considered. In addition, during the collection of the answers, a need for a wider response scale was found. For some questions, the criteria were met to varying degrees, which is not visible in dichotomous answers. The current model also does not specify the minimum effort required to meet the criterion of each question, which impairs the reliability of the results. Both problems could be overcome with a wider response scale.

Although the maturity levels are not comparable, the answers clearly show the levels of development and differences in the collaborations. Collaboration with partner 1 is at the highest maturity in terms of positive responses, while partner 7 is at the lowest maturity with only two of the SCC maturity criteria fulfilled. When looking at the duration of the collaboration, and its link to maturity, no clear connection can be observed. This can be explained by several factors. The attitude of the partner companies towards change, the desire to develop and the perceived importance of collaboration greatly affect the maturity of the collaboration. Therefore, even if the case company wants to develop the collaboration, the partner might not have similar goals. It is visible in table 5, that in some cases, more recent partnerships may have the same or higher levels of maturity than older partnerships.

A particularly large threshold issue for the fulfillment of maturity level 2 were sub-questions 19-20 under the *formalization* main question, which were not met for any of the collaborations (Appendix 2). This can be explained by several reasons. Firstly, it is possible that the case company is reluctant to implement these points, which would explain why they have not been implemented to any of the collaborations. Another reason may be that in these industries it is not considered necessary to carry out the processes of these steps. On the other hand, the collection of questionnaire replies did not reveal a clear reason to why these points

were not implemented. Therefore, these questions were seen as relevant to the maturity model and were not removed from the questionnaire.

Although maturity level two was not met for any of the collaborations, many of the level three criteria were met for most partners. Only sub-questions 21, 23 and 28 were not met for any of the partners in assessment. The questions addressed common goals for the supply chain, importance of collaboration in supply chain and resource sharing. Fulfilling these criteria would require closer collaboration with the partners, and according to theory, should lead to improved supply chain performance. Some of the unfulfilled criteria at higher maturity levels can also be explained by the cumulative nature of the questions.

Finally, at maturity levels four and five, none of the criteria were fulfilled for any of the partners. It was found during the answer collection that the case company does collaborative routine performance measurement at PI level, but not at KPI level. In addition, the case company does not have a supplier-scorecard based rating system as required in sub-question 34. Therefore, these questions 33 and 34 were not considered fulfilled. For the final maturity level, which included only question 35 on continuous improvement, the overall answer was seen as “No”. This can be explained with all collaborations missing some of the criteria at lower maturity levels, which is a prerequisite for meeting level five.

## 4.2 Performance of sales

Performance of sales was measured by the volume of sales made by the case company and the number of working hours spent on them. In addition, the number of individual transactions during the year was used to calculate the average working hours and average sales volume. The original exact values were used in the calculations, though the exact values have been coded in this study. The results will be discussed in more detail in the following subsections.

#### 4.2.1 Sales volume

The sales statistics of the case company are shown in table 3. Due to the large differences, the comparison will be divided into large project partners (partners 1-3), wholesale partners (partners 4-5) and small project partners (partners 6-7). In addition, to simplify the comparison, total sales and total own turnover of each partner will be collectively referred to as total volume, and average sales and average own turnover as average volume. There are remarkable differences between the partners in both total volume and average volume. This is partly explained by the types of products being sold. Some of the products and services are large-scale projects, while others are wholesale goods that are sold in large quantities. The large project partners 1, 2 and 3 stand out from the list with average and total sales being measured in millions. The average sales of wholesale partners are significantly lower than those of the other partners, however, the total sales of partner 5 are at the same level with partners 6 and 7. The smallest total volume is in the collaboration with partner 4, which has resulted less than 100 thousand in total sales and own turnover.

Table 3: Sales volume statistics

Partner name	Partner 1	Partner 2	Partner 3	Partner 4	Partner 5	Partner 6	Partner 7
Type	L. project	L. project	L. project	Wholesale	Wholesale	S. project	S. project
Collaboration age (Years)	<b>6-10y</b>	<b>15+y</b>	<b>6-10y</b>	<b>1-5y</b>	<b>10-15y</b>	<b>6-10y</b>	<b>6-10y</b>
Sales	<b>10-20M€</b>	<b>20-30M€</b>	<b>1-2M€</b>	<b>&lt;100k€</b>	<b>500k-1M€</b>	<b>100-200k€</b>	<b>200-300k€</b>
Own turnover	10-20M€	500k-1M€	200-500k€	<100k€	100-200k€	100-200k€	100-200k€
Avg. Sales (€)	<b>10-20M€</b>	<b>1-2M€</b>	<b>1-2M€</b>	<b>10-30k€</b>	<b>10-30k€</b>	<b>100-250 k€</b>	<b>100-250 k€</b>
Avg own turnover (€)	10-20M€	50-100k€	250-500k€	10-30k€	1-10k€	100-250k€	50-100k€
Number of deals	<b>1-5</b>	<b>10-15</b>	<b>1-5</b>	<b>1-5</b>	<b>20-30</b>	<b>1-5</b>	<b>1-5</b>

Table 3 also shows the effect which duration of the collaboration has on sales. In the most recent collaboration with partner 4, the total volumes are distinctly lower than in other collaborations. However, all other partnerships are over five years old, so the duration of the partnerships in relation to generated sales cannot be reliably examined. The table also shows that sales growth in the partnerships of the case company is not directly time bound. Some evidence can be seen in collaboration with partner 5, which, despite its long duration, has its

own turnover at the lower end of the list. Moreover, the average sales of partners 4 and 5 are at the same level, and average own turnover is higher with partner 4. The oldest collaboration with partner 2 has accounted for the largest sales, although the own turnover with partner 1 is the largest in the list.

#### 4.2.2 Labor

Table 4 shows the required working hours for the entire turnaround time of the transactions completed during the period of one year between 2020 and 2021. The table also includes lead time, which is the time spent in the entire sales process. The average lead times are longer for project partners than with wholesale partners. The least overall working time has been spent on small project partners, with less than 500 hours spent on partners 6 and 7. The lead times for partner 6 are the longest in the group, but its overall working hours is among the lowest of the list. The overall working hours are high for all large project partners. It must be noted, however, that partner 2 has lower average working hours than the two other large project partners.

Table 4: Working hour estimations

Partner name	Partner 1	Partner 2	Partner 3	Partner 4	Partner 5	Partner 6	Partner 7
Type	L. project	L. project	L. project	Wholesale	Wholesale	S. project	S. project
<b>Overall</b>	500-1000h	2000-3000h	1000-1500h	1000-1500h	1000-1500h	100-250h	250-500
<b>Average</b>	500-1000h	100-250h	1000-1500h	500-1000h	25-50h	100-250h	100-250h
<b>Number of deals</b>	1-5	10-15	1-5	1-5	20-30	1-5	1-5
<b>Lead time (Years)</b>	3-5y	1-2y	1y	<0.5y	0.5y-1.5y	3-5y	1y

It can be seen from the table, that least time in average has been spent with partner 5. Nonetheless, the large number of deals makes it one of the largest in overall working hours. In contrast, the average number of working hours with wholesale partner 4 is visibly higher, which may be explained by it being the newest partner of the list.

### 4.3 Relationship between SCC maturity and performance

To facilitate the review and synthesis of the results, the main figures from the collected data were included in table 5. The table shows the average number of working hours, average sales and average own turnover for each partner. In addition, the table includes sales to labor and own turnover to labor ratios, which measure average sales result of a working hour. The ratios serve as holistic measures of sales process performance, while converting the differences between the figures smaller. The two last rows in the table contain the results of the maturity questionnaire, with number of fulfilled maturity level criteria providing valuable information for the comparison. The partners have been organized in the table by their maturity.

Table 5: Summary of the results

Partner name	Partner 1	Partner 2	Partner 3	Partner 4	Partner 5	Partner 6	Partner 7
Type	S.project	S.project	S. project	Wholesale	Wholesale	S.project	S.project
Collaboration age (Years)	<b>6-10y</b>	<b>15+y</b>	<b>6-10y</b>	<b>1-5y</b>	<b>10-15y</b>	<b>6-10y</b>	<b>6-10y</b>
Avg. Labor (Hours)	500-1000h	100-250h	1000-1500h	500-1000h	25-50h	100-250h	100-250h
Avg. Sales (€)	<b>10-20M€</b>	<b>1-2M€</b>	<b>1-2M€</b>	<b>10-30k€</b>	<b>10-30k€</b>	<b>100-250k€</b>	<b>100-250k€</b>
Avg. own turnover (€)	10-20M€	50-100k€	250-500k€	10-30k€	1-10k€	100-250k€	50-100k€
<b>Sales/labor ratio (€/h)</b>	<b>24875€/h</b>	<b>8000€/h</b>	<b>1538€/h</b>	<b>27€/h</b>	<b>685€/h</b>	<b>813€/h</b>	<b>833€/h</b>
Turnover/labor ratio (€/h)	24875€/h	233€/h	231€/h	27€/h	108€/h	813€/h	367€/h
<b>Maturity level</b>	<b>Level 1</b>	<b>Level 1</b>	<b>Level 1</b>	<b>Level 1</b>	<b>Level 1</b>	<b>Level 1</b>	<b>Level 1</b>
Maturity level criteria	25	21	20	19	18	9	2

#### Maturity to average sales and own turnover

When the relation of fulfillment of maturity criteria and average volume is examined, higher volume of sales can be observed at higher maturity levels for some partners. In large project partners, partner 1 has both the highest maturity and the highest average volumes, which supports higher maturity as having a positive impact on sales and own turnover. For partners 2 and 3 however, though the average sales are on the same scale, partner 3 has higher average own turnover with lower maturity. The results of wholesale partners and small project partners are similar with each other. The average sales of wholesale partners 4 and 5 and

small project partners 6 and 7 are at the same level. However, in both groups the partner with higher maturity has higher average own turnover. Based on these results, the collaboration partners which fulfilled more maturity model criteria can be considered as having performed better in terms of average volume.

### **Maturity to average labor**

No connection can be observed between the fulfillment of maturity criteria and working hours. In large project partners, most working hours were spent on partner 3, which had the lowest maturity of the three. However, least hours in average were spent with partner 2, which had second highest maturity, while significantly more working hours were spent with partner 1 with the highest maturity. For wholesale partners, a considerably higher number of working hours were spent on higher maturity partner 4 when compared to partner 5. The hours worked with small project partners 6 and 7 are on the same scale, although there is a clear difference in number of fulfilled maturity model criteria. It must be noted that direct comparison of the number of hours worked in average is not justified, as the resulted sales differ significantly.

### **Maturity to sales performance**

The following paragraphs include the examination of overall sales performance and maturity in each partnership. The highest ratios, and the highest resulted sales volumes per working hour, can be observed for partner 1. In the same collaboration, most maturity model criteria were fulfilled as well. Therefore, the partnership has resulted the greatest financial results for the input and can be considered to have the best performance of the list. However, some of the numbers, own turnover to labor ratio in particular, are multiple times higher than with other partners, and the comparability of the figures must be questioned. It is possible that the agreement is different from other partnerships, which makes the figures inflated. It must be noted that both ratios, sales to labor and own turnover to labor, are the same for partners 1, 4 and 6, while for other partners the ratios differ significantly. At all events, it is unlikely that the time spent in sales with partner 1 produces many times better results than with the other partners.

In overall comparison, the two collaborations which met most maturity criteria, partners 1 and 2, have the highest levels of performance in terms of sales to labor ratio. However, measured by turnover to labor ratio, partner 2 has lower numbers than partners 6 and 7. When comparing large project partners 1, 2 and 3, partner 3 with the lowest maturity also has the lowest performance of the three. Therefore, the results of the three highest maturity partners support higher maturity as improving the performance of sales.

Wholesale partners 4 and 5 indicate opposite results than large project partners. Although partner 4 met more of the maturity level criteria, had partner 5 better performance according to both ratios. As found in previous sections, it is possible that this can be explained with the novelty of the partnership. For wholesale partners, a connection cannot be proven between the level of maturity and sales performance.

Maturity results for small project partners 6 and 7 show conflicting performance numbers. The sales to labor ratio is higher for partner 7, whereas turnover to labor ratio indicates better performance to partner 6. If the ratios are added together, however, collaboration with partner 6 has performed better. In addition, more maturity criteria were fulfilled by partner 6, although both small project partners stand out from the list with lower maturities than other partners. In comparison of small project partners, higher maturity can be considered to increase the performance of sales.

## 5 Discussion

This research attempted to give new insights to maturity of collaborative supply chain processes and its effects on sales performance. It was expected that a more systematic approach to the processes at a higher maturity level would lead to decreased number of working hours required for the sales process. The main findings of previous studies were presented at the beginning of this thesis and used to define the objectives and scope of this research. In addition, the relevant theories for this research concerning business relationships, maturity models and performance measures were addressed in theoretical framework. In the empirical part of the thesis, the research methods and the factors influencing this research from data collection to the case industry were reviewed. Finally, the results of the empirical research were examined multidimensionally.

Due to the diversity of the products of the case company, the seven SCC partners involved in this study had to be divided in three groups. It is important to note, that the results of this research would differ significantly if the partners were reviewed as a single group. Based on the findings of this research, the research questions can be answered as follows.

*“Does upstream collaboration maturity have a connection to the required downstream input?”* From an examination of the processes in the case company, working hours required for sales processes in each partnership was found to be the best available measure of downstream input. After the data collected for this study was reviewed and compared to the results of maturity assessment, the level of maturity was not found to have a detectable relationship with the number of working hours. This can be explained with some issues faced during the research. The limits of the available data such as inaccuracies and lack of definition of the processes included in the number of working hours undermined further examination, and the comparability of the figures was weakened by the differing types of products in the case company. In addition, the measure was reviewed in its absolute form and not proportioned to the resulting sales. It was also challenging to find comparable

previous studies on the subject, which complicated forming a background for the comparison.

*“How is the maturity of collaborative processes related to the volume of generated sales?”*

The relation between maturity of collaborative processes and turnover was examined through sales and own turnover data of the case company. Better performance in terms of these metrics was observed in partnerships that met more maturity criteria. However, the comparison of the sales numbers did not take the invested labor into account, which reduces the reliability of these findings. To address this problem, both numbers were included in a calculation which formed the ratio of hourly generated sales. When the ratio of working hours and sales generated was compared, measured as average sales and own turnover per hour, higher sales numbers and thus better performance was found at higher maturity.

The main research question *“How does the maturity of collaborative supply chain processes influence the performance of sales processes?”* can be answered with the following conclusion: With the data collected and the maturity model utilized for maturity assessment in this research, it can be considered that the level of supply chain collaboration maturity has a positive effect on performance of sales processes. While this study could not show a relationship between the number of working hours and the level of maturity, the overall sales performance was found to be better in partnerships with higher maturity.

The results of this research support the findings of previous studies, which have generally found a relationship between supply chain process maturity and performance. The main findings of the research by Ho et al. (2020) were lower performance outcomes in supply chain relationships with lower level of collaboration maturity, which aligns with the results of this study. McCormack et al. (2008) researched supply chain process maturity and performance and found a strong positive relationship. Although supply chain maturity and SCC maturity are not directly comparable, the results support the findings of this study. The results of this research are also consistent with Söderberg and Bengtsson (2010), which found some correlation between supply chain management maturity and financial performance.

Another object of this research was to provide insights into the applicability of maturity models in empirical academic research. The maturity model formed a base for comparison of the partnerships. Moreover, utilizing a maturity model was found to be simple and efficient during the data collection process. However, defining the criteria for the maturity model questionnaire was noted to be a challenge. As it was observed, the importance of different issues varies considerably from one industry to another. In addition, the need for a wider response scale was noted, as the current bipolar responses do not reflect the development level and development potential of individual processes briefly enough. The comparison of maturities had to be performed according to the number of fulfilled criteria, as all partners remained on the same maturity level according to the model.

### 5.1 Reliability and utilization of the research

There are several factors that may have affected the results of this research. Therefore, the reliability of the results must be examined. Firstly, due to anomalies in business, such as abnormally high sales volumes in one-off deals, it may be possible to generate large sales numbers regardless of the maturity of the collaboration. With the low quantity of data available in an SME, it is difficult to show evidence that would rule out this possibility. Another major issue in comparison of the figures was that there are major variations in products between the partners of the case company. It was also estimated that the duration of the partnerships may have an impact to their performance, however this was not further examined in this research. Moreover, the maturity questionnaire was answered by only one respondent, which reduces the reliability of the maturity results. This problem could be overcome by collecting answers from multiple respondents, including the representatives in the partnering companies. Working with high volumes of case data includes the risk of losing sense of proportion. As case studies lack quantitative gauges and observations from multiple studies, it is difficult to distinguish the remarkable relationships from individual phenomenon. (Eisenhardt 1989, 547) This research attempted to avoid this problem by carefully selecting the measures for analysis. In addition, the research was conducted with limited available information due to the size of the case company and the natures of the industries it is involved in. However, it does not eliminate the problem of this research as a

case study missing comparable reference values and observations from perfectly comparable previous research. The individual characteristics of agency companies pose a challenge for theoretical comparison, as the business is diverse.

This research can be utilized for decision-making in companies in several different ways. First, resources can be targeted to the areas identified as undeveloped by the maturity model. Improving these processes can speed up the supply chain's ability to respond to customer needs and changes in the environment, while reducing the required work-efforts, thus improving the competitiveness of the company. Second, the results can be used to form a profile for ideal supply chain partners. Identifying the most functional partnerships can assist in development of the strategic direction of the company. The findings of this study indicated a link between SCC process maturity and performance of sales processes. Therefore, companies dependent on supply chains should invest both financial and non-financial resources on the development of collaboration between its partners. Moreover, using maturity models to compare processes in widely differing partnerships was found to be efficient and should be tested for continuous development by companies.

## 5.2 Future research

There are many further research opportunities regarding supply chain process maturity and downstream performance. In future studies, a more specific data should be collected to increase the validity of the results. This would allow the examination of expenses and incomes of each partnership, such as the cost of maintaining a higher maturity level. Moreover, the maturity of the collaborative processes should be estimated at different times during the collection of the data to identify how the changes in maturity levels affect performance. It is also expectable that maturity models will continue to evolve, providing more reliable and accurate results in the future. The number of available computer models which allow more versatile analysis for maturity assessment is increasing. In future versions of maturity models, a five-point Likert scale is desirable, as it would make it possible to identify the processes that have been developed to the maximum from those that still have room for improvement.

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# Appendices

## Appendix 1: Maturity level definitions

	Main-questions	Sub-questions	Source:
Level 2	Managerial commitment and Strategic intent	1. A strategic intent for the partnership has been established and the stakeholders are aware of it	Min et al. 2005, 242; Fawcett et al. 2008, 101
		2. the need for collaboration is widespread and visible through the organization	
	Resource investment and development	3. Financial and non-financial resources are invested to support the collaboration	Min et al. 2005, 243; Fawcett et al. 2008, 99
		4. There are mechanisms to share learning with the partner	
		5. Teams and managers work cross-functionally	
	Rationalization	6. Commonalities and collaborative improvement opportunities are identified and taken advantage of	Fawcett et al. 2008, 99
		7. The network has been simplified (centered, unnecessary partners reduced)	
		8. Unnecessary or slow moving products have been eliminated	
	Internal alignment	9. The supply chain is mapped and the roles are defined	Cao and Zhang 2013, 161; Fawcett et al. 2008, 99
		10. The operations are frictionless	
		11. The supply chain partnerships that will be developed have been selected	
	Relationship and trust building	12. There is a high level of trust within the organization and with the supply chain partners	Fawcett et al. 2008, 99
		13. The product supplier or service provider is committed to continuous improvement	
		14. The ideal relationship types for new supply chain members are defined	
	Information Flow and System Integration	15. There are information systems capable of sharing real time accurate and relevant information	Fawcett et al. 2008, 99
		16. The stakeholders have a mindset of wanting to share information across functions and between organizations	
	Formalisation	17. The performance metrics and reporting mechanisms are co-developed	Fawcett et al. 2008, 111
		18. Each partner has determined roles and responsibilities,	
		19. Information technology and the information to share is standardized	
		20. Collaboration schedules are aligned	
Level 3	Goal congruence	21. There are common goals for the supply chain	Cao and Zhang 2013, 58
		22. Partners have similar interests to collaborate across the supply chain	
		23. It has been jointly planned how collaboration can lead to achieving the goals of the supply chain	
	Decision synchronisation	24. Promotional events are jointly planned	Cao and Zhang 2013, 58
		25. Demand forecasts are jointly developed and inventory managed	
		26. Partners have target of optimizing supply chain benefits	
	Incentive alignment	27. Costs, benefits and risks are shared with the supply chain partners	Cao and Zhang 2013, 58
		28. Assets are being leveraged and mutual investments are being made: cross-organizational teams, shared technical support and equipment	
	Resource sharing	29. New and relevant knowledge is jointly searched, acquired, assimilated and applied to use.	Cao and Zhang 2013, 58
		30. There are frequent, two-way, formal and informal, multi-channel contacts.	
Collaborative communication	31. Each other's decisions are influenced through discussion rather than request	Cao and Zhang 2013, 59	
	32. The exchanged information is: relevant, timely, accurate, complete and confidential		
Information sharing	33. There are routine processes such as: monthly KPI status review, quarterly executive business reviews and continual up-dating of key metrics/goals	Cao and Zhang 2013, 58	
	34. There is a supplier-scorecard based rating system for continuous improvement		
Level 4	Performance measurement	34. There is a supplier-scorecard based rating system for continuous improvement	Ho et al. 2020
		35. Ways to improve collaboration are continuously being searched	Fawcett et al. 2008, 99
Level 5	Continuous improvement	35. Ways to improve collaboration are continuously being searched	Fawcett et al. 2008, 93

## Appendix 2: Maturity questionnaire results

			Partner 1	Partner 2	Partner 3	Partner 4	Partner 5	Partner 6	Partner 7
Level 2	Managerial commitment and Strategic intent	1.	Yes	Yes	Yes	Yes	Yes	No	Yes
		2.	Yes	Yes	Yes	Yes	Yes	No	No
	Resource investment and development	3.	Yes	Yes	Yes	Yes	Yes	No	Yes
		4.	Yes	Yes	Yes	Yes	Yes	No	No
		5.	Yes	Yes	Yes	Yes	Yes	No	No
	Rationalisation	6.	Yes	Yes	Yes	Yes	Yes	No	No
		7.	Yes	Yes	Yes	Yes	Yes	No	Yes
		8.	Yes	Yes	Yes	Yes	Yes	No	No
	Internal alignment	9.	Yes	Yes	No	No	No	No	No
		10.	No	Yes	No	No	No	No	No
		11.	Yes	Yes	Yes	Yes	Yes	No	Yes
	Relationship and trust building	12.	Yes	Yes	Yes	No	No	No	No
		13.	Yes	Yes	No	No	Yes	No	No
		14.	No	Yes	Yes	No	Yes	No	No
	Information Flow and System Integration	15.	Yes						
		16.	No	Yes	Yes	No	No	No	No
	Formalisation	17.	No	No	Yes	Yes	No	No	No
		18.	Yes						
		19.	No						
		20.	No						
Level 3	Goal congruence	21.	No						
		22.	No	Yes	No	Yes	Yes	No	No
		23.	No						
	Decision synchronisation	24.	Yes	Yes	Yes	Yes	No	No	Yes
		25.	No	No	No	Yes	No	No	No
		26.	Yes	Yes	Yes	No	Yes	No	No
	Incentive alignment	27.	Yes	Yes	No	No	Yes	No	No
		28.	No						
		29.	Yes	Yes	Yes	Yes	Yes	No	Yes
	Collaborative communication	30.	Yes	Yes	Yes	Yes	Yes	No	Yes
		31.	No	Yes	Yes	Yes	Yes	No	No
		32.	Yes	Yes	Yes	No	No	No	No
Level 4	Performance measurement	33.	No	No	No	No	No	No	
		34.	No	No	No	No	No	No	
Level 5	Continuous improvement	35.	No	No	No	No	No	No	
	Maturity level:		Level 1						
	Criteria fulfilled:		20	25	21	18	19	2	9

## Appendix 3: Performance data form

Downstream working hour estimations							
	Partner 1	Partner 2	Partner 3	Partner 4	Partner 5	Partner 6	Partner 7
Overall							
Average							
Number of deals							
Sales figures for each partner							
	Partner 1	Partner 2	Partner 3	Partner 4	Partner 5	Partner 6	Partner 7
Sales							
Own Turnover							
<b>Avg. Sales</b>							
<b>Avg. Own Turnover</b>							
Number of deals							
Type of business							
Lead time							
Sales/Labor ratio							
Own turnover/Labor ratio							