Tampere University

Ville Reinilä

LOGISTICS CONTROL TOWER VALUE CREATION

Master's thesis
Faculty of Engineering and Natural Sciences
Heikki Liimatainen
Erika Kallionpää
July 2021

ABSTRACT

Ville Reinilä: Logistics Control Tower Value Creation
Master's Thesis
Tampere University
Master's Degree Programme in Information and Knowledge Management
July 2021

Global supply chains and logistics are continuously demanding more attention from organizations because of evolving business environments. The basis of this research is the aim of the case company to achieve better logistics management with a new organization called Logistics Control Tower. To be able to achieve better logistics management, the case company is required to understand the current state of the Logistics Control Tower and identify the desired future state. The objective of the Logistics Control Tower is to create value for internal customers with effective logistics management, and thereby the current and the future state have to be examined from a value creation and supply chain and logistics management point of view.

First, this research aims to define the current and desired future state of the Logistics Control Tower. Then, the research aims to identify a gap between the current and future state and suggest actions to fulfil the gap. The research was executed as a case study in the case company. The research consisted of theoretical study and empirical research. The empirical research was conducted by interviewing employees of the Logistics Control Tower and its internal stakeholders. The data that was collected with the interviews were analyzed with qualitative methods. Important themes around the Logistics Control Tower were identified with the help of the theoretical study and analysis of the qualitative data.

The current state of the Logistics Control Tower was identified based on theoretical and empirical studies. The current state was divided into current strengths, challenges and value-creating objects. After the current state was identified, the desired future state of the Logistics Control Tower was defined with the help of theoretical and empirical studies. After the current and future states were identified, a gap between these states was defined. Finally, suggested actions were presented to fulfil the gap and to be able to achieve the desired future state. The results of this research provide helpful information for other organizations as well about the most important features of a Logistics Control Tower in a global business environment.

Keywords: Internal value creation, supply chain management, logistics management, logistics control tower

The originality of this thesis has been checked using the Turnitin OriginalityCheck service.

TIIVISTELMÄ

Ville Reinilä: Logistiikan hallintaorganisaation arvonluonti
Diplomityö
Tampereen yliopisto
Tietojohtamisen diplomi-insinöörin tutkinto-ohjelma
Heinäkuu 2021

Globaalit toimitusketjut ja logistiikka vaativat organisaatioilta jatkuvasti enemmän huomiota toimintaympäristön muutosten vuoksi. Tämän tutkimuksen pohjana on kohdeorganisaation tavoite saavuttaa parempi logistiikan hallinta uuden logistiikan hallintaorganisaation avulla. Paremman logistiikan hallinnan saavuttamiseksi kohdeorganisaation tulee ymmärtää uuden logistiikan hallintaorganisaationsa nykytilanteen sekä tunnistaa tulevaisuuden tavoitetila. Kyseisen hallintaorganisaation tarkoituksena on luoda arvoa sisäisille asiakkaille tehokkaalla logistiikan hallinnalla, jonka vuoksi hallintaorganisaation nykytilaa ja tulevaisuuden tavoitetilaa on tarkasteltava sekä arvonluonnin, että toimitusketjun ja logistiikan hallinnan näkökulmasta.

Tämän tutkimuksen tavoitteena on analysoida logistiikan hallintaorganisaation nykytila kohdeorganisaatiossa, määritellä tulevaisuuden tavoitetila, tunnistaa kuilu nykytilan ja tavoitetilan välillä sekä antaa kehitysehdotuksia kuilun täyttämiseksi ja tulevaisuuden tavoitetilan saavuttamiseksi. Tutkimus toteutettiin tapaustutkimuksena kohdeorganisaatiossa. Tutkimukseen kuului kirjallisuuskatsaus sekä empiirinen tutkimus, joka toteutettiin haastattelemalla logistiikan hallintaorganisaation työntekijöitä ja sen eri sisäisiä sidosryhmiä. Haastatteluiden avulla kerätty aineisto analysoitiin laadullisilla menetelmillä. Kirjallisuuskatsauksen ja laadullisen aineiston analysoinnin avulla tunnistettiin hallintaorganisaation tärkeimmät osa-alueet nykyhetkellä ja tulevaisuudessa.

Kirjallisuuskatsauksen ja empiirisen tutkimuksen pohjalta tunnistettiin logistiikan hallintaorganisaation nykytila, joka jaoteltiin nykyisiin vahvuuksiin, heikkouksiin ja arvoa synnyttäviin toimintoihin. Nykytilan tunnistamisen jälkeen kirjallisuuskatsauksen ja empiirisen tutkimuksen avulla hallintaorganisaatiolle määriteltiin tulevaisuuden tavoitetila. Nykytilan ja tulevaisuuden tavoitetilan määrittelemisen jälkeen tunnistettiin näiden tilojen välinen kuilu. Kuilun tunnistamisen jälkeen esitettiin suositeltavia toimenpiteitä kuilun täyttämiseksi ja tavoitetilan saavuttamisen mahdollistamiseksi. Tutkimuksen tulokset tarjoavat myös muille organisaatioille hyödyllistä tietoa logistiikan hallintaorganisaation tärkeimmistä ominaisuuksista globaalissa toimintaympäristössä.

Avainsanat: Sisäinen arvonluonti, toimitusketjun hallinta, logistiikan hallinta, logistiikan hallintaorganisaatio

PREFACE

This Master's Thesis was done for Metso Outotec. It was conducted within six months period from January 2021 until July 2021. The thesis focused on the organization called Logistics Control Tower, which is a brand-new function in Metso Outotec. The thesis is finally ready and, the author is ready to graduate.

It has been an interesting and awesome opportunity to examine how a new organization is built in a global company. This thesis allowed me to discuss and learn from people all around the world with various perspectives and areas of expertise.

I want to thank Metso Outotec for giving me the opportunity to do this thesis. I want to thank all the people and interviewees I worked with during the six months: thank you for your effort and time. Thank you, Matt and O-P, for your commitment and making the thesis possible. Secondly, I want to thank my thesis instructors Heikki Liimatainen and Erika Kallionpää, for their commitment and guidance. Lastly, I want to thank all my friends with whom I worked during these years.

Helsinki, 9 July 2021

Ville Reinilä

CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABBREVIATIONS

BI	Business Intelligence
Case Company	Metso Outotec
CDL	Customer-Dominant Logic
ERP	Enterprise Resource Planning
GDL	Goods-Dominant Logic
IC	Intellectual Capital
IS	Information System
KPI	Key Performance Indicator
SC	Supply Chain
SCM	Supply Chain Management
SDL	Service-Dominant Logic
TMS	Transportation Management System

1. INTRODUCTION

1.1 Research background and motivation

Today's continuously evolving business environments demands organizations to improve their business efficiency constantly (Kasim et al. 2018). The main drivers behind the continuously evolving business environments are modern information technology (Kasim et al. 2018), globalization, longer supply chains and tighter product margins (Hidjaja 2018).

One business activity that is significantly affected by the changing business environment is the supply chain (SC), which is facing many challenges (Thai 2012) and is becoming even more complex than ever (Hidjaja 2018). According to Martinsuo et al. (2016), supply chain means planning and steering of supplier and distribution value chains, covering the management of processes between companies. Organizations are forced to rethink the efficiency of this function constantly as customers are repeatedly raising their baseline expectations (Kazemi 2019) and demanding more value for their money (Sople 2011). Increasing the service level, enhancing relationships within the SC and simultaneously improving cost efficiency are the concerns that SC professionals must deal with all the time (Thai 2012), which is why managing customer expectations has become one main challenge of the supply chain management (Rajah et al. 2018). The emphasis on an effective SC implicates that organizations must continually develop their value chains to improve their responsiveness (Dean 2020).

The emerging global competitive environment has led to a situation in which the skill of efficiently managing the information flows within the SC is critical (Rajah et al. 2018: Durugbo et al. 2014), as poor information flow management can result in lost revenues, weak customer service and distorted decision-making (Guggenberger et al. 2020). According to Durugbo et al. (2014), information flow implies access, exchange, and documentation of information, which supports the whole order to delivery process (Chibba & Rundquist 2009). Effective information and knowledge exchange between an organization's divisions, different stakeholders and locations are key requirements in increasing the firm's competitiveness (Rajah et al. 2018) and the effectiveness of the SC (Chibba & Rundquist 2009). Information flows within the SC are usually related to various processes between organizations (Martinsuo et al. 2016).

Logistics is a critical success factor in a successful SC, in which the main objective is to produce value to customers (Martinsuo et al. 2016) and it is seen as an enabler for commercial growth (Sople 2011). Logistics is a collection of combined activities inside a SC establishing cost-effectiveness and competitiveness of SCM (Sople 2011). Martinsuo et al. (2016) defined logistics as an operation that considers the managing of an organization's material and information flows to create and deliver value. The two types of flows are generated in business processes from procurement to delivery of finished products to the customer (Sople 2011).

An organization's success is based on delivering maximum value for the least possible costs, which is why logistics professionals shouldn't only focus on cost-effectiveness but also customer value creation (Dubey et al. 2020). According to Rahman et al. (2015), sustainability, performance, competitiveness and innovations of SC and its operations creates the basis for customer value creation, which is also supported by (Vijayan et al. 2016) who acknowledge that customer value creation requires a look into the value chains of its suppliers, distributors and customers. Gulyaz & Veen (2015) find that there are two key elements strongly related to customer value creation through logistics and SC activities, 1) thoroughly understanding the customer journey and customer contact points and 2) operations excellence, such as easy reverse logistics, outstanding communication and efficient feedback channel.

1.2 Purpose of the study & research questions

The aim of the study is to define the Logistics Control Tower an action plan to increase internal customer value. The internal customer value produced by the Logistics Control Tower transforms into external customer value in customer-facing services, which will eventually improve the net promoter score. Analysing the current state and defining the desired future state are required to meet the objective of the research. To reach this goal, this study will cover the theory of value and value creation as well as supply chain and logistics management. The study includes a theoretical part and a qualitative case study.

In the theoretical part of the study, the value creation and management of logistics and supply chain are studied. The case study focuses on Metso Outotec and its stakeholders that are covered by the services of the Logistics Control Tower. Metso Outotec is a frontrunner in sustainable technologies, end-to-end solutions and services for the minerals processing, aggregates and metals refining industries globally. The case study focuses on Logistics Control Tower team that provides optimized logistics performance and standardized logistics practices in Metso Outotec's global end-to-end supply chain, such as freight payment, claims, monitoring, booking, and information sharing. The

Logistics Control Tower team and stakeholders are interviewed to understand the current state of the control tower and identify the desired future state.

For Metso Outotec (the case company), the study of managing Logistics Control Tower value creation is important as it is a brand-new concept in the case company. There are no existing studies in the case company concerning the new service concept and there is a need for research to gain a deeper understanding to support the decision-making processes related to logistics management. The study is also important in understanding the potential of the concept in creating customer value. This study is a part of enabling end-to-end logistics management per company operating model and the objective of the study for the case company is to understand how the Logistics Control Tower should be executed and developed to maximize value creation.

Based on the research problem, the main research question is:

- How to maximize the Logistics Control Tower value creation?

To be able to answer the main research question, the following supporting research questions were formulated:

A. What is value creation and how to identify it?

B. How to improve customer value creation?

C. What are the critical success factors in supply chain and logistics management?

D. What is the current state of the Logistics Control Tower?

E. What is the desired future state of the Logistics Control Tower?

The main research question is answered through the empirical case study. The sub research questions are answered through both, theoretical study and empirical case study.

1.3 Research approach

Well-defined research philosophy enables a researcher to design solid research where all the elements fit well together. Selecting an appropriate philosophy is connected to three different views, ontology, epistemology, and axiology. This research is based on the organization's real need to understand the topic; therefore, pragmatism is the most suitable philosophy in this research. (Saunders et al. 2019) Pragmatism being the most relevant philosophy in this case is also supported by the goal of this research, to produce information that enables the case organization to succeed in their new concept. From a value point of view, researchers value drives the pragmatism-based research (Saunders

et al. 2019), enabling an abductive approach to be used in the research (Kaushik & Walsh 2019).

The research approach can either be inductive, deductive, or abductive. The inductive approach focuses on generating new theory from data. It aims to focus on studying new aspects while formulating new theory form the data. The deductive approach aims to verify or falsify theory and hypotheses. The third approach, abductive reasoning is a combination of inductive and deductive approaches, which is also the approach of this study. (Saunders et al. 2019) The abductive approach is a loop in which the process moves from observations to theory and finally back to observations (e.g. Saunders et al. 2019; Anttila 2014). Utilizing the abductive approach requires the researcher to have knowledge and understanding about the topic of the research (Anttila 2014).

According to Saunders et al. (2019), a research strategy can be defined as a plan which includes actions to accomplish research. Choosing an appropriate research strategy enable researchers to answer their research questions. The research strategy should be defined by research questions to find the best strategy for the research (Vogt et al. 2012). The research strategy chosen for this research is the case study method. It is the preferred method when research questions are “what” or “how” questions (Swanborn 2010). A case study is an optimal strategy when in-depth knowledge about a certain topic or phenomenon for example in an organisation or association is required (Swanborn 2010; Yin 2018, cited in Saunders et al. 2019). The empirical case study section applies interviews to collect the data.

1.4 Research structure

The research consists of two main sections: the theoretical study and the empirical study. The theoretical study is meant to support and create a basis for the empirical section. Both sections are then used to discuss and draw conclusions about the topic of the research. The research includes a total of seven chapters.

The first chapter is an introduction to the thesis. It covers the research background, the purpose of the study, research questions and research approach. It is meant to provide an understanding of the research.

The second and third chapters cover the theoretical study of the research. The second chapter, which is the first part of the theoretical study, focus on value creation. The third chapter, which is the second part of the theoretical study, focus on supply chain and logistics management.

The fourth chapter is the research design. It introduces the research methods, interview process and research analysis of the empirical study.

The fifth chapter is the results of the empirical research. It presents the results of the interviews, and it is split into two sections: the first-round interviews and the second-round interviews.

The sixth chapter is the discussion of the empirical research. It covers the results of qualitative analysis. The chapter covers the current state of the Logistics Control Tower, the desired future state of the Logistics Control Tower and an action plan and identified gap between the current and the desired future state.

The seventh chapter is conclusions. It covers a summary of the results, evaluation of the study and future areas of research.

2. VALUE CREATION

2.1 Value

Value is a concept that is hard to describe (Grönroos 2011) revealing terminological complexity (Sidorchuk 2015). Customer value is an ambiguous and diverging concept that is affected by current circumstances and is perceived by someone (Woodruff 1997). The definition of value depends on the person you ask (Grönroos 2011) and it varies from customer to customer meaning that value is always created for someone (Olajide et al. 2016). Olajide et al. (2016) describe value as a non-monetary utility of a good or service, which worth is strongly based on opinions as value represents the net score of total benefits perceived by the customer, including both intangible and tangible benefits (Woodside et al. 2008). Value can be approached from two perspectives, "value-in-exchange" and "value-in-use", both having their own definitions for value and value creation (Vargo et al. 2008), meaning that things can only have value at the time either in use or in exchange (Smith 2000). In addition to two perspectives, there are also two types of value (Figure 1), internal value and external value with common functionalities (Albores et al. 2004).

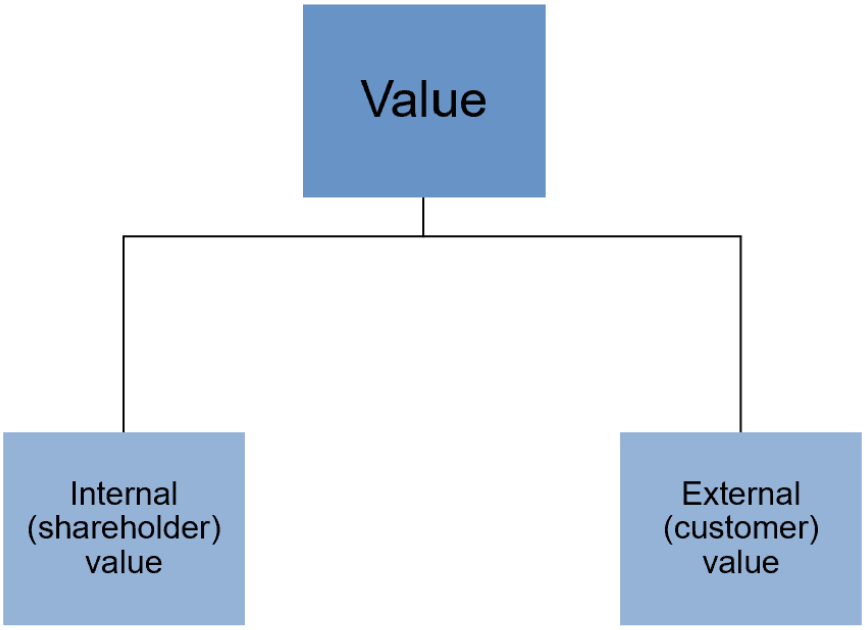

Figure 1: Value types (Albores et al. 2004)

The value-in-exchange, also known as goods-dominant logic (GDL), is the traditional view at value creation (Vargo et al. 2004) which considers value as a phenomenon that

is created mutually in a business engagement between customer and supplier (Grönroos & Helle 2010). Value is first manufactured and then distributed and realised in the market in an interaction between customer and supplier where money and goods are exchanged. In this perspective, value is determined by the manufacturer and it can be measured as an entity (Ng et al. 2012), while the role of the customer is to be operand resource (Vargo & Lusch 2004) who destroys the value in their operations (Saarijärvi et al. 2017).

The value-in-use perspective, also known as service-dominant logic (SDL), was constructed to challenge the traditional value perspective, GDL (Ballantyne et al. 2011). The fundamental meaning behind this perspective is to focus on creating value for yourself by serving others with the help of internal and external resources (Vargo & Lusch 2014) while adapting strategic business logic that illustrates creating value "with customers", instead of "for customers", where customers are partners (Karpen et al. 2011). Contrary to GDL, there are no such roles as manufacturers and customers in SDL, because the mentality behind the perspective is that value cannot be created independently (Vargo & Lusch 2014), thus organizations can only offer value propositions (Vargo 2009). The actual value is created later in a service collaboration (Karpen et al. 2011) with the recipient by integrating the input with other resources and value-creating activities (Vargo 2009).

2.2 Value creation & value co-creation

Value creation has been objective for organizations for a long time, but the definition of value creation has changed. At first, value creation meant creating value only for shareholders, but since then, the meaning of creating value have evolved and today it indicates creating value to all stakeholders. (Haksever et al. 2004) Understanding value creation as a concept is required to enable the actual value creation process in the organization. Knowledge of defining, creating, delivering, and sustaining value are the key factors to assimilate the concept. (IFAC 2020) Vargo & Akaka (2009) suggests that every instance of value creation is independent. The independency implicates there is no specific definition for value creation and each occurrence demands an individual view, which helps to define the meaning of value creation case-by-case.

As mentioned before, value is created for all stakeholders. Value receiver should be considered as the beneficiary since the receiving party defines the value itself and the value is created in a reciprocal relationship between receiver and producer. (Vargo 2009) Defining value is based on how and why the beneficiary utilises an object. Beneficiary's value-creating activities play a significant part in defining the value, as gaining the

proposed value insists the object to be a significant part of one's value-creating processes. In this context, the object should be considered as input which can refer to physical goods, service activities (Grönroos & Ravald 2011), intellectual capital or human capital that have an impact in their lives (IFAC 2020).

Previously, the value creation took place in manufacturer's premises, but today value creation is placed in an interaction between producer and beneficiary (Gummerus 2013), where the value-creating object is first applied and integrated with other existing resources (Vargo & Akaka, 2009), and then used simultaneously enabling the beneficiary to perceive the value (Medberg 2016). Value creation is often related to better performance, higher quality, or operational benefits (Smith & Colgate 2007) which major sources of value are located in two main areas, 1) information and knowledge or 2) organizational resources and capabilities (e.g. Smith & Colgate 2007; Ranta 2005). Even though the value creation process seems to focus on the beneficiary's processes, the supplier of the value is still needed to have an active role in customer's processes to help in creating value and achieving competitive advantages. Therefore, value creation can be divided into segments, the most important segments being the value the customer receives and the value the supplier receives. (Bergström & Svensson 2010)

Delivering value means delivering products, services and other value-creating objects to the customer at a right time in the right condition (IFAC 2020). Vargo and Lusch (2016) pointed out that delivering value refers to creating value together, instead of one actor creating and delivering the value to another actor, and therefore value delivery is also known as offering value propositions (Vargo et al. 2010). As mentioned, value is created in a relationship, meaning that the supplier should be able to capture a share of the value that the customer perceives to "deliver" value to itself to achieve competitive benefits. The definition of capturing value varies and depends on surrounding circumstances, but for example, capturing value can mean accessing other firm's resources or gaining a greater share of the network's revenues. (Tuomisaari et al. 2013) Capturing value is a decision that is based on expected net value. To maximize captured value, developing isolating mechanisms to prevent value slippage is necessary, but at the same time, it ties an organization's resources implying that finding a balance between net value and required resources is needed. (Hsieh et al. 2012)

The goal of sustaining value is to maximize total value captured and delivered in the long-term (Evans et al. 2017), thus sustained value is considered as a continuous success (Achtenhagen et al. 2013). However, emphasizing a specific time horizon is not preferred as utilizing both, short-term and long-term scopes allow value creation for a wide range of stakeholders creating the basis to maximize the long-term total value

(Cardoni et al. 2020). For example, examining failed value exchanges enables organizations to recognize new value opportunities that can be generated into additional value-creating business activities (Evans et al. 2017). According to Cardoni et al. (2020), failed value exchange can be identified by measuring the usage of a product or service. Object with a high usage level combined with positive effects will most likely lead to sustained value, which is why investigating failed exchanges is necessary. Continuously shaping, adapting, and renewing the underlying operation models forms the rationale of how an organization creates, delivers, and captures value (Osterwalder & Pigneur 2010). Achieving sustained value not only renews current business models but also creates new capabilities and enables long-term growth (Achtenhagen et al. 2013).

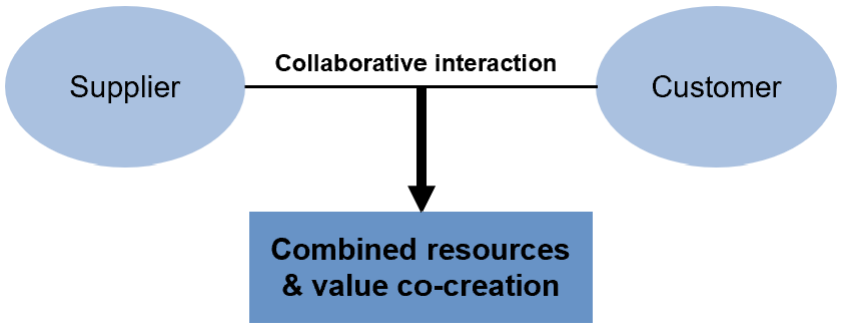

Figure 2: Value co-creation (Cova & Salle 2008; Vargo et al. 2010)

Value co-creation is demonstrated in Figure 2. It refers to activity where service providers and customers create together value for both parties in collaborative interaction (Cova & Salle 2008). Collaborative interaction is a chain of actions in which the customer's operant resources are combined and used with those provided by a supplier. The customer is needed to participate in the value creation process as the supplier can only propose the value and support its creation. (Vargo et al. 2010) This logic emphasizes the roles of both parties in successful value creation. Some authors claim that value is not always co-created, but it is stated that the differences between expressions are originated from deviant definitions of co-creation and interaction (Grönroos et al. 2015) combined with diverse social structures and social systems (Edvardsson et al 2011). Today, even the manufacturing and delivery of physical products is considered as a service, and thereby the importance of value co-creation as a term is emphasized as the term is applied especially in-service economies (Vargo et al. 2010). In a conclusion, it can be said that value creation requires both supplier and customer to be involved in the value creation process, but the importance of one's role may vary depending on the case and the economy surrounding the process.

2.3 Value creation with intellectual capital

Intellectual capital (IC) can be expressed in several ways, some of these are, for example, intangible assets, invisible values, and knowledge (Choong 2008). Skills, knowledge, networks and other intangible resources are already identified as important factors of production in organizations, however, managing and taking advantage of intellectual assets is still something that needs a lot of attention in firms to attain net benefits (Roos et al. 2006). Besides obtaining net benefits, managing IC is also important as it plays a significant role in business economies due to an emerging role of knowledge-intensiveness in today's companies and therefore it is connected to a company's competitiveness (Manzari et al. 2012).

Today, one significant target in business economies is obtaining a high usage level of intangible resources, such as information and know-how, to create additional value. The constantly increasing amount of intangible resources in organizations emphasizes the ability to convert those assets into tangible forms like revenue or added value (Volkov & Garanina 2008). The challenge of creating value from intangible assets is achieving the outcome that is perceived and preferred by the beneficiary. As there is no physical product to deliver, customer value is composed of knowledge, emotion, and experience (Steiner & Harmon 2009). Those challenges can be overcome with effective management of technology, human and social capital, and organizational and cultural structures to assure knowledge is in appropriate condition at a right time. To create value, a successful relationship between business and knowledge is vital. (Ghasemi & Gholami 2016)

Supplier value, customer's motivation, brand-image, and self-image are examples of how a firm can have an increasing impact on the perceived value of their service (Harmon et al. 2009). Only certain roles and transactions realize value from the inputs, but the managing of the whole entity, even the back-office functions, is needed to profitably maintain these factors. Non-customer facing roles and processes are equally important as they are part of a value chain and considered as success factors that allow the value conversion. (Allee 2008) Babin et al. (2000) stated that customer experience is the best indicator of future behaviour. Satisfaction indicates there is a high possibility that customer will utilize the service again as customer value is a result of satisfaction.

As a practical example, knowledge sharing in the supply chain (SC) will most likely lead to a better performance within the SC meaning reduced costs, more efficient cooperation, and deeper relationship with stakeholders. Also, information sharing has a vital role in eliminating external factors that may have increasing cost effects on the SC,

and, in this way, information sharing creates value for all related parties. (Li et al. 2005) To conclude, organizations can create value by sharing information since it has positive direct and indirect impacts on the business environment.

2.4 Understanding customer needs and value formation

Assessing customer needs is mainly a qualitative process (Griffin & Hauser 1993), which is something that enables the customer to experience satisfaction (Camilleri 2017). The most important thing to understand is those customer expressions are not requirements, they are only raw descriptions (Jayaswal et al. 2007) that are affected by culture, society (Camilleri 2017), and continuously changing personal, unique and individual needs (McKnight 1994; Holbrook 2001, cited in Voima et al. 2010). These raw statements, as known as voiced requirements, can be transferred into customer requirements by understanding, classifying, organizing, and prioritizing them into a hierarchy of needs (e.g. Jayaswal et al. 2007; Griffin & Hauser 1993). In addition to stated demands, there is also unvoiced requirements. Unvoiced demands can be discovered by examining and observing the process in which your object creates value for the customer. (Jayaswal et al. 2007)

According to Griffin and Hauser (1993) and Rahman and Safeena (2016), customer requirements can be classified into three categories, 1) basic needs, which are assumptions about what service or product will do, 2) expected needs, these features that customer wants the object will do, and 3) exciting needs, this kind of attributes would gratify the customer and create surprising value. Dividing customer requirements into categories helps to identify and prioritize high-impact, low-impact and hidden requirements guiding through their fulfilment process (Jiao & Chen 2006).

The basic customer needs don’t have an impact on satisfaction, but if this type of need is not fulfilled, a customer will experience dissatisfaction causing a loss in value creation. (Griffin & Hauser 1993; Xu et al. 2007) For instance, if television has a poor sound quality, it will have a negative effect on satisfaction. But the good sound quality is an assumption and it doesn’t have an increasing effect on satisfaction. (Cakir et al. 2017)

The expected customer needs are the one’s customer expects from the product. Fulfilling these expectations creates value and vice versa failing to fulfil will cause dissatisfaction. (He et al. 2017; Xu et al. 2007). For example, if a car has a low fuel consumption, the customer will feel satisfaction and the feature creates value, and if the fuel consumption is too high, it will lead to dissatisfaction and lost value. (Cakir et al. 2017)

The exciting customer needs will result in more than proportional satisfaction and highly increased value. The absence of these attributes will not lead to dissatisfaction as these requirements are not identified by the customer. (e.g. Rahman & Safeena 2016; He et al. 2017) To illustrate, freshly baked cookies delivered to a hotel room during turn-down service or customer loyalty program are features that will delight the customer, but their absence will not cause dissatisfaction and therefore can be classified as attractive features (Stroud n.d).

2.5 Customer-dominant logic of service

Customer-dominant logic of service (CDL) was proposed by Heinonen et al. (2009) to contrast SDL (Voima et al. 2010). In CDL, the customer is positioned in the centre, instead of service, service provider or the interaction (Heinonen et al. 2010) as value is recognized to be multi-contextual and dynamic based on customers' lives and ecosystems (Heinonen & Strandvik 2015), and it is recognized to be formed, rather than being created (Heinonen et al. 2013). This perspective was established to achieve unexploited value opportunities that are impossible to reach with previous perspectives. CDL focuses on investigating how customers live their lives (Heinonen et al. 2013), how are the services embedded in their ecosystems, and what do they do with services to reach their objectives. (Heinonen et al. 2010) According to Heinonen et al. (2013), the customer ecosystem refers to systems of actors and spheres that customers are involved with. Hence, CDL is not interested in the value offering alone, but in the customers' whole system where actors, value offerings, structures, and stakeholders are merged to form value (Strandvik & Heinonen 2015).

In the beginning, CDL was considered as a marketing perspective, but it was later expanded into a business perspective. Customers are vital for business and, therefore, assessing business through the customer's lens is highly recommended and that is the reason behind widening the perspective to cover the whole business. (Heinonen & Strandvik 2015) Exploring the role of service for the customer is one example of how to approach value formation from a CDL perspective, even though the customer's ecosystem and life sphere are often uncontrollable by the service provider. Multiple timeframes increase the complexity of the logic. Customers evolving reality has a history, a present time, and a future. Therefore, the experience of a service is multi-framed, and the recognition of value is dependent on the past, present, and future experiences of the customer. Even if the customer experience is individual for the customer, the experience is still influenced by internal and external factors offering the service provider an opportunity to have an impact on the experience. (Heinonen et al. 2013)

As mentioned, CDL views value as formed. Value formation emphasizes a close and persistent monitoring of value formation. (Strandvik & Heinonen 2015) Value formation is a longitudinal and over time accumulating process, which emerges through behavioural and mental processes while experiences are being interpreted by a customer. It is socially observed and encountered, rather than being restricted to a resource perspective. Value formation takes place in biological, physical, mental, social, geographical, and virtual spaces making the formation

n process partly invisible. Uncovering the value formation process demands the supplier to become proactive in understanding and profiling the emotions, life, and ecosystem of the customer. (Heinonen et al. 2013) The focus of monitoring and analysing value formation should evaluate four dimensions: How, where and when the company must be involved in customers' lives to support the value formation process (Heinonen & Strandvik 2015), and what is the formation based on (Heinonen et al. 2013).

Understanding customer's ecosystem should be approached by learning what processes customers are involved with, and what kind of physical and mental inputs they need to support those processes. This implicates that company should review how could they support customer's activities, rather than starting from services and then identifying how a company could fit in. (Heinonen et al. 2010) The customer value emerges in the customer's economy. Its formation is driven by customers' acumen and their sense-making about applicable ways for reaching their goals and performing their tasks (customer logic) and is influenced by the actions of other actors. Customer's logic, tasks, and needs are the factors defining how the value offering is experienced and forms value. Value evolves as a process that extends over an indefinite time. It includes the desired and undesired stages and components. Designing value offering should not be based on what the offering can do, but should focus on what customers want to achieve, regardless of whether it is functional performance, mental experience, or both. (Heinonen & Strandvik 2015)

2.6 Value formation from the thesis' point of view

As this thesis focuses on service function, value creation is mostly based on intellectual capital. Based on the literature, the value formation in the Logistics Control Tower can be classified into four dimensions, 1) physical and mental inputs, 2) monetary, tangible and intangible benefits, 3) expectations and propositions, and perceptions and emotions. The value formation is demonstrated in Figure 3.

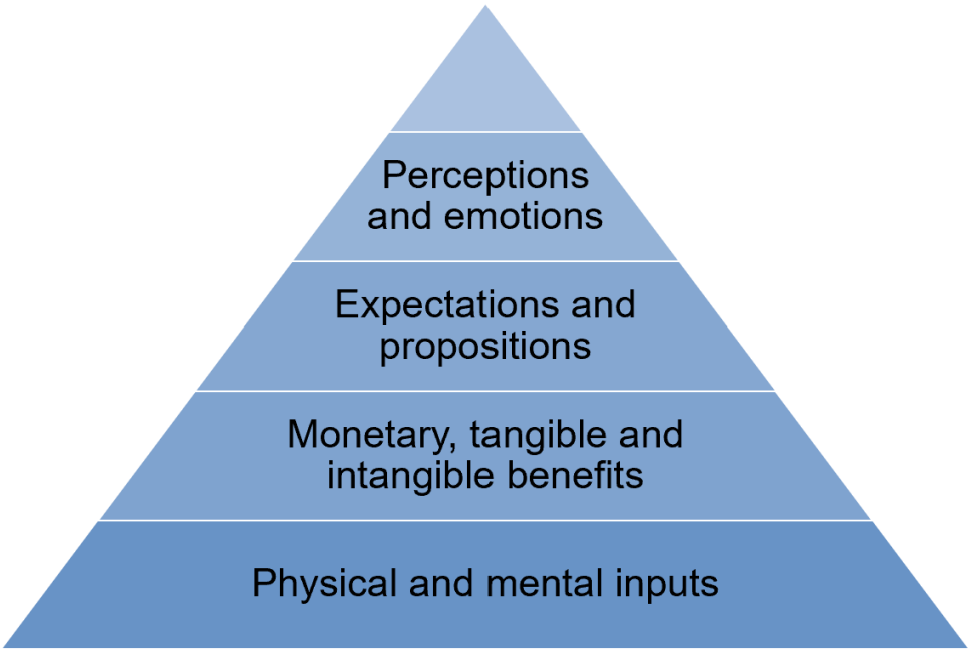

Figure 3: Value formation concluded from different viewpoints

The value formation starts with the first dimension, which is physical and mental inputs. The inputs are the actions that are mandatory to enable and launch the value creation process and with which the value-creation object is created. Those can be, for instance, gathering and analyzing information and utilizing expertise to support customers' processes.

The second dimension is monetary, tangible and intangible benefits that are created through physical and mental inputs. Those benefits are the objects that are produced and delivered by the Logistics Control Tower and, they can be considered as value. As an example, monetary benefits can refer to cost savings, tangible benefits can refer to increased efficiency and intangible benefits can refer to increased flexibility or quality.

The third dimension is expectations and propositions. Expectations are customers' needs they expect to be fulfilled. Even though benefits are created, their actual value depends on the customers' expectations. If those benefits fail to fulfil the expectations, the created value will suffer. For instance, if the shared amount of information is less than expectations, the value will be significantly lower. Propositions refer to the value that is marketed by the supplier. The propositions have an impact on customer's mind, which will affect the perceived value. If the propositions are not fulfilled, the amount of created value will suffer, just like failing to fulfil expectations.

The final and fourth dimension is customers' perceptions and emotions. The emotions of the customer need to be understood to provide the appropriate type of service. For example, if a customer is angry or has a very urgent and important issue, the Logistics

Control Tower must understand those emotions to be able to act accordingly and provide sufficient service. On the other hand, emotions can refer to customers' opinions or assumptions that are derived, for instance, from the function's brand image. Those emotions also have an impact on perceived value. The customers' perceptions are the variable that determines the final and actual amount of created value. The perceptions are based on benefits, expectations, propositions and emotions.

3. SUPPLY CHAIN AND LOGISTICS MANAGEMENT

According to Blanchard (2010), a supply chain (SC) is a series of activities that cover a product's whole lifecycle from the original supplier to the ultimate end-user. Quayle (2006) defines the SC as a chain of events, where several entities are involved with the processing or supporting the processing of a product to deliver it from its origination to the consumer. Sople (2011) describes the SC as a set of actions that encompasses the activities and capabilities of supply chain partners during the physical flow of goods from source to point-of-use. Felice et al. (2013) characterize the SC as an end-to-end process where products move from supplier to manufacturer, distributor, retailer and finally the end customer. Andreassen (2005) stated that it's not companies themselves that competes in the market with each other, but it's their supply chains (Antai 2011). Mentzer et al. (2001) described the SC as a network of firms involved in both upstream and downstream flows of objects from a source to an ultimate consumer. To conclude, SC is a sequence of activities where various parties add their value into an input to produce an output that will benefit and is desired by the end customer. The importance of the supply chain's efficiency cannot be emphasized enough as it is directly proportional to firms' competitiveness.

Morana (2018) defines logistics as a collection of processes that includes planning, execution, and steering of the movements and implementations of people, products, and services to satisfy customer needs cost-efficiently and for a promised level of service. This definition was supported by Martinsuo et al. (2016), but they added that logistics also includes the managing of information related to these processes. Zieger (2018) describes logistics as the art and science of efficiently managing the movement of objects by taking care of the flow of production and distribution while reducing tied-up capital and delivering goods just-in-time. According to Winkelhaus and Grosse (2020), logistics is a system that enables the sustainable fulfilment of customer needs without an increase in costs by utilizing digital technologies. Hines (2013) defines logistics as operational activities that are necessary to deliver customer service. According to Sakki (2014), logistics is a key function inside a SC that covers both strategic and operative activities to satisfy customer requirements. In a conclusion, logistics considers the managing of flows of people, goods, and information to deliver value and satisfy the customer.

Management is a set of activities, including planning, decision-making, organizing, leading, and steering that are directed at an organization's human, financial, physical, and information resources to accomplish organizational goals in an efficient manner (Griffin 2012). According to Bateman et al. (2017), good management means a process of working with people and resources to achieve organizational goals effectively and efficiently. Daft (2009) defines management as the attainment of goals effectively and efficiently by planning, organizing, leading, and controlling resources. These definitions are also supported by Certo and Certo (2011), who stated that management is reaching the organization's goals by working with and through human and other resources. To conclude, management is the act of working with people and resources to accomplish objectives as efficient and effective as possible. It consists of four typical functions: leading, controlling, organizing, and planning. Therefore, supply chain management (SCM) and logistics management are the management of supply chains and logistics (Zijm et al. 2019).

The hierarchy of SCM, logistics management, and transport operations are presented in Figure 4. Zijm et al. (2019) developed the model to demonstrate the relationship between SCM and logistics management and to avoid ambiguity as the concept of SCM and logistics management are a little bit complex.

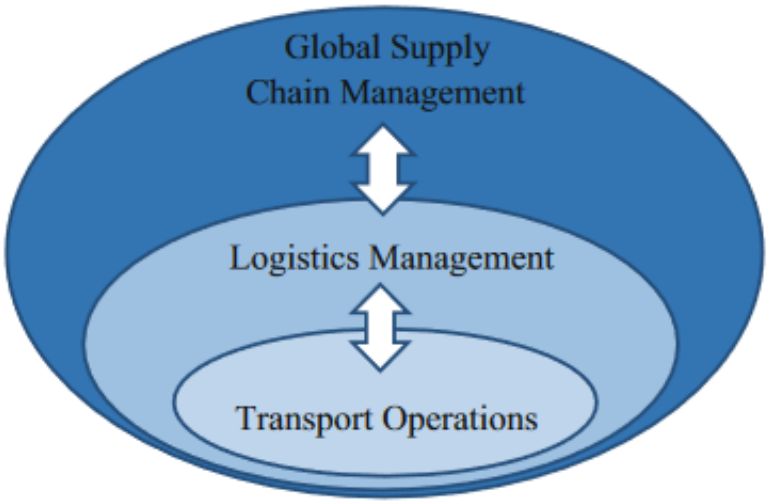

Figure 4: Hierarchy of supply chains, logistics, and transportation (Zijm et al. 2019)

The model presented by Zijm et al. (2019) emphasizes that logistics management is much more than just transportation. The hierarchy also demonstrates that logistics management is a part of supply chain management and therefore it has the same characteristics as SCM does.

3.1 Supply chain management

Even though SCM appeared in logistics literature in 1982, the term is still relatively new since it was later separated from the logistics concept. Larson and Rogers (1998) define it as coordination of processes between linked firms to serve end customer at a profit. According to Vorst (2004), SCM means delivering superior consumer value by satisfying customer requirements at the least possible cost. This objective is achieved by integrated planning, coordinating, and controlling of business activities within the SC (Vorst 2004). Janvier-James (2011) describes SCM as a function that aims at assessing and managing SC networks to enhance an organization's competitiveness in the global marketplace. Also, Sople (2011) states that SCM means the systematic and strategic coordination of all business activities within the SC to increase the performance of individual companies and the whole entity of SC. Accordingly, LeMay et al. (2017) wrapped up the meaning of SCM as "the design and coordination of a network through which organizations and individuals get, use, deliver, and dispose of material goods; acquire and distribute services; and make their offerings available to markets, customers, and clients". This definition is also supported by Krajewski et al. (2009), who defines SCM as follows: "Supply chain management is the synchronization of a firm's processes with those of its suppliers and customers to match the flow of materials, services, and information with demand. A key part of supply chain management is developing a strategy to mobilize and provide for all the resources in the supply chain to meet customer demand now and in the future". Zijm et al. (2019) concluded supply chain management as a function that integrates supply and demand management within and across companies.

Based on previous definitions, SCM is a strategic function that considers managing relationships, networks, and different business operations to fulfil end-consumers needs and create value. Supply chain management's linkage to definitions of "supply chain" and "management" is notable, and SCM can be considered as a combination of these terms.

Wong & Wong (2011) identified five key activities in SCM, that is information sharing, integration, on-time delivery, response time and communication of strategic requirements. Also, (Lu 2011) proposed that strategic positioning, structural configuration, collaboration, integration, and leadership are critical success factors in SCM. According to research conducted by Tracey et al. (2005), SCM has a significant and important impact on perceived product value, customer loyalty, and company's competitiveness. Thereby, Schoenherr (2009) defined six functions that are critical in SCM: 1) Internal human resource management, 2) adapting to unique environments, business cultures, and infrastructures, 3) outsourcing and management of buyer-supplier

relationships, 4) utilizing information technology, 5) risk management, and 6) sustainability of supply chain. Tracey et al. (2005) concluded the meaning of SCM well: “The supply chain management functions of physical distribution and supply chain management spanning processes directly create value for customers and affect a firm’s performance. The quality of a firm’s supply chain management processes undoubtedly moderates its ability to please clients.” These kinds of activities are performed to react to globalisation, more severe competition, increased customer expectations, technological, and geopolitical factors (Lu 2011).

3.1.1 Integration, communication, and collaboration

“Supply chain integration (SCI) is broadly defined as the alignment of supply chain goals between functions and enterprises, and the linkage of these functions and enterprises through information transparency, electronic or people-to-people.” (Carter et al. 2009) It is a strategic collaborative process that aims at creating cooperation, developing SC, and achieving common targets by connecting multiple functions, stakeholders, and customers. Such business functions are, for example, product development, customer and supplier relationship management, order fulfilment, and just-in-time delivery. Besides, the integration of information sharing improves the possibility to create agile and more flexible SC. (Sillanpää 2014) The main benefit of integration is reducing SC disruptions as functional and organizational integrations enable better visibility through SC. The integration allows value and information flow to move upstream and downstream simultaneously improving the performance of the SC (Krajewski et al. 2009) and allowing informed and coordinated decisions (Waters 2007). However, achieving an integrated SC demands company to develop a deep understanding of its partners’ organizations, capabilities, and weaknesses, thus, it is a long-term process that requires organizational resources (Krajewski et al. 2009).

“What all of these internal supply chain members need to do is communicate and collaborate.” (McKeller 2014) The key success factor of SC and its integration is accurate and quick communication between supply chain partners (Farooqui 2010). Ivanov and Sokolov (2010) defined communication as building channels and links within and outside the organization. Effective information exchange enables cost reductions, value enhancement, and collaborative planning activities (Farooqui 2010). This is also supported by McKeller (2014), who stated that supply chain collaboration is one approach to reduce costs and create competitive advantages. For example, collaboration can mean joint business strategies, technological know-how sharing, or process synchronization (Ivanov & Sokolov 2010). It allows service improvements

through collaborative actions, such as joint planning, shipment tracking and tracing, order management, and invoice handling and payment. Achieving effective communication and collaboration requires well defined and maintained channels with clearly articulated roles and responsibilities. (Farooqui 2010) Besides cost reductions and value enhancement, the collaboration also allows access to wider knowledge and information as well as a greater likelihood of improvement and innovation (Waters 2007). Aligning goals, visibility of information and information sharing, utilizing metrics, appropriate resources, active communication, and trust between parties, are some of the most critical success factors that demand attention to accomplish well-functioning collaboration. If supply chain collaboration and communication are on a low-level, external collaboration and customer relationship management will be difficult. (McKeller 2014)

Customer relationship management means the managing of the relationship between an organization and its customers. Externally, it considers providing customer real-time information about operations that concerns them. (Farooqui 2010) Internally, it includes providing employees with the information and processes necessary to know their customers and understand their needs. Firms must focus on culture, relationships, and information flows to deliver internal and external customer service. For the internal purpose, customer relationship management can be defined as “the management of customer identification, acquisition, and communications directed toward simultaneously satisfying the customer value proposition while maximizing organizational performance”. (Eichorn 2004)

Determining mutual goals, establishing and maintaining good synergy, and producing positive feelings in the company and the customers are some of the important steps to build successful customer service and relationships. (Farooqui 2010) High-level internal customer service can be obtained by 1) understanding the service requirements of customers, and 2) ask customers to assess the service and its provider against the requirements. To develop customer service, even more, internal customer segmentation can be done to customize service offerings to match the needs of different user groups. Such segments can be e.g., technical, administrative, and clerical or executives, managers, and professional employees. (Marshall et al. 1998) Successful relationship management drives the focus from price to value, improves risk management (McKeller 2014), and lowers waste and costs (Marshall et al. 1998).

3.1.2 Risk management

Supply chain risk is an internal or external disruption that is not anticipated and might cause problems within SC operations. Supply chain risk management is a means to

identify and manage risk sources and prevent risks with appropriate actions to avoid or minimize disruptions. (Shahbaz et al. 2017) Ivanov et al. (2019) describe it as a methodological approach to manage uncertainty outcome. According to Faizal and Palaniappan (2014), supply chain risk management is a critical success factor due to several occurring trends: increase in outsourcing, globalization of markets, increasing reliance on supply networks, and the emergence of information technologies. Waters (2007) identified two kinds of risks in SC: 1) Internal risks that appear in normal operations and 2) external risks that come from outside the supply chain. As this thesis focuses on service function, important risks to acknowledge are *time risks* referring to delays in processes, and *information risks*, e.g., communication breakdown, information infrastructure complications, and distorted information leak (Quang and Hara 2017, cited in Ivanov et al. 2019).

McKinsey (Bailey et al. 2019) studied supply chain risk management and conducted a structured approach. The approach includes two types of risks, known and unknown. Known risks can be measured and managed over time with four steps: identifying and documenting, building an integrated risk management framework, monitoring risks, and a robust governance mechanism to review risks, define actions, and improve flexibility. Unknown risks are challenging to identify, but they can be mitigated through defence layers and risk-aware culture. Such layers are, for example, design quality, equipment health, oversight and assurance methods, risk-informed standardized processes, worker fundamentals, and organizational preparedness. Risk-aware culture includes acknowledgement of risks, risk mitigation transparency, responsiveness to changes, and respect where individuals do not take risks that benefit themselves but harm the organization. (Bailey et al. 2019)

3.1.3 Response time

Response time indicates a length of time between inquiry and response (Rubinstein 2012). For example, it may refer to customer order response time, service response time, product delivery time, or message response time (Hausman 2002). In SC, responsiveness means the good performance of response times within information and material flows. Responsiveness is the capability to respond to the demand of customers on appropriate conditions. (Javaid & Siddiqui 2018) According to Reichhart and Holweg (2007), the responsiveness of the SC is the velocity with which the SC can adjust its output in response to an external stimulus. Hausman (2002) determined response time as a key factor in developing a SC performance since it has a direct impact on competitiveness, and it is also a key metric in measuring flexibility. Response time and

total service time can also be used to measure service quality. Response time indicates the time in which the ticket is responded, and total service time indicates the time from the beginning to the end of ticket processing. (Bober 2014) Response time can be improved by creating visibility to current response time as well as minimizing variability and waste in processes (Mallali et al. 2019). The main issue in aiming for fast response times is an increased probability of doing mistakes (Rubenstein 2002), but it can be prevented with optimal allocation of workload in the organization (Vidyarthi et al. 2009).

The role of message response time in creating customer satisfaction is demonstrated in the response model created by Min et al. (2014). According to the model, customer satisfaction consists of three dimensions, the quick response being one of those. The model is presented in Figure 5.

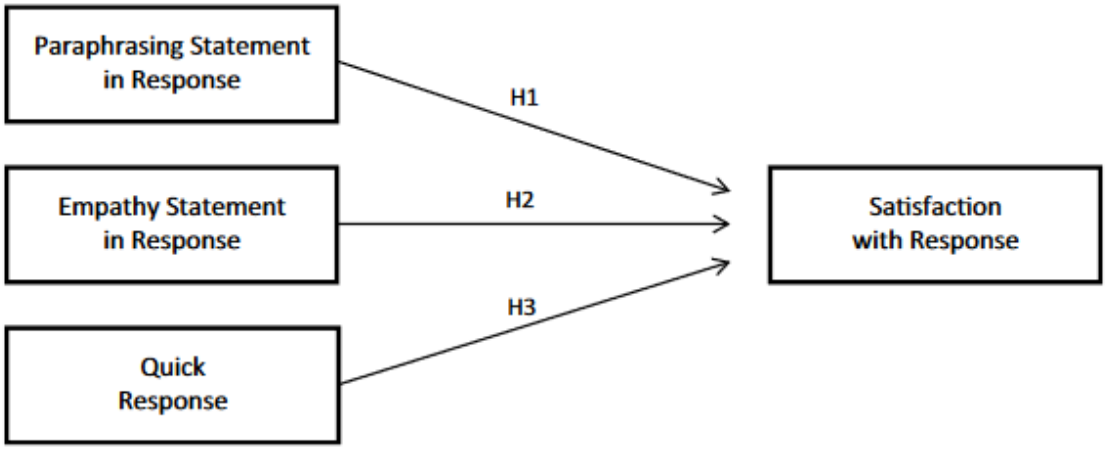

Figure 5: Response model (Min et al. 2014)

The first dimension in the model is paraphrasing statement. It is meant to signal the customer that their voice is taken seriously. The importance of paraphrasing the customer's message is based on active emphatic listening. (Min et al. 2014) Responding, sensing, and processing is the three elements of the theory, but responding is the only dimension that can be perceived by the customer and therefore paraphrasing is important (Drollinger et al. 2006). This is also supported by interactional justice theory, which states that paraphrasing the main message demonstrates effort and care to a customer (Gruber 2011, cited in Min et al. 2014). Customer contacts occurring online excludes the possibility of using nonverbal cues of active listening meaning that paraphrasing is the only solution to express seriousness and care. Based on the results of research done by Min et al., paraphrasing a statement is statistically significant on customer satisfaction. (Min et al. 2014)

The empathy statement is the second dimension in the model. Empathy is an important factor for understanding and satisfying customer needs (Min et al. 2014), which increases perceived service quality (Bahadur et al. 2018). It is defined as an ability to sense another's feelings and experiences and to react accordingly to experiences observed by another person. (Bahadur et al. 2018) Empathy is a way to communicate individual attention and care to customers. In addition, it is a critical component when responding to complaints as it can ease anger and dissatisfaction. Interactional justice theory states that customers evaluate a recovery effort by how they are treated during problematic situations. Based on the results of research conducted by Min et al., empathy has a significant effect on customer satisfaction. (Min et al. 2014) On the contrary, lack of empathy impacts service encounter negatively and causes dissatisfaction (Bahadur et al. 2018).

The last dimension in the model is the quick response. The importance of prompt response has been emphasized in several studies. For example, a quick response is an efficient mechanism to convert customer complaint into successful service recovery and restore customer satisfaction. A prompt response indicates to the customer that the organization accepts the responsibility and on the contrary, a delayed response can imply a lack of concern, thereby causing dissatisfaction and negative emotional states. However, based on the study, fast response time does not have significantly increase customer satisfaction. (Min et al. 2014) Nevertheless, the speed of response is related to the efficiency of the service provider. The delayed response causes dissatisfaction and implies inefficiency, thus minimizing waiting time is important and beneficial in the bigger picture. (Wirtz & Mattila 2003; Min et al. 2014; Darko et al. 2018) Also, an effective and quick response to customer needs is one of the major sources to obtain sustainable competitiveness. (Jahanshahi et al. 2019)

3.2 Logistics management

Logistics is an enabler of successful SCM (Sople 2012; McKeller 2014). Logistics management is a SCM function that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services and information between the source and endpoint to fulfil the customers' demands (Zijm et al. 2019). In all simplicity, logistics aims at filling the gaps between partners of the SC (McKeller 2014) by the integration of activities across business processes (Islam et al. 2013). It is "the process of strategically managing procurement, movement and storage of materials, parts and finished inventory, and the related information flows through the organization and its marketing channels in such way that current and future profitability are maximized

through the cost-effective fulfilment of orders" (Christopher 2016). The purpose of logistics management is to satisfy customers most efficiently by balancing between customer service and costs (e.g. Christopher 2016; Sople 2012; Martinsuo et al. 2016).

Sople (2012) considers logistics and its components as a link between marketplace and supply base. According to Islam et al. (2013), these components are transportation, warehousing, inventory management, packaging, and information processing. In addition, Sakki (2014) and Zijm et al. (2019) mentioned monitoring as a critical component. The elements of logistics management are not fully based on operational activities, as Zijm et al. (2019) defined the management of third-party logistics service providers and the design of logistics network as a key task. Sople (2012) created a logistics system model in which the main components are introduced. The model is presented in Figure 6.

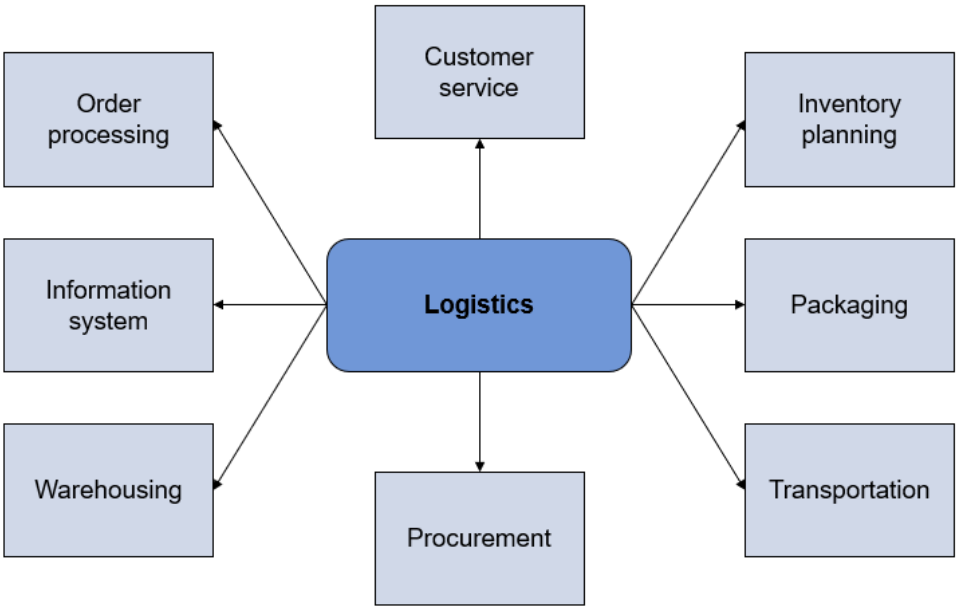

Figure 6: Logistics system components (Adapted from Sople 2012)

Supply chain and logistics management should not be separated as cost-effectiveness and customer satisfaction in SC are impossible to obtain without efficient key components presented in the above figure. At the micro-level, logistics has a great role in delivering value to the customer. The success of delivering value depends on the integration between logistics and the SC. (Sople 2012) The diversity of components not only emphasizes the skill of coordinating various tasks and material movement, but also the management of information flows and therefore an integration plays a significant role. The emphasis of information management is well described as Waters (2007) stated that logistics managers often describe themselves as processing information rather than moving goods.

To avoid ambiguity, Christopher (2016) introduced a logistics management process model that describes the main functions and flows. The model is presented in Figure 7.

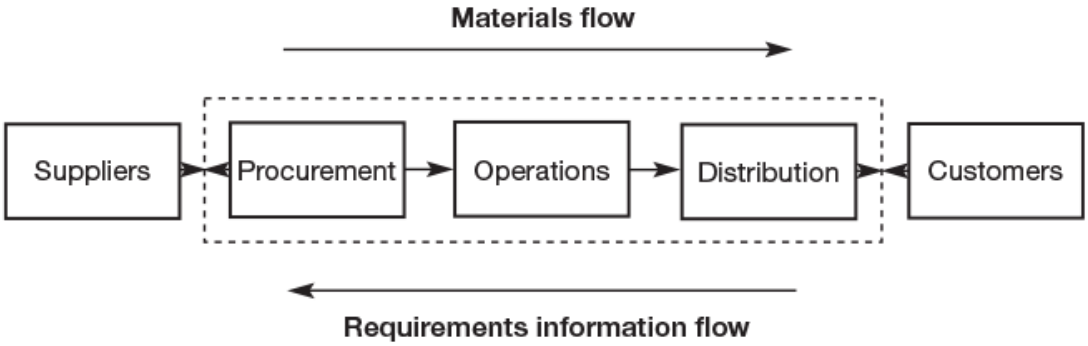

Figure 7: Logistics management process (Christopher 2016)

The model illustrates an integrated process of various actors where the needs of the customer are satisfied through the coordination of the material and information flows that cover the whole entity of marketplace, SC operations, and partners. The mission of logistics management is to create a framework through which the needs of the marketplace can be translated into a supply chain strategy and plan. (Christopher 2016) Unlike in the above process model, the flows are not necessarily limited to a specific direction. In addition, information and material flows are not only major flows in logistics and SCM as there are other major flows identified as well. (Krishna 2016)

To summarize, logistics management is an integrating function that is built on appropriate information infrastructure and ideally synchronized with other functions (Zijm et al. 2019). The core of logistics and SCM is the management of material, information, and financial flows that are related to order processing and monitoring, planning, exceptions, sales, procurement, financial management, material management, transportation, warehousing, manufacturing, document creation and processing, invoice handling, processing, and payment. (Sakki 2014)

3.3 Major flows in supply chain and logistics

The main flows of the SC are material, information, and cash flows (e.g. Farooqui 2010; McKeller 2014; Sakki 2014; Walker 2016). Also, McKeller (2014) and Krishna (2016) introduced value flow as a major flow. Besides those flows, Krishna (2016) additionally defined the flow of risk as a major flow. The flows of a SC are not limited to a specific direction as they are considered to move upstream and downstream (e.g. McKeller 2014; Krishna 2016; Paksoy et al. 2020). Due to the ambiguity of flows, Waters (2007) stated that everything an organization moves can be considered as material, whether it is raw materials, finished products, people, knowledge, money, or anything else. The ambiguity

is based on the definition of SCM, which is defined as the management various flows in the supply chain (Paksoy et al. 2020), and that's why the identified amount and type of flows depends on one's perspective. Thus, the major flows can be considered as categories that include different objects (Zijm et al. 2019)

However, the management of flows in SC has a vital role in business success as every transaction toward a physical exchange of goods or service involves flows of information, material, and money. (Rahman & Qureshi 2007) According to various authors, the integration of supply chain's flows is crucial as their integration enables the improvement of efficiency to attain better SC competitiveness, and therefore companies should focus on 1) integrating the major flows and 2) managing those integrated flows. (e.g. Rahman & Qureshi 2007; Zijm et al. 2019; Kolinski et al. 2020)

The flows selected for further exploration in this study are information, value, cash, and material flows. The flow of risk is excluded as risk management in SC was introduced in an earlier chapter.

3.3.1 Information flow

To understand the topic properly, explaining the definitions of information, data and knowledge are needed. Data refers to single pieces of information without any specific meaning. Data is usually non-organized, qualitative items. Information is processed data that has structure, purpose, and value to the recipient. Information is usually, but not always qualitative, whence the recipient can draw conclusions and implications. Finally, knowledge is constituted by processing and organizing data and information to deliver humane understanding, expertise, and accumulated learning. (Rainer et al. 2017; Laihonen et al. 2013)

Information flow is bidirectional communication between persons, functions, or organizations (Durugbo et al. 2014). It is argued that information flow is a factor that enables the existence of other flows (Bozarth & Hanfield 2013). As an example, information flow may indicate a situation, where information exchange process occurs between customer service and customer, in which the customer transmits an order (enabling the material flow), receives updates on the status of their order, and after the completion of delivery pays the invoice (enabling the cash flow). (Rahman & Qureshi 2007; Bozarth & Hanfield 2013; Durugbo et al. 2014) Information flow covers the access, exchange, and documentation of information and therefore, it considers all transactions related to processing data, information, and knowledge. (Durugbo et al. 2014) Other practical examples of information flows are invoices, schedules, supplier and customer information, and descriptions and pricing (Krishna 2016).

In an information's context, the integration of flow means how a company shares information with its partners utilizing different channels and systems. Integration of information flow among various actors in SC enables better traceability of product with regards to its quality and safety. (Durugbo et al. 2014) The integration is achieved when all parties share information and have a lucid vision of activities throughout the chain (Waters 2007). According to Ivanov et al. (2019), a successful information flow is a factor that also integrates material flow and information technology to leverage suppliers, manufacturers, customers, and partners in a SC. Thereby, the utilization of information systems is a key enabler in achieving the integration of flows (Durugbo et al. 2014). However, there is always underlying risks when things are shared more openly. In this case, when the information is distributed more widely, there is an increased chance of leaking the information to unwanted parties (Waters 2007). Therefore, being aware of the risk is important requiring companies to find a balance between completeness and partialness when coordinating the information flows (Durugbo et al. 2014).

Achieving better competitiveness among a company is the reason why the management of information flows is emphasized. Successful and well-organized information flows enable competitive advantages to individuals in SC through time, cost, and worry savings. Also, efficient information flows improve the transparency in SC enabling better visibility into other parts. Besides these benefits, effective and integrated information flows also grant companies access to wider knowledge as more organizations are involved with their valuable intellectual assets (Waters 2007). When a company wants to achieve those benefits, it should aim at improving the quality of information flows. Developing the quality of information flow should focus on the usefulness of information rather than the amount and speed as they have little effect on the quality (Mahto & Davis 2012). Quality can be evaluated through form, flexibility, accuracy, timeliness, and reliability of the flow. Before being able to develop quality, a company needs to identify its information needs. (Bozarth & Hanfield 2013)

Internal SC information flows can be classified into four different levels making the identification of information needs easier: execution and transaction processing, routine decision-making, tactical planning, and strategic decision-making. On an execution and transaction level, information flows consist of information that is necessary to execute and control other flows. On a routine decision-making level, information flow is mainly in a supportive role, for example forecasting with the help of an inventory management system. On a tactical planning level, information flows have a timeframe from months to a year. The flow must be in a form that is understandable from different perspectives. Finally, on a strategic decision-making level, information flow usually includes patterns,

relations, and comparisons of data from various sources. Again, information needs to be easily interpreted and flexible as strategic interests' changes. Classifying internal information flows enables the organization to manage and develop its information flows more efficiently and effectively. Achieving efficient internal information flows is required before an organization can improve its external information flows. (Bozarth & Hanfield 2013)

3.3.2 Value flow

Different SC operations are value-adding activities, where different stakeholders provide and add their value to create a valuable object that satisfies the market. These value-creating activities occur at SC stages, making the value move and creating the flow of value (Krishna 2016). This approach was constructed many decades ago by Porter, who introduced the value chain perspective. The perspective aims to understand how each actor and activity provides and effects the final value. (Simatupang et al. 2017) Porter determined two types of value-creating activities: primary and support activities. Primary activities are the actions that directly add value to the production of the object and support activities that provide indirect influence on the final value of the object. Defining whether the activity is primary or supportive helps in understanding how the process creates and adds value. The value flow can be bidirectional, and it depends on the value creation perspective. In some cases, the value can be created for stakeholders instead of customers. (Kumar & Rajeev 2016)

The efficiency of value flow is defined by how various value-adding activities from the source to the downstream are done. Costs, risks, and profits are the actors that define the performance of value flow. (Kumar & Rajeev 2016) However, identifying the actions in SC that has an important role in delivering a successful and satisfying object to the customer is required to improve the performance of value flow (Kaplinsky & Morris 2001). Reaching optimized individual processes across SC will lead to optimized value flow, customer satisfaction, and increased SC competitiveness. (Simatupang et al. 2017).

Chen et al. (2010a) and Salunke and Hebbar (2015) describes the value stream as a collection of activities that add value to a product. Thus, the value stream and value flow have the same definition. According to Majunath et al. (2014), the value stream includes everything that is required to deliver an object to the hands of the customer. The definition implicates that also both, information and material flows are parts of the value stream. Defining value flow as a value stream enables organizations to understand and develop value flows more thoroughly by utilizing the value stream mapping tool. Value stream mapping is used to investigate value streams to 1) understand the value from the

customer's perspective, 2) identify value flows, 3) eliminate waste in processes and 4) reach the optimized value flow stage. (Chen et al. 2010a; Majunath et al. 2014; Salunke & Hebbar 2015)

3.3.3 Cash flow

Financial flow is the counterpart of material flow (Jahangiri & Cecelja 2014). It refers to compensation paid for products and services. In the SC, the ultimate customer is usually the source of capital. When a customer submits payment for desired goods, it launches the upstream flow of cash through the SC. However, also investments and costs (payables) are considered as a monetary flow. Investments and costs cause the money to flow downstream, making the cash flow bidirectional. The definition of cash flow implicates that there wouldn't be material and information flows as cash flow is always compensation for something. (Jahangiri & Cecelja 2014; Krishna 2016) Gaining efficiency in inventory, process, and cash management is often the driver, why cash flows are managed in SC. These three areas affect the free working capital of a company and therefore is an important topic. (Pfohl & Gomm 2009)

However, cash flow is not merely "real" money moving in the supply chain. Also, payment schedules, credit terms, consignment arrangements as well as title ownership are considered as financial flow (Rahman & Qureshi 2007; Sakki 2014). Thereby, the role of cash flow is vital for business performance and understanding the cash flow is crucial in decision-making situations. For example, monetary flows can be used to evaluate SC partners and make decisions. Examining financial flows can unveil insufficient financial strength that increases business risks and might cause problems to other parties in the chain. (Leng & Zailani 2012) The more efficient the cash flow is, the better the business performance is. The efficiency is determined by how well an organization manages its material and information flows. Effective utilization of information flows to effectively manage and execute material flows enables the company to achieve an efficient, competitive, and healthy cash flow. (Leng & Zailani 2012; Jahangiri & Cecelja 2014)

Pfohl and Gomm (2009) introduced a SC finance model to understand and finally optimize financial flows. In the model, financial flow consists of three key elements, actors, objects, and levers. The model focuses on defining which assets are financed by whom and on what terms. Each of these three elements has critical factors. The model is presented in Figure 8.

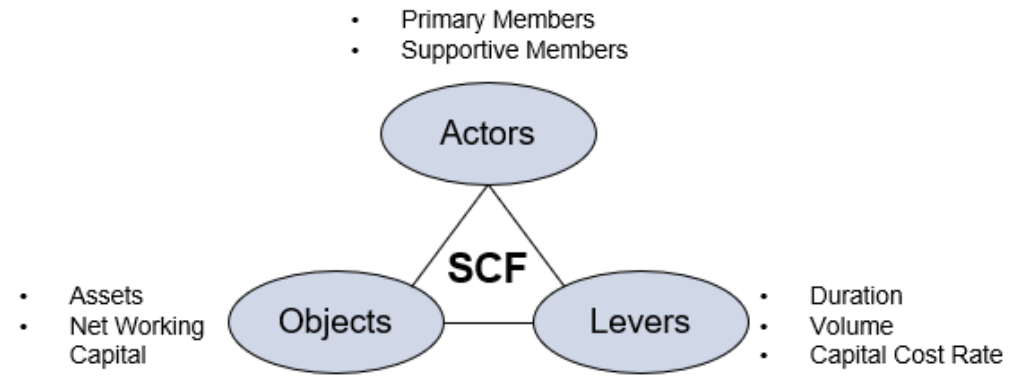

Figure 8: Framework of supply chain finance (Adapted from Pfohl & Gomm 2009)

To properly understand cash flows, companies need to identify the actors that can have a role in financing (Pfohl & Gomm 2009). These actors can be distinguished into primary members and supportive members. Primary actors consider suppliers, customers, and the company itself. Supportive members are other partners, such as parties providing different services. (Lamber et al. 1998, cited in Pfohl & Gomm 2009) Besides those, insurance brokers, leasing companies, banking houses, investors, stock markets, and rating agencies produce capital flows. Their contribution can be monetary, informative, or both. (Pfohl & Gomm 2009)

The objects refer to all kinds of assets that have a vital role in performing business operations and producing working capital. For example, warehouses are one type of assets that are vital to enable a logistics network. Objects that produce working capital refers to goods that can be transformed into financial resources in a reasonable timeframe. The performance of objects can be measured with the time between paying the supplier for their services and receiving the compensation for the end product from the customer. This measure is called cash-to-cash-cycle. (Pfohl & Gomm 2009)

The levers element focuses on answering how long, what amount, and on what cost rates the assets need to be financed. The element indicates capital costs, which is the amount of money that a company is required to generate to cover the costs and become profitable. (Pfohl & Gomm 2009) From a company's capital cost viewpoint, the faster information and material flows are, the less the capital costs of goods are. This is because the company is alone responsible for managing the capital costs as, for example, logistics service providers don't carry the capital costs of the goods, but the final capital costs are dependent on the duration of their services. (Gong & Cullinane 2018)

3.3.4 Material flow

Material flow is a physical flow that refers to the movement of raw materials, finished products, and services from the source to the point of consumption (Rahman & Qureshi 2007). Also, input materials and services that are vital in providing customer service, should also be considered as material flow (Krishna 2016). Managing material flows is a critical strategic success factor in enhancing superior value for SC partners and customers (Leng & Zailani 2012). Material flow is mainly moving downstream, but since there is also reverse flows, such as product returns, the flow is bidirectional (Krishna 2016).

Warehousing, transportation, and logistical decisions are strongly related to physical flows as these activities are needed to execute the flow. Understanding the movement of goods enables the coordination of the flow through the SC. (Bozarth & Handfield 2013) Precise coordination is vital as the speed at which the material moves through the supply chain determines the efficiency of the chain (Harrison & Hoek 2008), and the movement of products cause costs to the company (Leng & Zailani 2012). To be able to develop and maintain a sufficient level of coordination, monitoring the flow is also required as it provides essential information (Paksoy et al. 2020).

Monitoring material flows reduces risks in transportation as better visibility enables easier management of order and transportation processes. Thorough management has a significant contribution to the flow of materials to the end-consumer at the right time, place, and quality, which leads to shorter lead times and better on-time delivery performance. (Paksoy et al. 2020) Well-coordinated, efficient, and continuous flows also reduce transportation costs and prevent local inventory build-ups during different stages lowering inventory-related costs (Harrison & Hoek 2008). Besides those benefits, effective material flows also have a significant part in increasing the knowledge of the entire supply chain (Zijm et al. 2019) as well as determining the operational flexibility of the network (Bozarth & Handfield 2013).

When a company wants to coordinate and monitor its material flows, it is required to exploit information. Beneficial usage of information requires a company to find a balance between shared information volume and material flow execution flexibility. For this purpose, Kaipia (2009) created a framework that is presented in Figure 9.

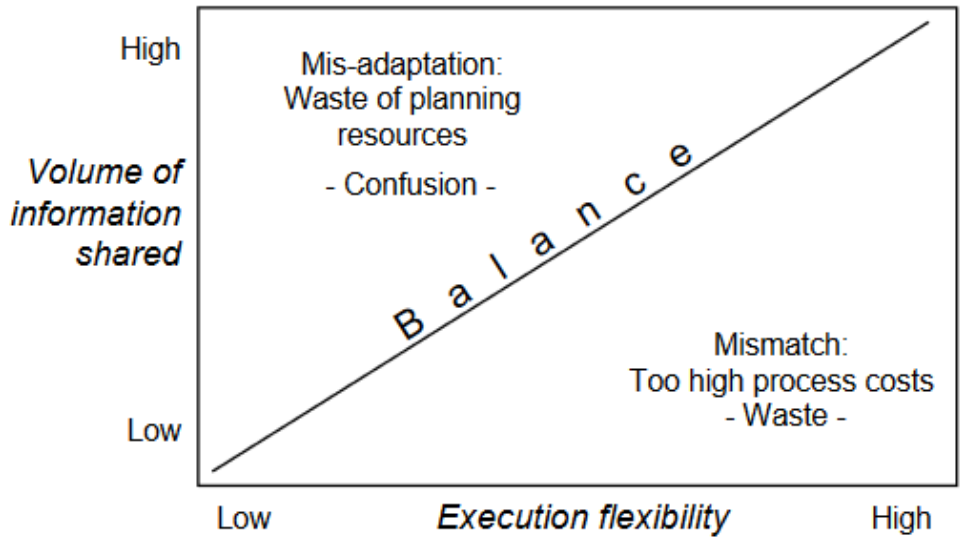

Figure 9: Volume of information shared and execution flexibility framework (Kaipia 2009)

The execution flexibility on the x-axis refers to the flexibility of material flows. Flexibility means the ability to adapt to changing customer demands indicating timing and quantity changes as well as the responsiveness of SC. Higher flexibility level might cause waste and increased process costs across the chain, but on the other hand, it enables better transparency and visibility through the chain with a higher volume of information flows. (Kaipia 2009)

On the y-axis, information flow is described as the volume of information shared. It includes the speed, frequency, and amount of information flow. It is stated as a volume of information shared because it's meant to describe the existence, extent, and availability of data. The high volume of information enables higher flexibility of material flow, but at the same time, it exposes confusion and waste in resources. (Kaipia 2009)

The framework proposes that flexible material flows should be supported with appropriate information flows. Better flexibility demands a higher volume of information flows, but neither of those should be raised alone and without a purpose. (Kaipia 2009)

3.4 Management and coordination mechanisms

Management mechanisms facilitate SC partners to maintain effective relationships and increase SC efficiency. These mechanisms can be divided into three groups with different goals: sharing decision responsibilities to best-positioned SC partners, sharing information, and synchronizing operations to meet market demands. (Kaipia 2007) Effective relationships between partners in a SC provide a basis for ensuring high-level management of flows in the SC and logistics. Well-coordinated flows support maximizing

customer value and providing a profit for all partners in the network. However, proper use of management mechanisms is required to align local and individual decisions with global objectives. On a local level, processes should be optimized, but to be able to achieve efficient usage of global resources, minimized total costs, superior customer service, and long-term benefits in the SC require individual partners to have a complete focus on overall system performance. (Fugate et al. 2006)

Management mechanisms are means to handle problems, execute daily operations, and achieve desired outcomes. For example, the multi-functional involvement of stakeholders, standardization of processes, and technology are the tools that help in managing the SC. (Fugate et al. 2006) Today, the critical success factor and coordination mechanism is information technology. It enables the elaborate, easy, and more accurate gathering, processing, and analyzing of data. The data is then transformed into information which allows information sharing and supports decision-making. (Neubert et al. 2004) According to McKinsey (Alicke et al. 2016a), the most valuable digital tools are planning, physical flow, order management, performance management, and collaboration systems.

3.4.1 Business intelligence and analytics

Today, data, information, knowledge, and intellectual capital have a significant role in organizations. These intangible resources are the source of power in companies instead of land, finance, and material capital. Thereby, organizations that can utilize these assets in their business will have an increased chance of success. (Olszak 2020)

The definition of Business Intelligence (BI) is ambiguous as it is multidimensional (Olszak 2020), and some define it as a managerial approach to support decision-making while others consider it as a technical approach (Isik et al. 2011). Despite the complexity of the term, BI is a system that covers an integrated set of tools, processes, and technologies to collect, integrate, analyze, and distribute data from various data streams. These actions have a major role in supporting, improving, and optimizing operational and strategic decision-making in organizations (e.g. Negash 2004; Chen et al. 2010b; Isik et al. 2011; Azeroual & Theel 2018). The main goal of BI is to produce valuable and easily accessible insights about business and its performance. Besides, allowing managers and analysts to create analyses and perform actions is an important goal (Chen et al. 2010b). Thereby, McKinsey (Alicke et al. 2016b) classified business intelligence and analytics as a supply chain planning mechanism. To understand the main goals, steps, and effects of BI and analytics, Olszak (2020) constructed a simplified model that is presented in Figure 10.

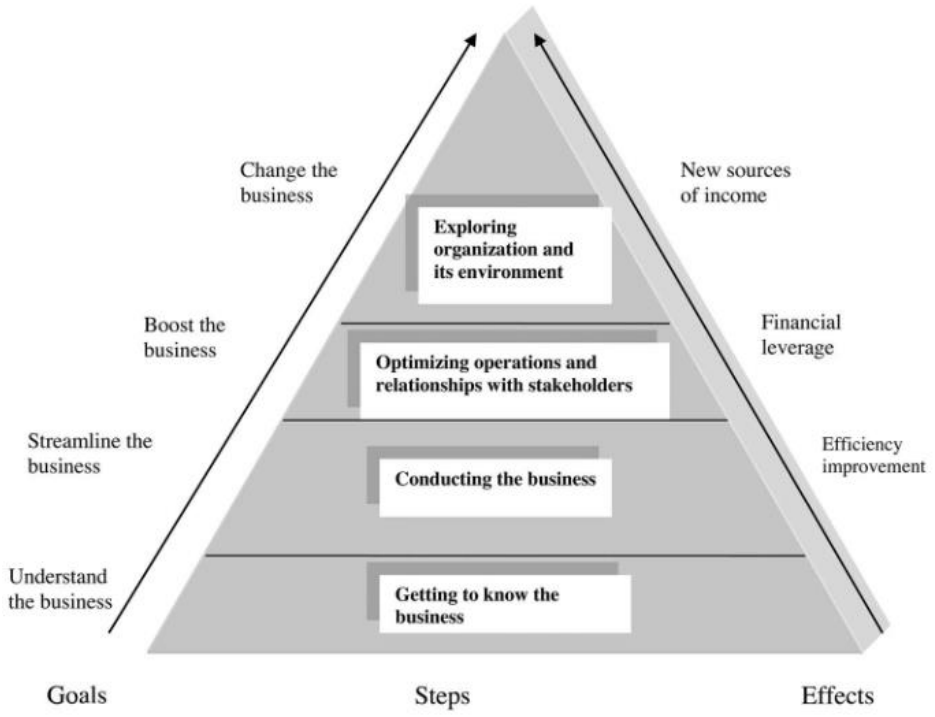

Figure 10: Business Intelligence role in business development (Olszak 2020)

Value providing insights aims at streamlining processes, improving customer relationship management, monitoring business ecosystems, or detecting business failures (Olszak 2020). BI requires historical and current data as answers for “what” and “how” is sought. As the term BI indicates, these questions focus on investigating how well business objectives are reached or how well specific business processes perform. However, BI cannot alone answer all questions. For example, answering the question “why” often requires analytics to enhance decision-making. (Bulusu & Abellera 2021)

According to McKinsey (Alicke et al. 2016b), analytics is used to apply statistical methods to data from various sources to create a deeper vision into operations and strategic choices. It is contrasted to BI because it deals with the “why’s”, focuses on providing an understanding of solutions that are needed or will be needed (Bulusu & Abellera 2021), and is considered as the analysis part of BI (Watson 2013). Utilizing analytics means enabling visualization and reporting capabilities for all users to support their daily tasks and decisions (Isik et al. 2011). Various authors classify analytics differently into distinct categories, but descriptive, diagnostic, predictive, and prescriptive analytics are the most typical maturity levels (Gartner 2012, cited in Widjaja 2020; Watson 2013; Krol & Zdonek 2020; Bulusu & Allera 2021). This classification is done by evaluating tools, techniques, and approach (Krol & Zdonek 2020). The value and difficulty of analytics depend on the established level of analytics. The higher level of analytics is executed, the more value it provides, but at the same time, it becomes more complex, requiring more resources.

(Widjaja 2020) Gartner's analytic ascendancy model and the most common levels of analytics are presented in Figure 11.

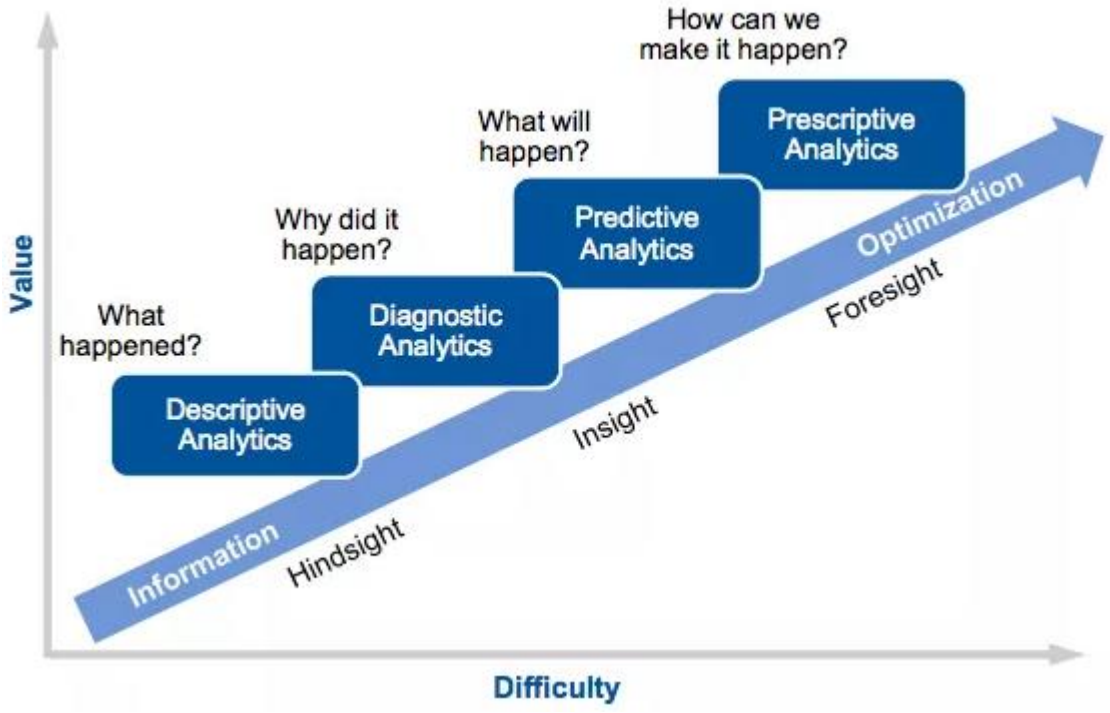

Figure 11: Gartner Analytic Ascendancy Model (Widjaja 2020)

Descriptive analytics is the lowest maturity level. It focuses on answering the question "what happened" to provide an understanding of the performance, efficiency, and effectiveness of the business and operations. (Krol & Zdonek 2020) Descriptive analytics is usually data visualization, dashboards, and reporting capabilities. These applications are the most common practices of BI. (Watson 2013)

Diagnostic analytics focuses on utilizing historical data to answer the question "what went wrong and why did it happen" (Olubunmi & Amos 2019). It enables organizations to detect cause-effect links, relations and regularities between variables providing a deeper understanding of business than descriptive analytics. (Krol & Zdonek 2020) This kind of information allows management to make decisions and take corrective actions (Olubunmi & Amos 2019).

Simulation, advanced statistics, machine learning, and forecasts are methods to execute predictive analytics. Predictive analytics requires both current and historical data. With data and advanced algorithms, it answers the question "what will happen", and therefore is considered as advanced analytics. Predictive analytics aims to find hidden relationships, project patterns and forecast the possibility of future outcomes. (Watson 2013; Olubunmi & Amos 2019; Krol & Zdonek 2020)

Prescriptive analytics is to understand what should be done in future. The main tools and techniques to execute prescriptive analytics are machine learning, simulation, and data mining. The emphasis of answering the question “what should occur in the future” is to optimize the whole business and thus the revenues. (Watson 2013; Krol & Zdonek 2020)

According to Sangar & Iahad (2013), the most presented BI and analytics process models are cyclical with various stages. These process models define the main steps to transform information into intelligence to support decision-making. They presented a cyclic process model that is presented in Figure 12. The model concludes the main stages of BI and analytics process models.

Figure 12: Business intelligence and analytics process (Sangar & Iahad 2013)

According to the model, the main steps of the process are: 1) defining information needs and key intelligence topics, 2) collecting data and information, 3) refining collected data and information, 4) analyzing and interpreting processed data, 5) distributing intelligence to whom it provides value, and 6) utilizing the intelligence to enhance decision-making and develop the business as well as develop the BI and analytics process with received feedback. (Sangar & Iahad 2013)

3.4.2 Information systems

Information systems (IS) enable organizations to develop their flexibility and responsiveness. Modern business ecosystems demand organizations to utilize information systems to obtain effective and efficient SC activities. (Zijm et al. 2019) IS are used in customer-focused and internal operations to manage assets effectively, exchange information and increase the internal and external visibility of operations to

strengthen the cooperation and linkages between organizations. (Christopher 2016; Zijm et al. 2019; Paksoy et al. 2021) According to Zijm et al. (2019) and Paksoy et al. (2021), the most common IS used for those purposes in the SC are enterprise resource planning (ERP), customer relationship management, and data analytics tools.

As mentioned earlier, changing customer needs emphasizes the ability to exploit the functionalities of IS as a part of daily operations. Effective usage of IS enables the execution of daily SC activities, ad hoc and real-time planning, instantaneous end-to-end visibility, reduced lead times, increased automation levels, and versatile service offerings to customers. (Alicke et al. 2016a) Achieving those benefits requires distribution, warehouse, order, transportation, inventory, and document management capabilities (Zijm et al. 2019), as well as exploiting operational data and optimizing integrated processes (Alicke et al. 2016a).

Zijm et al. (2019) presented a concept of control towers where information systems are utilized to manage logistics and SC activities in real-time. They highlighted that the concept requires IS to have present information about orders, condition of operations, current inventory levels, possible problems and risks, routes, and progress of deliveries. Maintaining a wide range of information requires the usage of various integrated systems such as ERP, analytical decision support (Zijm et al. 2019), warehouse management, transportation management (Paksoy et al. 2021), order management, and collaboration systems (Alicke et al. 2016a).

McKinsey (Alicke et al. 2016a) classified the benefits of exploiting IS in SC into four categories. The categories are service, cost, capital, and agility, and they are presented in Figure 13.

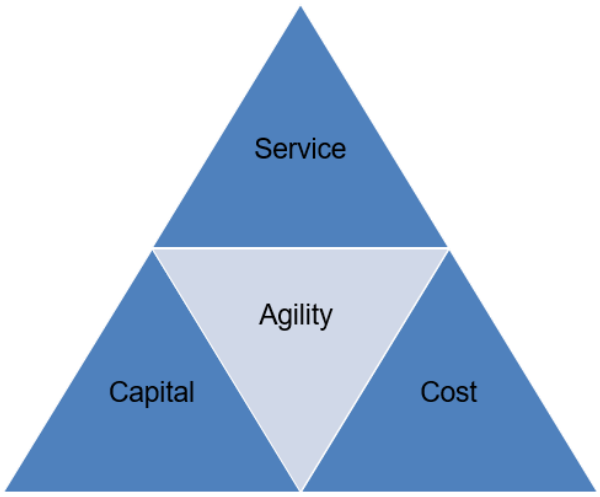

Figure 13: Supply chain potential benefit categories (Adapted from Alicke et al. 2016a)

Service benefits mainly refer to customer service improvements. Appropriate IS capabilities enable organizations to maintain higher customer service level. It is obtained with present and versatile information combined with better end-to-end visibility throughout the supply chain. Also, superior IS usage enables companies to develop better and more customer-focused service offerings. (Alicke et al. 2016a)

Cost benefits are cost reductions in warehousing and transportation. Those reductions are achieved by optimizing warehousing and transportation processes. Optimizing these functions require the usage of analytics, management of supply network, minimizing touchpoints and kilometres driven, dynamic routing, and crowdsourced transport capacity while meeting the required customer service level. (Alicke et al. 2016a)

Capital benefits are achieved through decreased inventory levels by reducing uncertainty. Usage of IS enables superior forecasting and planning that helps in lowering safety stock levels. Better visibility and increased collaboration lower replenishment lead times and thus lower inventory levels and extend working capital. (Alicke et al. 2016a)

Increased overall agility of SC is achieved through the previously mentioned three benefits. Increased agility helps the whole SC mitigate risks, achieve better responsiveness, and gain a better competitive advantage. (Alicke et al. 2016a) Deloitte (Mussomeli et al. 2016) introduced a digital supply networks model (see Figure 14) that enables achieving the same benefits that were introduced by McKinsey and can therefore be contrasted to SC agility.

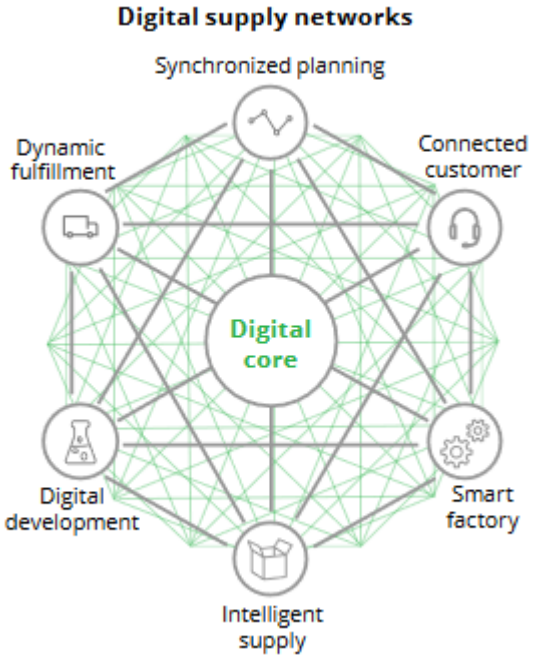

Figure 14: Digital supply networks model (Mussomeli et al. 2016)

The digital core in the model refers to external connectivity, superior data architecture, as well as advanced systems and applications in the SC. The digital core transforms the SC into a supply network where stakeholders, partners, and activities (nodes) are digitally connected. In a digital supply network, real-time data is in the centre, enabling agility, a connected network, intelligent optimization, end-to-end transparency, and holistic decision-making. (Mussomeli et al. 2016)

However, achieving those benefits demands a lot of effort from organizations. Gathering, processing, and utilizing current and historical data from various sources is required to increase responsiveness. Continuous and real-time collaboration with different stakeholders and customers is required to achieve better visibility and valuable insights about operations. The active connection between humans, machines, analytics, and actions is needed to discover the best decisions and solutions. Real-time tracking and tracing are required to improve end-to-end transparency to the main aspects of the network. Finally, breaking functional silos and high-level utilization of relevant information is necessary to enhance decision-making for the network as a whole. (Mussomeli et al. 2016)

Deloitte (Mussomeli et al. 2016) presented a continuous cyclic physical-to-digital-to-physical model that concludes the meaning of digital supply network and helps to understand the connection between physical and digital worlds. The model is presented in Figure 15.

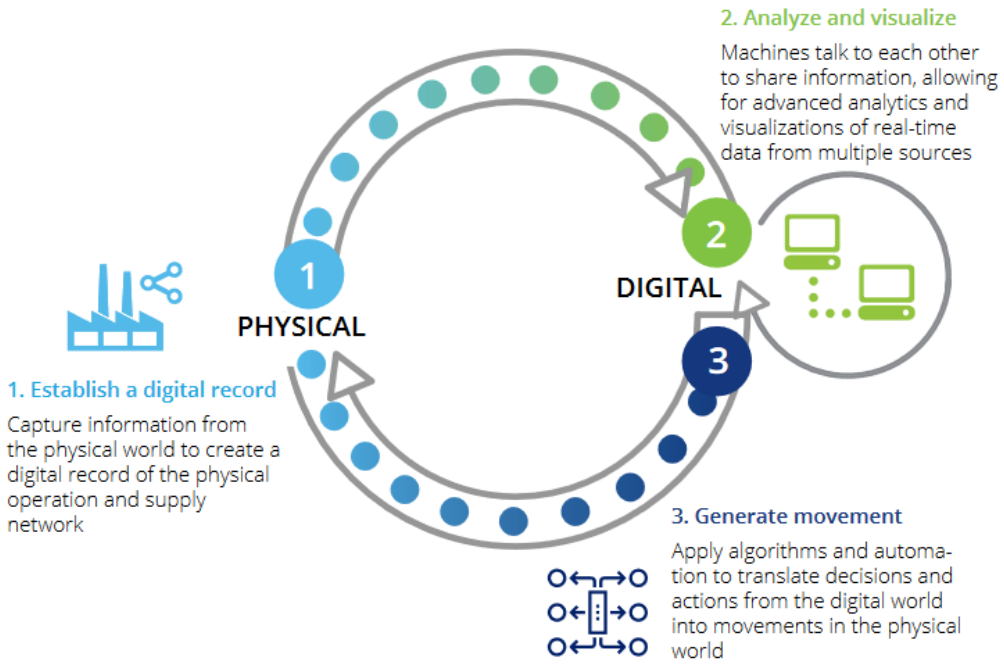

Figure 15: Physical-to-digital-to-physical loop (Mussomeli et al. 2016)

The loop starts from the physical world, where information and data are first gathered and then processed. After processing the data, a digital record of the physical activities and supply network is created (step 1), where the movement from the physical world to the digital world happens (step 2). Loop continues moving from digital (step 2) to digital (step 3), where information is shared across the network. Information from various sources combined with analytical tools enables one to interpret valuable insights and make enhanced decisions. Finally, the loop moves from digital (step 3) to physical (step 1). The digital-world insights and decisions are exploited in the physical world to develop activities and implement data-driven changes. After the loop is complete, the process starts from the beginning. (Mussomeli et al. 2016)

3.4.3 Processes

The process is a structured set of tasks and activities that lead to the desired outcome. These activities begin with well-defined inputs and end with specific outputs. These outputs create benefits and value for customer, user group, or market. Processes consist of structure, focus, measurement, ownership, and customers. When costs are reduced or, customer satisfaction increased, the process is enhanced. (Davenport 1992)

The emphasis on managing processes is related to its linkage with business performance. The process approach to business defines how daily operations are executed and therefore is a critical success factor. (Davenport 1992) Developing maturity and capability of processes improves an organization's agility and flexibility. Thereby it enhances the ability to react to changing business ecosystems and maintain business performance (Bititci et al. 2011). According to Davenport (1992), developing and maintaining efficient business processes is vital if companies are willing to offer quality products and services for their customers. Achieving and maintaining efficient business processes are requires continuous analysis of current processes, redesigning those processes, and implementing the changes and new actions. The business process development can be done either with a process improvement approach or, process re-engineering approach (Brocke & Roswemann 2014).

Business process improvement

Business process improvement refers to an approach where business processes are analyzed and improved (Brocke & Roswemann 2014). The analysis is to understand what, why, and how of the process. It also focuses on discovering relationships between people, processes and technology, and developing a better understanding of the processes and the desired outcomes. Business process improvement can be either incremental or continuous process. Despite, if it's a continuous or incremental process,

it must be done with the organization's vision and objectives in the centre. The improvement process should focus on enhancing customer satisfaction, flexibility, profit, competitiveness or operational costs. The business process improvement process can be done in six phases (see Figure 16). (Attong & Metz 2013)

Figure 16: Business process improvement phases (adapted from Attong & Metz 2013)

Menken (2009) concluded the above six phases into three simple actions, define an area for improvement, conduct present state analysis and define the objective, and finally implement the changes. The first step by Menden is the same as the first phase from Attong and Metz (2013) model, which is to determine the process and the team that is concerned by the upcoming improvement. After determining those, defining the project scope and mandate is needed to complete the first phase.

The second step by Menden (2009) includes the second and third phases from Attong and Metz (2013) model. In the second phase, defining the reasons behind the change and creating a change management plan is required. After those are completed, a stakeholder analysis should be done to identify related stakeholders and understand their interests, risks, and opportunities. Understanding those elements are required to have a successful discussion about upcoming changes. The third phase by Attong and Metz (2013) is defining and planning phase, in which common objectives are defined, and an action plan is created.

The third and final step by Menden (2009) includes the fourth and fifth phases from Attong & Metz (2013), in which the fourth phase is the actual action phase where the process improvement itself is done. The fifth phase includes generating a commitment from the project team and stakeholders to implement the changes into daily business.

The sixth and final phase in Attong & Metz (2013) model is monitoring the renewed process to evaluate the performance of the improvement. Menden didn't introduce this step, but the sixth phase was supported by Page (2010), who introduced the same phase as driving continuous improvement. Page also introduced a few interesting steps that are worth noting. The first step is drawing a process map to enable everyone involved to understand how the process works. The second step is estimating time and costs to understand the starting point, set targets, and create metrics. The third is the testing and rework step, which helps to unveil any bugs and confirm that the new process works as planned. (Page 2010)

Business process re-engineering

Business process re-engineering means fundamental rethinking radical redesigning of existing processes. In this approach, processes are redesigned from the beginning to the end, with organizational objectives on the focus. (Brocke & Roswemann 2014) As process re-engineering have radical initiatives, it also focuses on changing the ways of working significantly. Besides cost and time reductions, other typical drivers behind redesigning processes are changing customer needs and better coordination and management capabilities. (Davenport 1992) Mohapatra (2013) stated that a suitable process to be re-engineered should: have a poor performance, has an important role in customer satisfaction, and can be successfully redesigned.

Mohapatra (2013) suggested that business process re-engineering should be distinguished into five stages. The methodology and stages are presented in Figure 17.

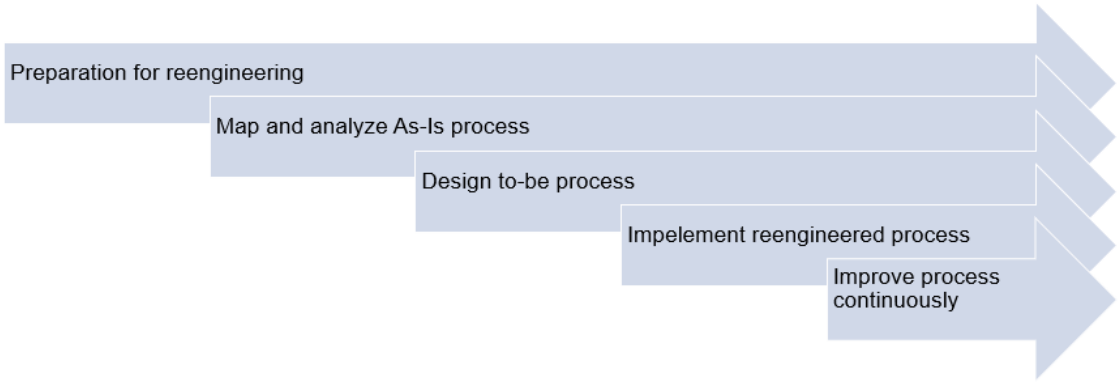

Figure 17: Five stages to re-engineer business process (Mohapatra 2013)

The first stage is preparation, in which the necessity and benefits of re-designing the process are examined. The stage includes identifying customers, defining objectives of the re-design, and defining organizational objectives. The second stage consists of mapping and analyzing the current process to understand every aspect. The third stage is designing the desired new process. The best practices approach should be used in this phase to define the best possible solution available. The fourth stage is the most difficult as it includes the implementation of the new business process. A transition plan and applying active change management supports the succeeding. The new process is aligned with technology, people, and other processes, and thereby some change resistance may occur from concerned personnel. The final and fifth stage is continuous process improvement which means monitoring the performance of the process. Iterative improvement might be required, and it can be assessed through customer and employee feedback, employee attitudes, and total performance. There are several re-engineering frameworks available, but those five stages are the most typical steps as different models

are built around those stages. (Grover & Kettinger 1998; Srinivasan 2011; Mohapatra 2013)

Management of business processes

Today, information systems have a significant role in executing business processes. They either help employees to perform process activities or even enable the automation of specific processes. Thereby, managing business processes usually concerns with tightening the gap between the organization and its technological capabilities. (Weske 2019) Business processes can be classified into managerial processes, operational processes, and support processes. Managerial processes focus on maintaining and developing business performance in the long-term. For example, monitoring, formulating and implementing strategies and change management is considered managerial processes. Operational processes focus on managing the daily performance, which is, for example, customer-facing operations, logistics, and administrative tasks. Support processes are the activities that support the performance and execution of operational processes. Such processes are support technology, human resources, and finance. Identifying the type of process helps to define critical success factors of a process, making the process management and development easier. (Davenport 1992; Bititci et al. 2011)

According to (Harmon 2019), the key factor to maintain successful business processes is understanding the business. Everyone in the organization, stakeholders, and customers should understand why and how specific processes are done. To gain such a comprehensive understanding, an organization’s strategy, objectives, and key relationships are the critical elements that need to be well-defined. Managing business processes demands active monitoring and measuring of process performance, and in case poor performance is recognized, process improvement or re-engineering methods should be applied to better the process, align it with business objectives, and increase its performance (Weske 2019).

Evaluation of business processes

Measuring is an important element in successful process management (Harmon 2019). It enables companies to maintain the alignment of business processes with their strategy, objectives, and values. Vital measures of process success can be distinguished into external and internal value metrics. (Ohlsson & Han 2018) External metrics communicate the results and satisfaction achieved by process and, conversely, internal metrics communicate how the process is working without telling if the process is satisfying customers and stakeholders. (Harmon 2019)

Typical external metrics are revenue measures, customer satisfaction, market growth (Harmon 2019), differentiation from competitors (Ohlsson & Han 2018), response time, and failure rate (Meroni 2019). Examples of internal metrics are process efficiency, financial costs, quality of process outputs (Harmon 2019), formality (Ohlsson & Han 2018), and time spent running each activity, as well as idle time (Meroni 2019). External measures are usually harder to define and use, but they are most likely more valuable for the organization. Implementing internal metrics before external can lead to a situation in which efficiency increases at the expense of customer satisfaction, revenues, or market share. Thereby, organizations should focus on implementing external metrics first. (Harmon 2019)

According to Ohlsson & Han (2018), the process can be evaluated through five steps. The first step is *positioning* which refers to the alignment of the process with business objectives and value. As an example, answering the question “How clear is the process role, mandate, and importance to the business strategy and operational actions?” can help in assessing the process positioning. The second step is *relating,* which considers the attitudes, risks, roles, and rewards of the concerned stakeholders. Examining if stakeholders understand and agree with their role is a way to assess process relating. *Preparing* means evaluating the required skills and competences of employees to execute the process. Also, investigating the availability of necessary resources and the general commitment is critical. *Implementing* refers to investigating how do customers and stakeholders perceive the process performance and how effective is the process for them. During this stage, examining the compatibility of support processes is critical. The fifth step is *proving*. The business impact of the process should be measured appropriately, with relevant KPI’s and a well-functioning feedback loop. Proving assesses the degree to which the process is monitored and measured.

Process metrics should be generated with the help of customers and stakeholders. Those parties should be interviewed to understand what they value and why they value. (Meroni 2019) Understanding the valuable outcomes enables the organization to align its processes and metrics with desired outputs. Finally, a measurement system should be created that connects strategic goals, stakeholder goals, and internal process goals, which enables identifying the real low-performance processes and prioritize their development. (Harmon 2019)

3.5 Supply chain and logistics management from the thesis' point of view

From the thesis' point of view, the key actions of SC and logistics management are thorough coordination and control of business activities. Those business activities consist of managing various internal and external relationships, networks and different logistics-related tasks. Thereby, the key success factors in the Logistics Control Tower are information sharing, integrated operations, efficient response time, good level of communication and collaboration with partners, exploiting information technology, managing internal human resources efficiently and successfully adapting to diverse business environments and cultures. The key success factors are presented in Figure 18.

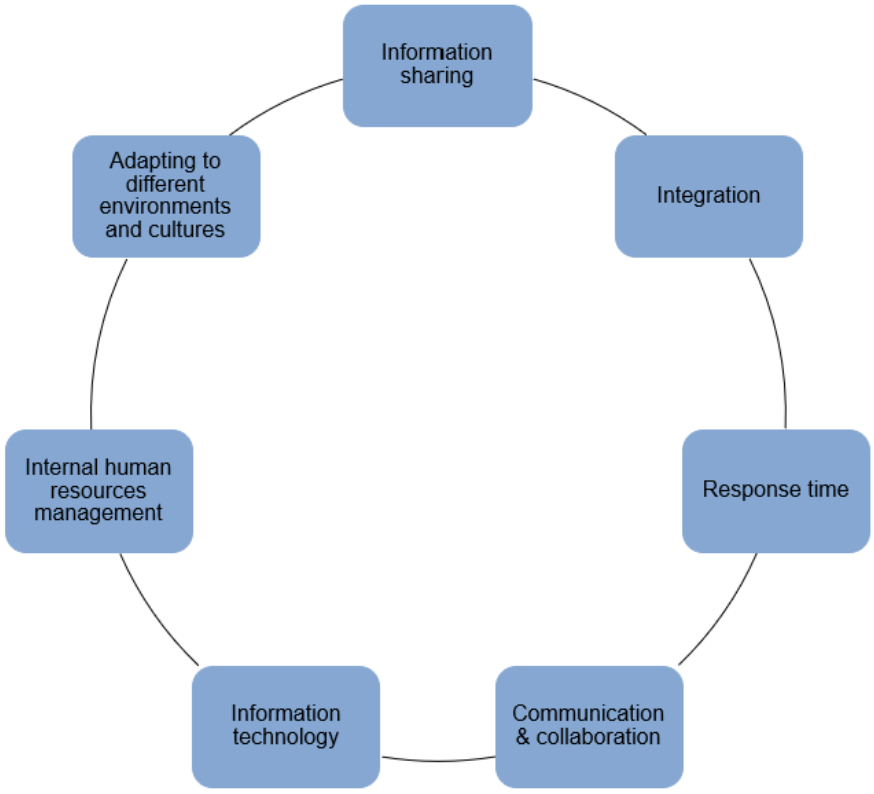

Figure 18: Key success factors from the Logistics Control Tower point of view

To conclude, successful logistics operations require integrated, accurate and quick processes between the SC partners to fulfil the gaps between partners. Filling those gaps require good flexibility of operations as business environments are continuously changing. A good level of flexibility and value enhancements can be achieved through fast response times and effective information exchange with stakeholders.

From the Logistics Control Tower point of view, logistics management aims at delivering value and satisfying customers. Logistics management from the thesis' point of view is

demonstrated in Figure 19. The key purpose is to satisfy internal customers while balancing between customer service and costs. For example, balancing can refer to selecting the best transportation mode where costs and delivery time are taken into account to satisfy the end customer.

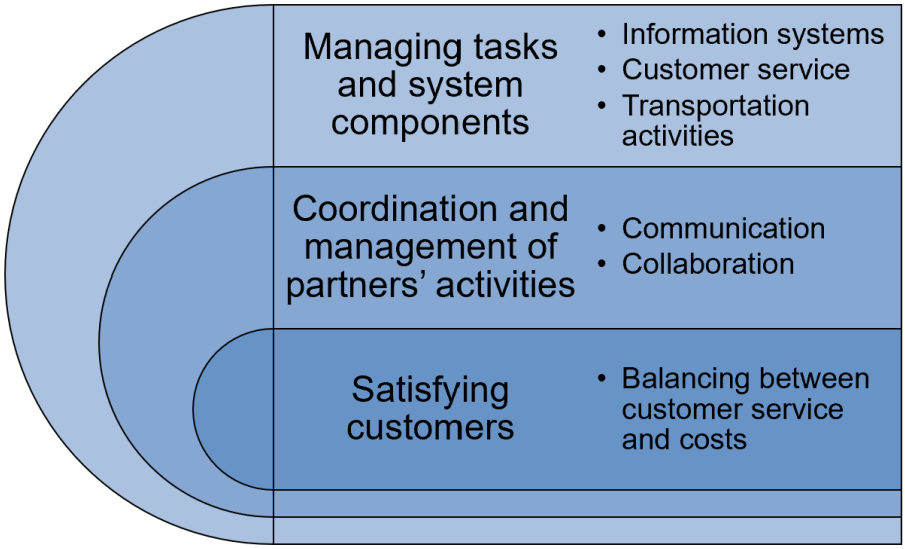

Figure 19: Logistics management from the Logistics Control Tower point of view

However, balancing requires a skill to coordinate various tasks and activities in the SC. Coordination and management of partners' activities is a key factor. For example, managing logistics service providers' activities require active communication and good collaboration to have them continuously updated about changing requirements.

The basis for managing partners' activities and satisfying customers is done by managing various tasks and different components in the logistic system. From the thesis' point of view, the most important components of the system are information systems, customer service and transportation activities. Information systems are one of the key components because today's business heavily relies on information systems. All the important flows are managed with information systems, and therefore, it is a critical component. As the Logistics Control Tower is a supportive service function, good customer service is vital and one of the key components. Transportation activities are the activities that allow the whole network to work properly. From the Logistics Control Tower point of view, the key dimensions of transportation activities are management of different flows, exceptions handling, document creation and processing, operational logistics tasks and invoice handling, processing and payment.

In this case, value-creating activities are support activities that rely on the information. Therefore, managing cash and material flows through information flows are the core meaning of the Logistics Control Tower (Figure 20).

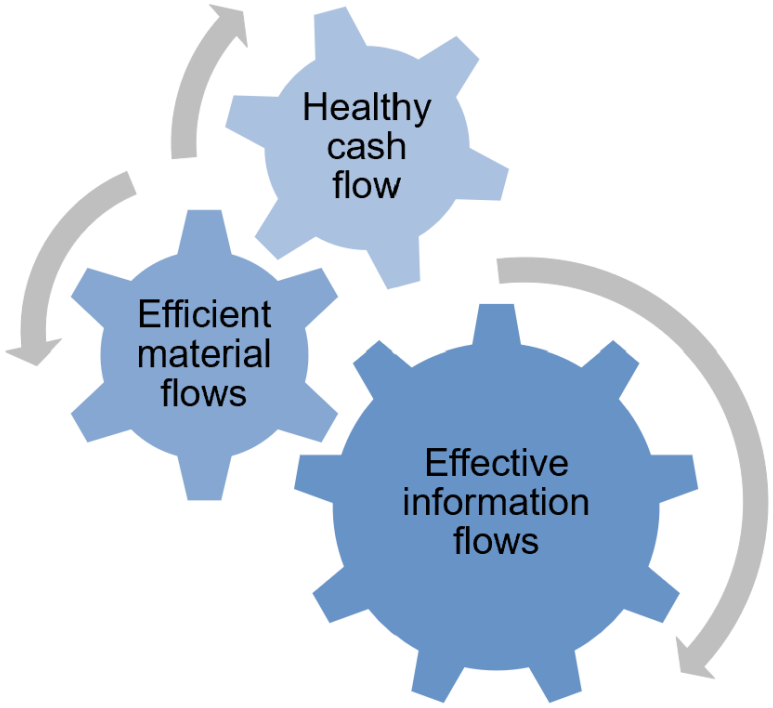

Figure 20: Consequence of managing information flows in the Logistics Control Tower

As mentioned, the Logistics Control Tower aims to manage information flows. Effective and integrated information flows are the key to manage material flows efficiently. Monitoring material flows reduce risks in transportation activities, and thereby, efficient material flows allow the company to maintain healthy cash flow. Understanding those consequences enable one to understand how each activity provides and affects the final value produced by the Logistics Control Tower.

As mentioned before, information systems are a critical component in the Logistics Control Tower. Information systems are used to understand SC and logistics processes, execute business processes and communicate and collaborate with stakeholders. In this case, information systems are operative systems that are used to execute logistics activities. In addition, business intelligence systems are used to understand business and produce valuable insights to support decision-making. Information systems enable the Logistics Control Tower to manage business processes. Managing processes includes evaluation and improvement of processes as well as improving visibility and transparency. Improving processes increase the efficiency of logistics operations and better transparency enable effective material flows, which allows the Logistics Control

Tower to have thorough control of logistics activities. Those dimensions are presented in Figure 21.

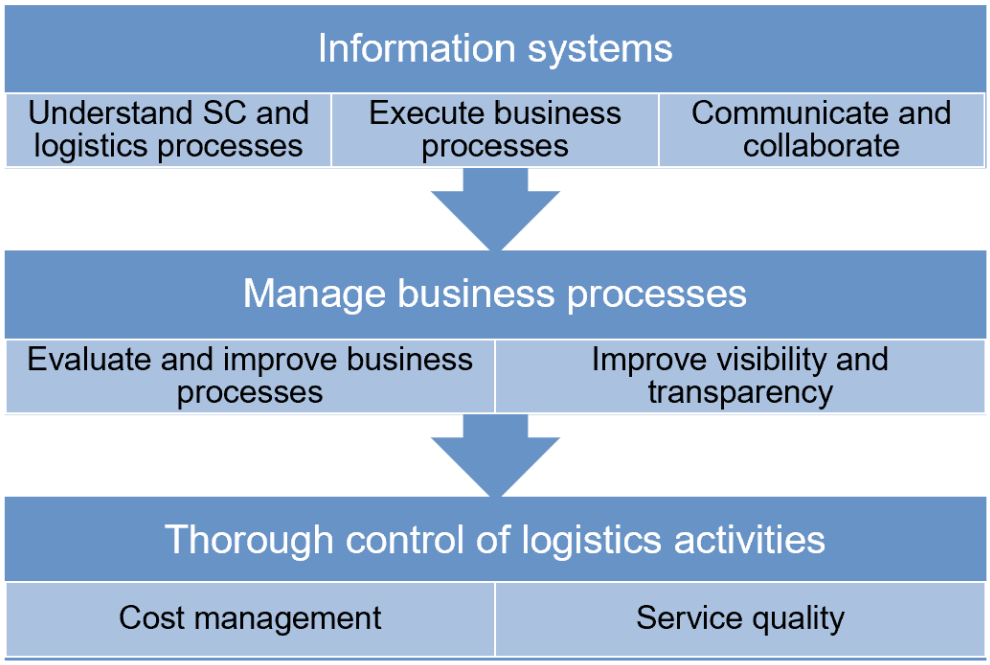

Figure 21: Enabling thorough control of logistics activities in the Logistics Control Tower

Thorough control of logistics activities is critical and valuable because it allows effective logistics' cost management and better quality of service. Cost management and service quality are value-adding dimensions from the case company's perspective.

4. RESEARCH DESIGN

4.1 Research methods

This chapter describes research methods and the process of gathering and analyzing data. Employees from the logistics control tower function, internal stakeholders, and internal customers were interviewed during the study to reach the goal of the thesis.

4.2 Qualitative research & interviews

This study used qualitative research as a methodological approach to gathering data. As the Logistics Control tower is a new function in the case company, there is only a little quantitative data available. Thus, qualitative research is required to gather enough data. Also, a comprehensive investigation of the topic was required, which supported the qualitative approach. (Saunders et al. 2019)

Qualitative research focuses on detecting and understanding participants' attributed meanings and associated relationships, which are acquired through words, images (Saunders et al. 2019), documents, emotions, and gestures (Anttila 2014). According to Anttila (2014), qualitative data can also include diverse quantitative matters, such as measured attributes or results of inquiries. Qualitative research is either unstructured or semi-structured interactive approach, meaning that focus, questions, and procedures can vary during the interview process. Interviewees are considered as participants in the collection of data instead of being respondents. (Saunders et al. 2019)

In this study, a semi-structured interview was chosen to collect empirical material. It is a suitable approach when a comparison of participants' responses within each theme is valuable (Saunders et al. 2019) while making sure all necessary subjects are covered (Anttila 2014). Semi-structured interviews enable more open discussions with participants, while the prevalent theme remains the same. It allows the participant to explain and build on their answer to provide more depth to the data. (Saunders et al. 2019) Depending on the interview situation, the researcher can make changes to the order of the questions, rephrase the questions, or advise the participant to reach the best possible outcome (Galletta 2013). The first-round interviews consisted of questions focused on the experiences and opinions about the operations of the Logistics Control Tower so far to examine the current state. The second-round interviews consisted of questions focused on the opinions and future needs of the other organizations in the case company.

A purposive sampling method was used to choose the interviewees. The purposive sampling method enables the researcher to select the best participants that support answering the research questions and meeting the objectives of the research. Utilizing a purposive method requires thorough judgement as including and excluding cases have a significant impact on the outcome of the research. The purposive method is a typical sampling method in case studies. In this case, critical case sampling was used. It ensures all important cases are covered and understood, making logical generalizations possible. (Saunders et al. 2019) In addition to critical case sampling, advice from the Logistics Control Tower's management were asked to make sure the representativeness of the sample is adequate.

All the interviews were conducted through the Microsoft Teams application. The application made it possible to interview people from abroad in real-time. All the interviews were recorded with the interviewees' approval. Recording the interviews allowed the interviewer to have a complete focus on the answers and expressions of the interviewees. Some of the interviewees used a camera during the interview, but it was not required.

A short introduction about the topic and the objectives of the thesis was provided in advance to all interviewees. Providing the short introduction allowed the interviewees to have a better understanding of the purpose and the goals of the interview. In addition, the interview questions were provided to interviewees in advance to give them a chance to prepare for the interview. In most cases, the interviewee hadn't familiarized themselves with the interview questions even though they were given in advance. At the end of each interview, the interviewee was asked if any important topics concerning the subject were left out in their opinion. This allowed an iterative development process of the interview questions.

4.3 Interview process

The theoretical study is a fundament for the interviews in the empirical research section. Both rounds of interviews are based on the theoretical study. In addition, the second-round interviews are not based only on the theoretical study but also on the first-round interviews. Finally, the conclusions are drawn and interpreted. The conclusions are based on the results of the interviews. However, also the theoretical study was considered during the process. The interview process is demonstrated in Figure 22.

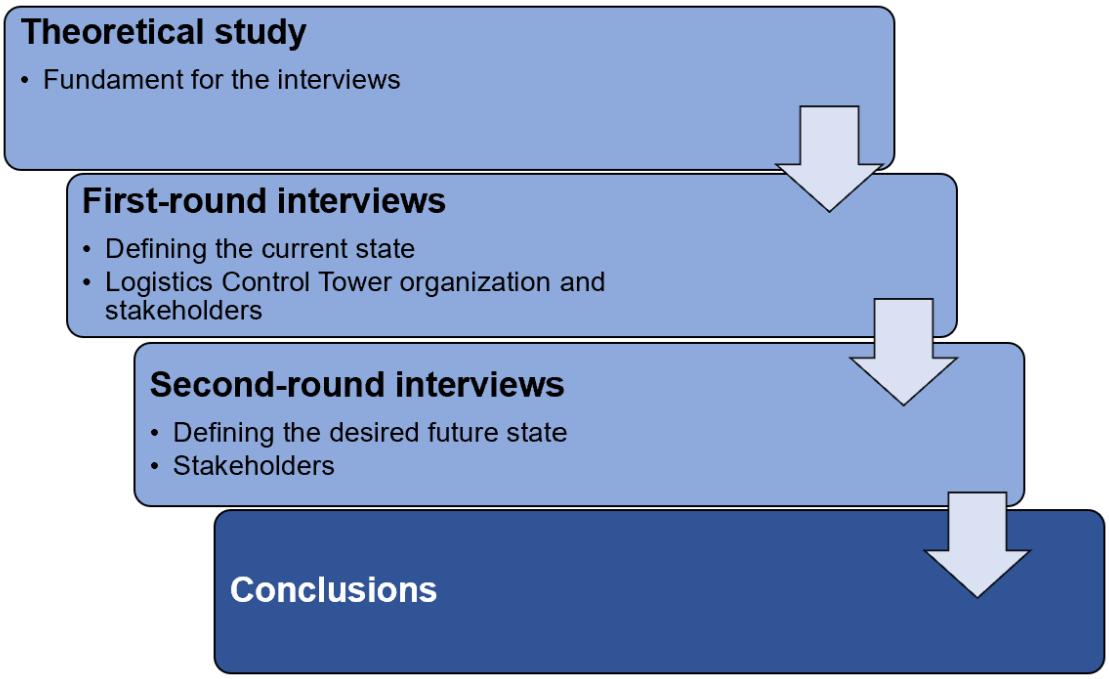

Figure 22: Description of the interview process

The goal of the empirical research is to define the desired future state of the Logistics Control Tower as well as the required development tasks. Thereby, understanding the current state of the Logistics Control Tower and defining the gap between the current and future state is required. The objective of examining the current state was to understand the current strengths, challenges and ways of working in the Logistics Control Tower. The objective of defining the desired future state is to investigate Logistics Control Tower from the internal customers' point of view, as the function aims at being heavily customer-focused. The objective of defining the gap between current and future state is to identify and understand the most critical and mandatory areas of development.

4.3.1 First-round interviews – Defining the current state

The list of first-round interviews is presented in Table 1. The first-round interviews included a total of ten interviewees. Two people from each Logistics Control Tower locations were interviewed making a total of six control tower employees. In addition, the Logistics Solutions Manager, the Senior Manager of the Logistics Control Tower and two key stakeholders were interviewed.

The objective of interviewing control tower employees was to identify existing challenges, current strengths and ways of working. The reason why the control tower employees were selected from various locations was to understand regional perspectives as well as taking diverse viewpoints into account. The objective of interviewing the Logistics Solutions Manager was to deep dive into the technical aspect of the most important tools,

especially the transportation management system (TMS). The objective of interviewing the Senior Manager of the Logistics Control Tower was to understand the current level of operating from a strategic viewpoint. Besides that, the Senior Manager has good visibility of all the control towers in different locations enabling comparison and a wider perspective. The objective of interviewing two key stakeholders was to investigate the internal customer's perspective at this point. In addition, the meaning of these interviews was to verify the information gathered from the interviews with the Logistics Control Tower employees.

As mentioned in Chapter 4.2, the introduction of the thesis as well as the goals and the interview questions were sent to every interviewee by email in advance. The interview questions for the Logistics Control Tower employees, the Logistics Solutions Manager and the Senior Manager were the same. All the interviews consisted of the same questions that were provided in advance (Appendix A: The First-round interview frame) and possible extra questions around the themes of the interview. The interview questions for the key stakeholders diverged, but they were composed of interviews with the Logistics Control Tower employees (Appendix B: The first-round interview frame 2). All the first-round interviews were conducted during a three-week time span.

Table 1: The first-round interviews

Number	Date	Role	Type
I1	15.4.2021	Logistics Solutions Manager	System Support
I2	19.4.2021	Manager, Logistics Control Tower EMEA	Control Tower
I3	22.4.2021	Manager, Logistics Control Tower Asia	Control Tower
I4	23.4.2021	Senior Manager, Logistics Control Tower	Management
I5	26.4.2021	Logistics Specialist	Control Tower
I6	28.4.2021	Logistics Coordinator	Control Tower
I7	30.4.2021	Manager, Logistics Control Tower Americas	Control Tower
I8	3.5.2021	Logistics Specialist	Control Tower
I9	3.5.2021	Manager, Operational Procurement	Stakeholder
I10	7.5.2021	Manager, Logistics Asia	Stakeholder

After completing all the interviews, the data was analyzed. The main themes of the current challenges, strengths and ways of working were identified with the help of the theoretical study. The main themes are 1) intellectual capital, 2) collaboration and communication, 3) marketing and growth, 4) resources, 5) processes and policies, and 6) tools and technologies.

4.3.2 Second-round interviews – Defining the desired future state

The list of second-round interviews is presented in Table 2. The second-round interviews included only stakeholders as its purpose was to investigate future state of the Logistics Control Tower. The second-round interviews included a total of six interviewees. The interviewees were selected from different organizations to take diverse perspectives into account.

Table 2: The second-round interviews

Number	Date	Role	Type
I11	26.5.2021	VP, Global Order and Data Management	Stakeholder
I12	26.5.2021	VP, Aftermarket DMO	Stakeholder
I13	27.5.2021	Director, Region EMEA Customer Logistics	Stakeholder
I14	31.5.2021	Director, DMO CL	Stakeholder
I15	7.6.2021	Director, Availability Management	Stakeholder
I16	28.6.2021	SVP, Customer Logistics	Management

The objective of the second-round interviews was to investigate what kind of control tower is needed in the case company in the future from stakeholders' perspective. All the interviewees were asked the same questions that were provided in advance (Appendix C: The second-round interview frame). In addition to those questions, in some cases there was complementary questions which allowed the interviewee to specify their answer.

After completing all the interviews, the data was analyzed and, the main themes were identified. The main themes are monitoring and controlling, visibility and transparency and communication and collaboration.

4.4 Analysis

The analysis was done by utilizing qualitative analysis practices. Qualitative data collection and analysis are a collection of processes that enable relative flexibility to the researcher. Qualitative analysis methods allow the researcher to identify important themes, patterns and relationships. To be able to recognize themes and patterns, the researcher is most likely required to re-code and re-categorize their collected data. Identifying the most suitable analysis method can be complicated as there are no "right" or "wrong" techniques. In addition, the researcher can utilize more than one analysis technique at the same time during the process. (Saunders et al. 2019)

In this research, the recorded interviews were first transcribed to text right after each interview. To reduce the time spent, the researcher can decide not to transcribe every detail to text (Saunders et al. 2019). Transcription aimed to identify the most important and relevant sections of the interviews. However, the pertinent sections were transcribed from word to word to avoid missing anything.

After the transcription of the interviews was completed, transcriptions and the interview questions were combined into a single spreadsheet. Combining the data allowed the researcher simpler processing of the interview materials.

After combining all the materials, the data was coded utilizing the labelling technique, where a label summarizes the meaning of the data item. Coding the data aims at categorizing data with similar meanings and granting easier access for further analysis. (Saunders et al. 2019) In this case, the code was a short phrase that described the meaning of the data. The phrases were derived from the theoretical study and the data. According to Saunders et al. (2019), utilizing both data-driven and theory-driven codes are typical in abductive approach and, thus, it was a reasonable approach in this research.

Searching for themes and identifying relationships was the next step after the coding of the data was completed. The aim of recognizing themes is to shorten the list of the codes. A theme is an analytic category that summarizes multiple codes and illustrates their idea that is important to the researcher's research questions. To be able to recognize themes, the researcher is required to make judgements about the data. After the themes are conducted, defining the relationships between those themes is required. (Saunders et al. 2019). As the codes were derived from the literature and the data, recognizing appropriate themes was a simple step, even though the semi-structured interviews allow informal conversations around the subject.

Lastly, the themes and the codes under each theme was reviewed to refine the themes. Some of the themes were rephrased and, some of the themes were combined into one bigger entity. Refining the themes is an important phase as it enhances the coherence of the data and allows the data to answer one's research questions (Saunders et al. 2019).

5. RESULTS OF EMPIRICAL RESEARCH

5.1 First-round interviews

The first-round interviews focused on identifying existing challenges, current strengths and ways of working in the Logistics Control Tower. The results of the interviews were coded, summarized and categorized into recognized themes based on the theoretical study and the data. Those themes are presented next.

5.1.1 Intellectual capital

According to the interviews, the most valuable asset is the structure of the Logistics Control Tower Teams. Diverse previous work experiences from Metso Outotec as well as outside the company allows the teams to serve the internal customers with a wide range of perspectives. In addition, teams have a lot of experience and knowledge from customer service, logistics and supply chain activities, which allows the Logistics Control Tower to support its stakeholders with a great variety of topics. The passion and desire of the employees to have a positive impact on the company combined with the diversity of the teams is a significant and the most important strength. (I3, I4, I5, I6, I9, I10)

"The first strength is that we have people with different experiences and different levels of expertise, which gives various perspectives in each one of the teams, which is a key. …The second strength is the ambition of the individuals in the Logistics Control tower to change and have an impact on the company they did not have in the past. …Those are the two key strengths." – Senior Manager, Logistics Control Tower (I4)

"… We review the urgency of the orders. We use our expertise to identify and select the best transportation mode for the order instead of the cheapest one." – Logistics Specialist (I8)

"They have a lot of expertise…" – Manager, Logistics Asia (I10)

As the intellectual capital of the teams is a key strength, the teams are required to learn and develop themselves continuously. One main challenge is a lot of new tasks coming all the time, which require a lot of effort from everyone in the Logistics Control Tower to assimilate the changes, new responsibilities and new practices to be able to support internal customers (I2, I3, I5, I6, I7, I10).

"The challenge is that learning and assimilating new tasks require a lot of time." – Manager, Logistics Control Tower EMEA (I2)

"The challenge is that we have to adjust to new practices continuously… …at the same time we have to be able to give advice and support our stakeholders and internal customers." – Manager, Logistics Control Tower Asia (I3)

"There are a lot of processes the control tower needs to adapt to…" – Manager, Logistics Asia (I10)

The intellectual capital of the Logistics Control Tower teams is recognized as an asset and, the objective is to maintain and exploit it in the best way possible. However, at the same time, the teams are aware of the required amount of continuous learning, which is a bottleneck at the moment.

5.1.2 Collaboration and communication

Logistics Control Tower teams

Seamless collaboration and communication between the Logistics Control Tower teams are important. At the moment, the teams are working separate from each other, which cause losses in efficiency, complicates communication and limits global visibility (I2, I4).

"Good collaboration between each of the teams is important. In that way, we can ensure our information flows are integrated and instructions are aligned. That is why collaboration between the teams is important." – Manager, Logistics Control Tower EMEA (I2)

"We have to find a way to collaborate so, that if for instance, EMEA is under resource issues, the team in Americas or Asia can support. Right now, we don't have that kind of global visibility to those kinds of things. …We are still kind of regionalized and, we don't have the resources and the communication method to do so." – Senior Manager, Logistics Control Tower (I4)

Integrating the Logistics Control Tower teams and achieving a good level of collaboration and communication is vital. It allows the teams to develop themselves, their processes and instructions together more efficiently (I5, I8). Integrated teams with common processes would allow the Logistics Control Tower to standardize their processes, improve the agility and flexibility of their operations and offer quality services to the customers.

"… We should align our teams so we could find the best practices and standardize the operations of the Logistics Control Tower." – Logistics Specialist (I8)

Internal stakeholders and customers

Good communication with customers is recognized as a critical success factor in understanding customers' requirements and aligning the objectives and operations. Current communication and understanding of customers' needs are on a good level but, continuous improvement is required to maintain a good level of collaboration. With some of the customers, seamless collaboration is ensured by having follow-up and review meetings. (I2, I3, I5, I7, I8, I9, I10)

"Communication is good. We are having meetings twice a week with the manager of the Logistics Control Tower Americas. … The Logistics Control Tower is working efficiently… … They understand our needs and expectations. … There have been only a few situations where our needs weren't fulfilled." – Manager, Operational Procurement (I9)

"Keeping in mind that it is a new organization I would say the collaboration and communication are really good. … We have an open and honest communication." – Manager, Logistics Asia (I10)

"Communication with other organizations is on a good level as we have common goals." – Manager, Logistics Control Tower Asia (I3)

"… Now the collaboration is working well and, we have a good understanding of what should different organizations do. We keep on improving the collaboration with different teams… We must focus on improving the communication and collaboration continuously… … Good collaboration enables us to be up to date." – Logistics Specialist (I8)

As there are various logistics-related organizations in the case company, clear communication is needed to avoid confusion and overlapping duties (I3). Even though the communication and collaboration are on a good level, there are still tasks that are done simultaneously by multiple teams (I6). Those kinds of issues exist because there still are some communication interruptions (I5).

"At the moment, we have a few overlapping tasks… To avoid overlapping work, we should improve our communication and collaboration with other organizations. We should agree how, and in which point we transfer the responsibility of certain tasks." – Logistics Coordinator (I6)

With certain stakeholders, there is room for improvement, especially when it comes to visibility (I4, I5, I6, I7, I9, I10).

"… Better visibility into the tools and reports of Operative Procurement and Order Management would benefit us." -Logistics Coordinator (I6)

"We work a lot with Operative Procurement, so a report of upcoming purchase orders within a week or month would give us better visibility into our workload. That visibility would allow us to prepare and organize our workload more efficiently, with which we could produce better and faster service." – Manager, Logistics Control Tower Americas (I7)

"Operative procurement could provide the Logistics Control Tower a report of upcoming purchase orders so they could plan their workload and actions accordingly. … At the moment they don't have that visibility." – Manager, Operational Procurement (I9)

"… We don't have a visibility of which our transportation quote requests are handled by our logistics service providers and which are not… … A process for quote requests for unusual transportation lanes and ad-hoc air freight is not utilized in Customer Logistics organization… If we had this process centralized to the Logistics Control Tower, we would have a better visibility of our quote requests." – Manager, Logistics Asia (I10)

"When it comes to operative logistics, we don't have visibility of what has been loaded to trucks in the warehouse. We should have that visibility. … The warehouses could start scanning what is being loaded to trucks… It would be important to have that visibility because, at the moment, we just hope that everything is collected on time. … This would allow us to react faster if an order hasn't been collected. In my previous team, we utilized this kind of process and, it worked well." – Logistics Specialist (I5)

External stakeholders

In this case, the external stakeholders mainly consider logistics service providers that produce forwarding services for the case company. Logistics service providers are usually contacted when there are issues, need to improve processes or need to change existing transportation orders (I2, I6, I7).

"… We react and collaborate with the logistics service provider to solve the issue." – Manager, Logistics Control Tower Americas (I7)

"… We try to communicate and collaborate with logistics service providers to get the order to the customer on time." – Logistics Coordinator (I6)

"If we detect room for improvements, we communicate with the logistics service provider to develop our actions." – Manager, Logistics Control Tower EMEA (I2)

Processes are continuously developing on the case company's end. The downside is that the updated procedures are not always aligned with logistics service providers, which cause delays and extra work in processes. Even though there is a lack of alignment, it is still recognized as a mandatory and important matter. (I6)

"For example, when it comes to the approval process of oversized cargo, the logistics service provider is required to ask for acceptance from a specific person. … Usually, logistics service providers contact the wrong person… We should align our updated processes with them. At the moment it is causing transportation delays as they can't find the correct person on time. … It is necessary and important to align our logistics service providers with our processes." – Logistics Coordinator (I6)

5.1.3 Marketing and growth

Internal marketing

According to the interviews, one key challenge is that the other organizations in the case company aren't that aware of what is the Logistics Control Tower (I1, I2, I3, I4, I8, I10). Usually, if other organizations are aware of the Logistics Control Tower, the problem is that they don't clearly understand what the control tower does (I2, I9). When other organizations hear about the Logistics Control Tower, they either think the control tower is stealing their tasks, or they want to give all the responsibilities to the control tower instead of building collaboration between the organizations (I4, I8). The reason for this kind of issues seem to be the lack of internal marketing of the Logistics Control Tower and, it should be fixed right away (I1, I2, I4).

"I believe they should market themselves more. For example, I often receive requests that must be forwarded to the control tower." – Manager, Logistics Asia (I10)

"… Marketing of the Logistics Control Tower should be improved. People may know that there is the Logistics Control Tower, but it is usually unclear what we do in the control tower." – Manager, Logistics Control Tower EMEA (I2)

"… Other organizations considered that the Logistics Control Tower is stealing their tasks." – Logistics Specialist (I8)

"… Marketing of the Logistics Control Tower is a key. People hear "control tower" and, immediately, they want to give everything to us. … That's not something we can take on. … With marketing, we can have a clearer understanding… We need to share the work and, we have to have those collaborative discussions proactively. … We need to make sure people don't confuse the actions of the control tower as being accountable for the orders. The accountability still overlies with the local business…" – Senior Manager, Logistics Control Tower (I4)

The reason why people know about the Logistics Control Tower, but at the same time doesn't fully understand its operations and responsibilities is the grapevine. Good

experiences of the control tower are spreading through the grapevine. It causes misunderstandings as it is uncontrolled unofficial marketing. (I1)

Growth and workload

The Logistics Control Tower is rapidly growing all the time. It is continuously gaining more responsibilities and tasks as it is filling a gap in the case company that was previously uncovered. (I1, I2, I4, I7)

"… The Logistics Control Tower is really dynamic, and we are receiving new demands all the time." – Manager, Logistics Control Tower Americas (I7)

"… Now as the Logistics Control Tower is developing and growing…" – Senior Manager, Logistics Control Tower (I4)

Because of the rapid and uncontrolled growth, the current workload in the Logistics Control Tower is a challenge as it is limiting the potential and decreasing the efficiency of the control tower. The current amount of work is overloading the control tower, which causes delays. Also, the development of processes and teams are suffering due to the overload. (I2, I5, I6, I9, I10). The teams have a lot of manual work currently due to the uncontrolled growth as there is not enough time to take on the new tasks properly and, develop and automate the processes in the Logistics Control Tower (I1, I4, I5).

"The workload of the teams has been growing… … Reduce the amount of manual work and focus on something else." – Logistics Solutions Manager (I1)

"At the moment, we have too much work to do." – Logistics Coordinator (I6)

"Currently we have a hurry and a big workload. … We don't have enough time to respond right away and, it causes delays. … The workload is so big that we can't focus on the development of our processes. … Automation would save us time and allow faster responses…" – Logistics Specialist (I5)

"The challenge is that there is a high demand for the Logistics Control Tower, but the growth should be well controlled. We should have enough time to take over the new tasks before receiving more responsibilities." – Manager, Logistics Control Tower EMEA (I2)

5.1.4 Resources

At the moment, the resources in the Logistics Control Tower are a bottleneck. The lack of resources is caused by the rapid growth, tough workload and the amount of manual work in the control tower. (I1, I2, I4, I5, I6, I7, I9, I10)

“We know that we need more resources.” – Manager, Logistics Control Tower EMEA (I2)

“The resources right now are a struggle.” – Senior Manager, Logistics Control Tower (I4)

“We don’t necessarily have enough resources.” – Logistics Specialist (I5)

The lack of data and information resources are causing extra work (I1, I2, I3, I4, I5, I6, I8). Gathering and processing diverse and reliable data requires the employees in the Logistics Control Tower to use various information systems (I1, I8). Even though the data and information are accessed successfully, their accuracy and completeness are often trouble (I3, I4, I5). For instance, the usage level of the data produced by the logistics service providers is low because of the bad availability of the data. The current tools in the Logistics Control Tower limit the usage level of external data and, therefore, exploiting external data requires a lot of manual work. (I2, I3, I4)

“We have diverse data and different kinds of information systems, but the quality of data and information is a question mark.” – Logistics Solutions Manager (I1)

“We need to use multiple information systems… Sometimes it requires extra time instead of saving time. We should improve the capabilities of our core information systems to be able to reduce the number of digital tools.” – Logistics Specialist (I8)

“The completeness of an operational logistics data is a challenge… In some cases, the data is partly or completely missing. It slows down our process performance.” – Logistics Specialist (I5)

“The data and information aren’t always accurate. The usage level of external data should be higher. … We are missing 10-20% of external data because of technical matters.” – Manager, Logistics Control Tower Asia (I3)

Another important resource that is lacking is the number of employees in the Logistics Control Tower. The headcount in the teams is growing, but at the time, the workload in the control tower is increasing even faster. (I1, I2, I4, I5, I7, I9, I10)

“… There is a lot of manual work and backlog, which cause delays…” – Manager, Operational Procurement (I9)

“They don’t have enough employees compared to their workload.” – Manager, Logistics Asia (I10)

“The workload has been increasing in the teams. … The headcount in the teams is growing. The headcount should be increased even more…” – Logistics Solutions Manager (I1)

“The headcount of the team should be increased…” – Logistics Specialist (I5)

"The number of employees and their development is important. We will not have enough of those as the Logistics Control Tower is dynamic and the workload is continuously increasing." – Manager, Logistics Control Tower Americas (I7)

"… I think we don't have the resources we need whether it is personnel or technology." – Senior Manager, Logistics Control Tower (I4)

5.1.5 Processes and policies

Processes inside the Logistics Control Tower

The processes and policies inside the Logistics Control Tower are still at an early stage as the function is still pretty new. The improvement needs and key challenges are identified, but at the moment, there are not enough resources to put effort on the development side. (I1, I2, I3, I4, I5, I6)

"… We are still exploring correct processes and ways of working to execute our daily tasks." – Logistics Coordinator (I6)

"We should develop and standardize our processes, but at the moment, we don't have enough resources to do so." – Logistics Specialist (I5)

"We are trying to develop our processes and, we have identified our targets. We are not at the stage where we want to be. … But currently, we are unable to get there" – Manager, Logistics Control Tower EMEA (I2)

Standardization and harmonization of processes is an important objective of the Logistics Control Tower (I1, I2, I3, I4, I5, I6, I8, I10). Some of the processes inside the control tower are already standardized and, they are working well (I2, I4, I5, I6, I7). The most important phase would be having all the processes standardized and harmonized inside the control tower as it enables global standardization (I2, I4, I5, I8). Achieving it requires harmonization of the processes inside each of the control tower teams (I2, I5, I8). After this, the teams should together benchmark their processes. After benchmarking the processes, the best practices should be standardized and harmonized to cover the whole Logistics Control Tower. (I8)

"… We need to do more work to harmonize most of our processes." – Manager, Logistics Control Tower EMEA (I2)

"We do have standard processes in the control tower, and they are working well. … One of the biggest values the control tower can have. If it is agile enough and the processes are internally standard enough, you can manage anything from any business area." – Senior Manager, Logistics Control Tower (I4)

"We need to harmonize our processes in the control tower… Some of the processes are standardized and, they are working pretty well. … We have common ways of working inside our team." – Logistics Specialist (I5)

"Our transportation management systems force us to do our tasks similarly. … Those are indirectly standardized." – Manager, Logistics Control Tower Americas (I7)

"We are trying to maintain standard ways of working inside our team. … When we achieve standard ways of working inside every team in each region, we should benchmark our processes and identify the best practices. The best practices should be standardized and harmonized to have a common way of working in the control tower" – Logistics Specialist (I8)

Processes with stakeholders

The reason why the Logistics Control Tower was established is to standardize logistics practices in the global end-to-end supply chain. It means that the control tower is aiming to standardize processes globally with its stakeholders. (I3, I4, I5, I10)

"The main objective of the Logistics Control Tower is to achieve harmonized processes that work in all regions. … Benchmarking of our logistics processes would be important" – Manager, Logistics Asia (I10)

According to the interviews, only a small number of processes are standardized with internal stakeholders. For instance, the EMEA team has standardized operational logistics procedures with a few plants in the region (I5). Even though there aren't many standardized processes with internal stakeholders, the tasks are still completed successfully. However, the lack of common and standardized processes cause challenges, extra manual work and delays. Those challenges are missing information and documents in support requests (I3), long email threads (I6), delayed transportation order requests (I8), unclear responsibilities (I2), understanding different ways of doing and expressing things (I4, I7), support requests coming outside of the scope (I6) as well as identifying a correct team and person from whom to ask help (I2, I3) and, therefore, an increased number of contacts to provide an answer (I8).

"…The general procedures are doing okay at the moment, but there is still a lot of extra work and uncertainty. The procedures need to be clarified to make them more streamlined and efficient." – Logistics Specialist (I5)

"... There is uncertainty that who does what, where and when." – Manager, Logistics Control Tower EMEA (I2)

Two challenges in processes with external stakeholders was mentioned during the interviews. The first is the approval process for oversized cargo that was mentioned in Chapter 5.1.2. The lack of standardization in that process with logistics service providers is causing delays. The second challenge is shipment monitoring. In some cases, more than one organization is doing the shipment monitoring for the same orders at the same time. It is not only the case company that does extra work, but when there are issues in those shipments, the logistics service provider is often contacted by those organizations. This cause extra work to the logistics service provider as they must deal with the same issue at least twice. (I6)

"Only one team should monitor the shipments to avoid overlapping work. … It is important because it also causes extra work to the logistics service provider as they have to deal with the same issue more than once." – Logistics Coordinator (I6)

The agenda in the near future is to have policies that are agreed with stakeholders (I2, I4, I10). According to the interviews, the most important step would be having well clarified common procedures (I2, I5, I6, I8, I10), such as the harmonized process triggers (I4, I5, I6) and the processes for expediting and monitoring shipments (I6, I9). Clear processes would reduce the required number of contacts for a solution, which is important in terms of efficiency (I8).

"… We need to increase the visibility of who does what. … We need to have all parties committed to the processes; it would allow us to measure OTD reliably." – Manager, Logistics Control Tower EMEA (I2)

"… We could agree in which point the responsibility of monitoring and expediting the shipments shifts to us." – Logistics Coordinator (I6)

"At the moment, our suppliers are not informed by us or the control tower if a collection of materials is delayed. … It requires clear and agreed process." – Manager, Operational Procurement (I9)

"It would alleviate our work if we had harmonized process triggers." – Logistics Specialist (I5)

"The biggest and the most challenging change to make is more harmonization and standardization in our global logistics processes on every level… … If we are all operating whether it is local or global logistics person in a same and similar manner utilizing same tools, updating the information the same way in these tools, then we can all have visibility to what is going on… Diverse ways of using tools and updating information make it very difficult for us to provide quick responses…" – Senior Manager, Logistics Control Tower (I4)

5.1.6 Tools and technologies

Data and information

One strength of the Logistics Control Tower is diverse data from various sources (I1, I3, I6). However, the common problem of the tools in the control tower is the poor data accuracy (I1, I3, I4, I6). Better data quality, as well as centralized data and information, would improve transparency, reduce manual work and allow the control tower to move towards a proactive way of working instead of being reactive (I1, I2, I3, I4, I8).

"Our strength is utilizing diverse data from various data sources. … Centralized information would improve transparency." – Manager, Logistics Control Tower Asia (I3)

"We need to be sure the data and information in our reports and tools are accurate." – Logistics Coordinator (I6)

"… Centralized data would help us." – Manager, Logistics Control Tower EMEA (I2)

"Visibility is a struggle because our data is fragmented. … Centralized data would allow easier reporting and analytics. … It enables better visibility to the whole supply chain." – Logistics Solutions Manager (I1)

Transportation Management System (TMS)

The transportation management system is one of the most relevant tools in the Logistics Control Tower (I1, I2, I3, I4, I5, I6, I7, I8). The current TMS is regularly used to create manual transportation bookings and monitor shipments (I2, I4, I5, I7, I8). The best feature and strength of the current TMS is its user-friendliness (I2, I3, I5, I8).

"The user interface is very simple and user-friendly. It is easy to create manual bookings there." – Manager, Logistics Control Tower EMEA (I2)

Even though the TMS is user-friendly, there are still a lot of challenges with it. One big challenge is the digital connectivity with other tools in the case company and logistics service providers' systems (I2, I4, I5, I6, I7, I8). The lack of proper integration cause reliability issues, such as data transfer errors as well as unreliable and missing information (I1, I2, I5, I6, I7, I8). Another major challenge with the TMS is poor data and information management, which is partly caused by the poor digital connectivity (I2, I4, I6). In addition, swiftness (I4), general reliability and operability are also current major challenges (I5, I7, I8). Those TMS-related challenges cause extra manual work in the Logistics Control Tower.

"Our TMS is not properly, reliably and timely connected to our logistics service providers' systems. … There is no certainty that when you look at something, it is correct, such as

delivery statuses… … You have to do extra work to verify the information." – Logistics Coordinator (I6)

"… The data transfer between our TMS and logistics service provider is a problem." – Logistics Specialist (I8)

"TMS to ERP integration is more one-way than anything. There is very little information pass backing to ERP." Senior Manager, Logistics Control Tower (I4)

"… The reliability is a question mark." – Logistics Specialist (I5)

In the future, it would be important to have a user-friendly and reliable TMS that has excellent and trustworthy data and information management capabilities (I1, I3, I6). The integration of the TMS should be complete and reliable both internally and externally (I2, I3, I4, I6). As material movement produces a lot of important data, the TMS should be able to combine important data from various data sources, enabling easy, comprehensive and reliable reporting (I1, I2, I4). Lastly, the TMS should be working all the time reliably without worries of getting errors (I5, I7, I8).

"Well-functioning TMS is important because there is a lot of information and, it should cover all needs. It is also important that the TMS would be simple and user-friendly." – Manager, Logistics Control Tower Asia (I3)

"… The data in TMS is extremely important. … Requires manual work to combine data from TMS and the logistics service provider… TMS should solve this issue." – Logistics Coordinator (I6)

"The TMS requires development, it should contain all the data from logistics activities. … When you look at a booking, you could be sure it is up-to-date…" – Logistics Solutions Manager (1)

"We should be on a higher lever what comes to combining and processing data." – Manager, Logistics Control Tower EMEA (I2)

"The resource that would be the biggest change would be global TMS that not only helps us operationally but from a data perspective and is linked to various steps in the supply chain. … Properly integrated TMS is a massive game-changer, it not only allows us to have data being pulled from sales orders or purchase orders into the TMS, but it also allows us to capture and track freight costs… If we want to look at the landed cost for material, we should be able to have it. It really improves visibility and everything." – Senior Manager, Logistics Control Tower (I4)

Enterprise Resource Planning (ERP)

Case company's ERP is used daily in the Logistics Control tower (I1, I2, I3, I4, I5, I6, I7, I8). It is an important tool that fulfils its need (I1, I2, I5). The ERP is used to update data (I4, I6), monitor IDoc errors (I2, I7, I8), create post goods issues of deliveries (I2, I5) and create transportation bookings (I2, I4, I5, I7, I8).

"ERP is definitely the most important if you consider the tasks that are being completed with it. … It is a pretty good tool…" – Logistics Specialist (I5)

"There is no reason why I wouldn't consider our ERP as a good tool." – Manager, Logistics Control Tower EMEA (I2)

"... ERP is good at understanding the supply chain." – Manager, Logistics Control Tower Asia (I3)

Even though the ERP is working fine, few issues still came up during the interviews. The first issue is that the data in the ERP is not complete, which prevents automatizing some of the tasks (I5). The second issue is that the ERP enable different ways of doing things and updating information in the ERP, which complicates the work (I6). The third issue is technical errors that cause extra manual work (I8).

"Some of the data in our ERP is not accurate and complete, which is why we can't automatize some of our tasks. … We should solve that issue to decrease the amount of manual work." – Logistics Specialist (I5)

"The configuration of the ERP should be improved… There are a lot of different processes done in multiple ways in different regions, which complicates our work." – Logistics Coordinator (I6)

"Many of the tickets coming to the control tower from our internal stakeholders are caused by an error in our ERP. For instance, something didn't happen automatically as it should have happened. If our ERP processes were perfect, we could avoid many tickets and save time." – Logistics Specialist (I8)

Ticketing tool

The Logistics Control Tower is using a ticketing tool to manage support requests from internal stakeholders. The support requests coming through the ticketing tool are usually related to virtual goods receipts and logistics-related order management and communication (I2, I4, I5, I6, I7, I8).

"... The tickets are related to logistics communication, virtual goods receipts and expediting orders." – Logistics Specialist (I8)

According to the interviews, the ticketing tool is very important because plenty of communication with stakeholders goes through it (I1, I4, I5, I7, I8). The ticketing tool is user-friendly and easy to use, which is important because it is a global tool and, people with different level of skills are using it daily (I3, I7, I8).

"… It is nice and easy to use… It is like a checklist that tells step by step what you need to do and, that's why it is user-friendly." – Logistics Specialist (I8)

There are also challenges with the ticketing tool. Those challenges are enabling user errors and various ways of using the tool (I3, I7, I8), frequent failures because of poor reliability (I5, I8, I9), enabling wrong types of requests to wrong organizations (I8) and lack of visibility (I1).

"There have been challenges with frequent failures in ticketing tool" – Logistics Specialist (I5)

"… There are reliability issues with the ticketing tool." – Manager, Operational Procurement (I9)

"… Every ticket is distinct because people use the tool differently as there are different ways of working in different regions." – Manager, Logistics Control Tower Americas (I7)

"Ticketing tool is really open to user errors. For example, you can select wrong type of request, which complicates our work and delays the process." – Logistics Specialist (I8)

The suggested improvements for the ticketing tool are preventing user errors and different ways of using the tool (I7, I8) and enhancing data usage and visibility (1).

"… There are a lot of mandatory fields in the tool. Artificial intelligence could be implemented to assist the user in filling mandatory fields. It would reduce user errors and manual work." – Logistics Specialist (I6)

"We should have all the data in the ticketing tool to enable better visibility…" – Logistics Solutions Manager (I1)

Reporting and analytics

Reporting is done with Power BI and, therefore, it is another important tool in the Logistics Control Tower (I1, I3, I6, I7). Even though the Power BI is a bit tedious (I1, I3), the reports are currently more accurate than ever before (I4). The reports mainly utilize data from ERP, TMS and logistics service providers' systems (I3, I6), but especially the accessibility and usage level of external data should be on a higher level (I3, I5, I6). Most of the issues with reporting are related to required manual work or their unclearness, such as lack of consistency or number of columns and rows (I3, I5, I6). Reports should

cover as much information as possible, but at the same time, they should be accurate, clear, easy to read (I1, I3, I5) and focus on key information (I3).

"… Power BI reports and the information in them are good and useful" – Manager, Logistics Control Tower Americas (I7)

"Power BI is good, but it is tedious in its own way." – Logistics Solutions Manager (I1)

"Power BI reports are good. These reports are probably the most accurate they have ever been." – Senior Manager, Logistics Control Tower (I4)

"The current shipment tracking report is good. The same kind of report focused on transportation order expediting would be good." – Manager, Logistics Asia (I10)

"… Also, we should utilize data from logistics service providers' better… Combining internal and external data in reports creates important visibility. … The report is inconsistent and unclear because our logistics service providers use different expressions. There are also too many columns, which is why focusing on the key information is hard. … It should be simpler." – Manager, Logistics Control Tower Asia (I3)

"Power BI reports should be easy to read, clear and comprehensive. One report should cover as much information as possible." – Logistics Specialist (I5)

The current level of analytics is very limited in the Logistics Control Tower. The usage level is not sufficient as it not exploited to support daily operations (I1, I2, I4 I5, I6, I7, I8). The analytics should be developed and designed together by the control tower to implement solutions that support decision-making as well as daily tasks such as shipment monitoring (I2, I4, I6, I8). The goal of the analytics should be to provide excellent visibility and transparency of logistics and supply chain activities (I2, I6).

"... It requires more development and effort." – Logistics Specialist (I5)

"Analytics should be designed together… It should be in a form that supports us. … It should be our daily partner instead of just being "that data there". … Now we have to analyze data manually with Excel, which takes time." – Logistics Coordinator (I6)

"Hopefully, it will have a remarkable role. It should produce information that supports decision-making. … We need more information about logistics activities, such as where are we going now… Steering our actions would be more reasonable if we had well-functioning analytics and more information." – Manager, Logistics Control Tower EMEA (I2)

"… It should provide us better and more reliable visibility into logistics activities and realized lead times." – Logistics Specialist (I8)

"We haven't even had the opportunity to start doing some analytics. … I'm looking to see various trends in our transportation. If we are shipping multiple orders to a customer in one day having multiple bills of lading, is there an opportunity for consolidation. How do we optimize our freight spend and reduce the amount of labour it takes to process these logistics orders. Those are the key analytics I'm trying to find and, from there, anything else would be a bonus." – Senior Manager, Logistics Control Tower (I4)

Automation

One goal in the Logistics Control Tower is to automatize daily tasks. There is already a small amount of automation exploited (I2, I4, I8). The need for automation is identified, but it requires well-functioning and defined processes, which is now a challenge (I2, I5).

Automation would have a significant impact on the operations of the Logistics Control Tower. It would save a lot of time (I1, I2, I4, I5, I6, I8, I10), release resources (I1, I4, I5, I6, I7, I8, I10) and improve response time (I1, I7).

"Automation will improve the response time by reducing the amount of continuous manual tasks." – Manager, Logistics Control Tower Americas (I7)

"… Automation would reduce required steps in processes. …" – Logistics Solutions Manager (I1)

"… It would save us plenty of time." – Logistics Specialist (I5)

"… We have people there that are doing things that could be automated and managed very quickly so we could use their expertise for…" – Senior Manager, Logistics Control Tower (I4)

"Automation would help the Logistics Control Tower and our logistics service providers…" – Manager, Logistics Asia (I10)

According to the interviews, important tasks to be automated are invoice processing (I2, I4, I8), transportation booking creation (I1, I2, I5), post goods issue creation (I2, I5), updating information between different tools (I3, I6), monitoring shipments (I1, I2) and monitoring IDoc errors (I7).

"Especially invoice processing takes a lot of time. It would be good to automate it." – Manager, Logistics Control Tower EMEA (I2)

"From the operative logistics point of view, post goods issue and transportation booking creation should be automated…" – Logistics Specialist (I5)

"Updating dates and other delivery related information should be automated." – Manager, Logistics Control Tower Asia (I3)

"Monitoring shipments could be automated, for instance, automatic alarms would help to identify delayed deliveries." – Logistics Solutions Manager (I1)

"Monitoring IDoc errors as it is a really simple task, but we have to do it twice a day…" – Manager, Logistics Control Tower Americas (I7)

"… Anything that is labour intensive and simple, reviewing an Excel sheet, updating something, maintaining a list. Those have to be automated. Updating information in ERP and handling the invoices… … We have to find better ways to automate that." – Senior Manager, Logistics Control Tower (I4)

Metrics and Key Performance Indicators (KPI)

The interviewees were asked what kind of metrics and KPI's would be helpful and important in the Logistics Control Tower. The metrics and KPI's that were mentioned are concluded in Table 3.

Table 3: Proposed important metrics and KPI's

Proposed important metrics and KPI's	Source
Ticket resolve and response times	(I1, I2, I3, I4, I7)
On-time-delivery (OTD)	(I2, I6, I8)
Volume of transportation bookings and tickets per week or month (workload)	(I3, I5)
Elapsed time between transportation booking and collection	(I4, I6)
Solved v. unsolved Idoc errors	(I2)
Utilization rate of global tools (for instance, how many transportation bookings are created outside the TMS v. bookings created with the TMS)	(I3)
Time spent processing freight invoices	(I4)
Time spent creating transportation bookings	(I7)
The date transportation booking request was received v. actual booking creation date	(I8)
Agreed transportation lead time v. actual lead time	(I8)
Time lost in processes because of bottlenecks	(I8)
An amount of (purchase) orders collected from suppliers	(I9)
An amount of processed logistics service providers' invoices and their accuracy	(I10)
An overall number of handled transportation booking expedition requests v. successfully expedited orders (per week)	(I10)

5.2 Second-round interviews

The second-round interviews focused on investigating what kind of control tower is preferred by different organizations in the case company. Three main themes of the interviews were identified during an analysis process where the answers of the interviews

were coded, summarized and categorized. Those themes are next presented one by one.

5.2.1 Monitoring and controlling

Monitoring and controlling was a theme that occurred directly and indirectly during the interviews. Business environments are changing continuously, and therefore, there are always factors that cause challenges in the global supply chain. Monitoring and controlling challenges that affect the transportation process is one important area that should be the responsibility of the Logistics Control Tower. For example, now there are a global lack of containers, a lot of port congestions and other logistics-related capability issues. The Logistics Control Tower should react and focus on mitigating those kinds of issues. (I11, I12, I13, I14, I15)

"… Port congestions and lack of containers, vessels and airplanes are causing challenges." – VP, Global Order and Data Management (I11)

"… The global unreliability of transportation has increased… There are a lot of challenges in transportation caused by external factors at the moment." – Director, Availability Management (I15)

The monitoring and controlling of transportation are important as they improve the reliability of logistics in the case company, which is a critical success factor for all the organizations.

"… The transportation legs have not been accomplished within agreed lead times, which have been a challenge for us lately. The unreliability has increased." – Director, Availability Management (I15)

"Previously, we didn't need to monitor if the orders were collected on time. Now those global challenges have created a demand for better monitoring and controlling… We need to somebody to monitor the collection and transportation part more closely…" – Director, DMO CL (I14)

The need for monitoring and controlling transportation is not only limited to challenges. According to the interviews, better overall control of logistics is needed in the case company generally (I11, I12, I13, I14, I15). Monitoring and controlling are important as they enable the case company to react to logistics-related exceptions (I13, I14, I15), which improves the visibility and efficiency of logistics (I12, I15).

"… Should have a view and control on every transportation order in the case company. … It could be a good idea if they had more responsibilities in the supply chain than just

the logistics part. It would allow better end-to-end control and view of the supply chain" – VP, Global Order and Data Management (I11)

"… Should be able to look further and take the full ownership of the transportation leg…" – VP, Aftermarket DMO (I12)

"Prioritizing shipments is important. We have thousands of shipments moving around the world and, we should be able to identify the high priority shipments that require thorough monitoring and controlling. That would provide a lot of added value." – SVP, Customer Logistics (I16)

"… Monitor transports and efficiently react to exceptions. … Controlling and monitoring shipments that are not directly connected to the Customer Logistics organization's warehouse network. … The tasks that don't require local expertise could be centralized in the Logistics Control Tower for better control of logistics." – Director, Region EMEA Customer Logistics (I13)

"… Monitor transportations flow, react to exceptions and be able to solve challenges during the transportation leg to ensure the material flows are successful. … Remarkable thing is to monitor the performance of logistics service providers." – Director, DMO CL (14)

"The Logistics Control Tower should actively follow what is collected, what is being transported, what is delayed and act accordingly to solve those issues… … It would be good if the control tower had an ownership and control of different delivery models, such as direct shipments and consolidations. … Monitoring would allow us to recognize upcoming issues and control risks." – Director, Availability Management (I15)

5.2.2 Visibility and transparency

Another important theme that occurred during the interviews was visibility and transparency. One important visibility-related responsibility that is also related to earlier challenges is updating transportation-related information in the case company's information systems. Updating and maintaining information of orders, such as delivery times, gives very important visibility as it is the only way how all the organizations in the case company gets to know about schedule changes (I11, I12, I13, I14, I15, I16).

"… It is important to have updated schedules in our ERP in case of delays. … We need to have updated data from our logistics service providers all the time, which gives us important visibility into delays and changes." – Director, DMO CL (I14)

"… Delivery schedules must be updated. Our order data should be up to date all the time as it allows us to react accordingly. … The purpose of the Logistics Control Tower should be maintaining and improving transparency of logistics, which gives other organizations important visibility into changes in orders." – VP, Global Order and Data Management (I11)

"… Updated information allows our sales department and customers to have appropriate information and visibility through the whole supply chain." – VP, Aftermarket DMO (I12)

"... Providing up-to-date data for organizations in the customer interface enable successful customer service." – SVP, Customer Logistics (I16)

Improving overall visibility and thorough transparency was emphasized several times during the interviews. It was recognized to be one of the most important responsibilities of the Logistics Control Tower.

"The most important thing is to provide excellent visibility of deliveries for organizations in the customer interface... The data in the customer interface should be enriched, processed and prioritized. Another important thing is to have good visibility of logistics' performance. It allows us to understand how we are doing and what should be improved." – SVP, Customer Logistics (I16)

"From the operational point of view, the challenge is always transparency. … Not limited to, but especially the shipments to customers outside the Customer Logistics' network require transparency… … We would know all the time where the materials are… How to make the information move reasonably, so it is easily accessible, very transparent and quick. … Track and trace information should be easily available as well as information about workflows…" – Director, Region EMEA Customer Logistics (I13)

"Our visibility to on-time delivery is a challenge. Our on-time delivery metric doesn't include the transportation part as it limited to the collection of orders. We don't measure if the order is delivered to the customer on time." – VP, Aftermarket DMO (I12)

"Controlling and providing better transparency… It gives us important visibility what is all right and what is not." – Director, Availability Management (I15)

"The Logistics Control Tower should bring visibility regardless of the location and organization. For instance, the visibility that local logistics teams provide is limited to local operations, but the control tower should bring a good global overview." – Director, DMO CL (I14)

According to the interviews, exploiting diverse data to improve the visibility and transparency of logistics in the case company is an important task as soon as the Logistics Control Tower is properly working.

"From our organization's point of view, important visibility is created with reports, such as the active shipment report. It enables us to know where our orders are, and thereby, predict our sales volume. Utilizing data to create diverse reports about the current situation gives us important transparency." – Director, DMO CL (I14)

"Important area of development is to utilize data from external partners. There are continuous problems with it. For instance, the external data is not always up-to-date." – Director, Region EMEA Customer Logistics (I13)

"As the Logistics Control Tower is updating order-related information in our ERP, it would be interesting to see metric or trend about how much that type of work is being done and to which transportation lanes. It would allow us to understand issues better, which would enable us to prepare and have a closer look into those orders." – VP, Global Order and Data Management (I11)

"The control tower should exploit diverse data as much as possible. We need to understand what kind of data is valuable... We have enough data, but we aren't utilizing it properly at the moment." – SVP, Customer Logistics (I16)

Better visibility and transparency of logistics is also important in understanding challenges and solving issues in the case company.

"… Visibility enables us to notice issues. For example, if something is not collected on time, how can we notice it as soon as possible. … It is important to be able to react to those issues." – Director, Region EMEA Customer Logistics (I13)

"Logistics-related Power Bi reports and sets of KPI's would improve transparency and help us to understand where the biggest challenges are. … Information about global circumstances of logistics is useful. It enables us to deliver that information to our customers, which allows them to understand the external challenges that affect us and, thereby, improve customer satisfaction." – VP, Aftermarket DMO (I12)

"… Utilizing data to see if a port is congested or a transportation lane is overloaded. We could see in advance that there might be problems coming. … External data from logistics service providers and other partners could be used to understand and mitigate evolving risks. … We could see if things are going as planned and, if they are not, we would see what the actions are to solve those issues." – Director, Availability Management (I15)

5.2.3 Communication and collaboration

Communication was also emphasized during the interviews. It is an important responsibility, especially when there are changes in delivery schedules. Effective and quick communication with stakeholders is a key success factor as it enables the case company's end customers to be up to date about their orders and, thereby, it affects customer satisfaction. (I11, I12, I13, I14, I15)

"We need to have a proactive information flow to the customer. If there are changes, there should be proactive communication with the end customer, so they wouldn't need to contact and ask us what is going on. This kind of process would improve our and distributors' efficiency. … When it comes to requests or questions for the control tower, the response time should be quick…" – VP, Aftermarket DMO (I12)

"A single point of contact would always be simple, but the most important thing is that the communication is working very well and, the response time is good." – Director, DMO CL (I14)

"Simple and compact communication from the Logistics Control Tower to its stakeholders is important…" – Director, Availability Management (I15)

Good and proactive communication is required and very important when some changes or challenges affect orders. Communication regarding challenges enables other organizations to act accordingly. (I11, I12, I13, I14, I15)

"In case there are issues, The Logistics Control Tower could communicate that the problem is under investigation in organization X and, it will be fixed as soon as possible. … If something is not going as it should, it should be proactively communicated, monitored and fixed." – Director, Availability Management (I15)

"Automated information flow of issues, such as delays, to relevant internal and external stakeholders would reduce the required amount of contacts and, thereby, increase our and stakeholders' efficiency." – Director, DMO CL (I14)

"… An ability to communicate with different organizations inside the company is important as the purpose of the Logistics Control Tower is to make sure that relevant people in different organizations knows and understands if there are changes in deliveries." – VP, Global Order and Data Management (I11)

"… Reacting to exceptions in orders as well as communicating them to appropriate parties." – Director, Region EMEA Customer Logistics (I13)

According to the interviews, sharing and utilizing expertise to support other organizations is a valuable type of collaboration (I13, I14).

"… Supporting and collaborating with manufacturing and virtual plants in logistics-related matters…" – Director, Region EMEA Customer Logistics (I13)

"… There are a lot of needs to have support in understanding logistics processes and transportation documents. Collaboration is important to ensure there are correct documents and requirements are filled. I think the Logistics Control Tower should be this kind of expertise organization that supports other organizations. … Supporting local logistics teams with their challenges is also valuable." – Director, DMO CL (I14)

5.2.4 Other

Internal marketing

The interviewees were asked how well do they know what the Logistics Control Tower is. All of the interviewees knew that the control tower exists, but they all thought that internal marketing should be improved in the future.

"I know what it is and what it does, but I think it's not well known in the company. Now with the global challenges, people have become aware of the control tower... I would say that people know about it in the company, but a better understanding of what does it do is required." – VP, Global Order and Data Management (I11)

"I have to say I don't know that much about it. ... We know that it exists, but it is unclear what do they do and what is their scope." – VP, Aftermarket DMO (I12)

"... We need more communication and information, but I am sure it is improving all the time. The brand of the Logistics Control Tower is unclear." – Director, Region EMEA Customer Logistics (I13)

"... The scope is unclear. ... It's still unclear what is its vision, strategy and role. ... Internal marketing should be improved..." – Director, DMO CL (I14)

"I think the understanding of what is the control tower and what are their responsibilities is still weak. Clear communication about its scope and employees would be useful." – Director, Availability Management (I15)

Scope in the future

The interviewees were asked whether the Logistics Control Tower should remain transportation-focused or aim to be a supply chain control tower in the future. The opinions about the control tower being a supply chain control tower in the future were either positive or neutral.

"Definitely should think about expanding. … End-to-end monitoring and highlighting could be valuable. It could be a good idea if they had more responsibilities than just the logistics part." – VP, Global Order and Data Management (I11)

"… It could be reasonable. If it makes sense, why not, but I don't see that it is necessary right now." – VP, Aftermarket DMO (I12)

"Interesting idea… … Processes and tasks that don't require physical presence could be centralized." – Director, Region EMEA Customer Logistics (I13)

"I don't have a clear vision of what should be the role of the control tower. I think that is the direction we want to aim for, but I don't know right now what the benefits of the centralization are." – Director, DMO CL (I14)

"I think it would be good to have a supply chain control tower and, I think it will be the goal in the future. … Centralized ownership and monitoring would be good…" – Director, Availability Management (I15)

"The scope could be expanded. For example, invoicing, monitoring of receivables, escalations and handling of orders could be in the scope in the future. There could be an increasing amount of responsibilities as long as the old tasks are automated. Responsibilities could be expanded if the headcount doesn't increase with it." – SVP, Customer Logistics (I16)

6. DISCUSSION

6.1 The current state of the Logistics Control Tower

One supporting research question focused on defining the current state of the Logistics Control Tower, including key strengths and challenges. The research question is as follows:

What is the current state of the Logistics Control Tower?

To be able to analyze the current state and answer the above research question, it is helpful to understand critical success factors. Thereby, another research question was applied:

What are the critical success factors in supply chain and logistics management?

Based on those research questions, the current state of the Logistics Control Tower was analyzed and divided into three sections: current strengths, challenges and value creation.

6.1.1 Current strengths

The current strengths of the Logistics Control Tower are concluded in Table 4.

Table 4: Current strengths of the Logistics Control Tower

Strength	Description
Ambition and diversity of the teams	•Diverse experiences, knowledge and expertise •Willingness to have an impact on the business •Ability to utilize intellectual capital and convert those assets into tangible forms
Recognized development areas and future state	•Ability to examine own performance critically and outside of the box
Good understanding of customers	•Active communication and collaboration •Good understanding of customer requirements •Enabling good service level
Risk management	•Identifying, documenting, communicating and preventing issues •Being able to discover hidden risks •Reducing bottlenecks

Utilization of global common tools	•Increased transparency and visibility •Better customer service •Better supply chain agility and flexibility •Supporting stakeholders in utilizing global tools •Higher usage level of global tools •More centralized information

The first and the most important strength **is the ambition and diversity of the teams**. The individuals in the teams have a lot of diverse experiences, knowledge and expertise. Those assets combined with the ambition of the employees is the factor that enables value creation in the Logistics Control Tower. Volkov and Garanina (2008) emphasized the importance of obtaining a high usage level of intangible assets and converting those assets into tangible forms. The research indicates that the Logistics Control Tower has successfully identified its most valuable asset and has also obtained a high usage level of intellectual capital.

The second strength is that the Logistics Control Tower **have recognized their development areas and the state they want to achieve**. It refers to an ability to examine operations critically and outside of the box. In addition, it refers to professionalism and, therefore, it can be considered as well-managed intellectual capital, which is a critical success factor as knowledge-intensiveness is nowadays emphasized because it has a significant impact on the business economy and company's competitiveness (Manzari et al. 2012).

Good understanding of customers and their needs is the third strength of the Logistics Control Tower. It allows the customers to experience satisfaction and improves value creation (Camilleri 2017). Focusing on active communication with the customers is continuously emphasized in the control tower. Communication and collaboration with the customers allow the control tower to convert voiced requirements into customer requirements enabling a good level of service (Jayaswal et al. 2007). The current customer needs are mostly basic and expected needs because the Logistics Control Tower fills a gap that was previously uncovered. Unveiling hidden customer requirements and meeting exciting needs are not yet possible as it requires the control tower to understand its business environment and customers thoroughly, which requires a significant amount of time (Jayaswal et al. 2007).

The fourth strength of the Logistics Control Tower is **risk management**. According to Faizal and Palaniappan (2014), risk management is a critical supply chain success factor. In this case, it refers to the ability to identify, examine, document, communicate and prevent issues and understand their root causes. As mentioned, the Logistics Control Tower is filling an important gap as it has taken the responsibility of tasks that were

previously uncovered. Thereby, they can discover issues that were earlier hidden. Identifying risks itself is a very important matter, but the Logistics Control Tower also focus on examining, documenting and communicating the root causes. The control tower teams focus on solving those issues by themselves, but if they are unable to do so, they will communicate the issues to the correct organizations to get those issues solved. This is remarkable work for the whole case company as dealing with the issues prevents them from happening again and, thereby, decreases risks and bottlenecks.

The fifth strength of the Logistics Control Tower is that all the teams in different regions are **utilizing common global tools** in their daily operations. It increases transparency, supports managing the global supply chain (Fugate et al. 2006), enables higher customer service level and better supply chain agility (Alicke et al. 2016a). The tools are used to execute tasks, process data and share information to support decision-making. According to Neubert et al. (2004), it is a critical supply chain success factor. The teams are not only using the tools themselves, but they are also supporting stakeholders to use the tools, which enable higher global usage level of tools, reduced capital costs, more centralized information and better visibility. In addition, it allows the case company to identify important areas of development in its digital tools.

6.1.2 Current challenges

The current challenges of the Logistics Control Tower are concluded in Table 5.

Table 5: Current challenges of the Logistics Control Tower

Challenge	Description
•Overload of work •Lack of resources •Manual work	•Increased response time •Decreased competitiveness, flexibility and service quality •Decreased supply chain efficiency •Increased amount of human mistakes
Poor internal marketing	•Misunderstanding of what is the Logistics Control Tower, what does it do and what is its scope •Uncontrollable growth (tasks coming out of the scope) •Increased amount of manual work •Decreased efficiency
•Poor reliability of tools •Poor data and information management	•Technical failures •Easy user errors •Delays in processes •Fragmented information (bad accessibility) •Extra manual work
Current TMS	•Technical failures •One-way integrations •Decreased visibility •Increased workload •Lack of important features

Utilization of BI and analytics	•Poor visibility into costs •Limited transparency of the Logistics Control Tower •Lack of support for decision-making
Lack of standardization with internal and external partners	•Limited capability to support other teams in different regions •Decreased quality of delivered services •Overlapping work •Communication disruptions •Delays •Incomplete information flows •Limited visibility

One big challenge in the Logistics Control Tower is **the overload of work**, which is continuously increasing. It is caused by various factors that are presented later in this section. The overload of work causes a remarkable **lack of resources**. The lack of resources not only burden the employees, but it also affects the customers of the control tower as it negatively impacts response time, which is a critical supply chain success factor in developing competitiveness, flexibility (Hausman 2002) and service quality (Bober 2014). In addition, the Logistics Control Tower don't have enough resources to develop their own and global processes that would increase the overall efficiency of the supply chain. The lack of development also forces the employees to **execute daily tasks manually**, which not only takes extra time but also exposes them to human mistakes. On top of those challenges, the poor collaboration between the Logistics Control Tower teams in different regions makes the gap even bigger as the teams are not able to support each other properly. Integrated Logistics Control Tower teams would enable accurate and quick communication and collaboration, making it one critical success factor in the supply chain (Farooqui 2010).

Another major challenge in the Logistics Control Tower is **poor internal marketing**. Other organizations are aware of the existence of the Logistics Control Tower, but they don't know what the control tower does because it is not marketed effectively. This leads to a situation where multiple organizations want to utilize the control tower's services immediately, but because of the poor marketing, they have misunderstood the scope of the control tower. When such tasks are coming out of the current scope, the control tower doesn't have enough understanding, resources and capabilities to do such tasks efficiently and, the growth of the control tower is uncontrollable. It causes more manual work in the Logistics Control tower and decreased efficiency in global operations. According to McKeller (2014), appropriate resources are a critical supply chain success factor, and in this case, those are missing.

Appropriate tools are a critical success factor in the supply chain (McKeller 2014) because they enable efficient supply chain operations (Zijm et al. 2019). In this case, there

are common global tools in the case company. However, one **big challenge with those tools is their reliability**. The employees of the Logistics Control Tower mentioned that the tools have technical failures often. Besides the technical failures, the tools are also allowing its users to do human mistakes, which cause delays in processes and manual work to solve those mistakes. Another common issue of the tools is **poor data and information management**. Important data is fragmented into various information systems making the accessibility of the data worse and, therefore, data processing and information sharing require extra work. Waters (2007) emphasized the importance of managing information flows as successful flows allow better utilization of intellectual assets and, thus, competitive advantages. According to the control tower model presented by Zijm et al. (2019), the tools should utilize operational and strategic data from various sources to be able to manage logistics and supply chain activities effectively.

The biggest challenge with the tools in the Logistics Control Tower is **the current TMS**. It is not just unreliable, but its data and information management features and the integrations with other systems are also bad. The integration between the TMS and case company's ERP is one-way, meaning that there isn't data flowing back to the ERP. Also, the integration between logistics service providers' systems is poor. Those integration issues cause decreased visibility and extra work, and therefore, Alicke et al. (2016a) defined the usage of operational data as a critical supply chain success. The is TMS good for operational logistics tasks such as creating transportation bookings, but it is missing important features like reviewing total landed costs or reporting. To conclude, the TMS increases the workload in the control tower and, thereby, it causes a lack of resources.

Business intelligence and analytics are critical factors that support operational and strategic decision-making (Azeroual & Theel 2018) and, they can be classified as a supply chain planning mechanism (Alicke et al. 2016b). Currently**, the utilization level of BI and analytics** in the Logistics Control Tower is near zero. For example, the management doesn't have proper visibility into costs or actions that could be used to optimize the transportation spend. Besides those, also **the usage of metrics and KPI's** are poor, which also restricts the transparency of the control tower. Utilizing those mechanisms would allow the Logistics Control Tower to investigate its business performance (Bulusu & Abellera 2021) and make more effective decisions (Isik et al. 2011).

The final major challenge is **the lack of standardized processes and policies**. It is a critical success factor because it affects business performance (Davenport 1992). Some of the processes in the Logistics Control Tower are standardized, but there are still plenty of processes that are not. The biggest challenge inside the control tower is that the teams

in different regions have deviant policies and ways of working, which makes supporting other control tower teams hard. Also, it decreases the quality of services delivered to the customers (Davenport 1992). Besides the lack of standardization inside the control tower, processes with internal and external stakeholders lack standard policies, which cause overlapping work. For example, multiple organizations are doing transportation monitoring simultaneously. In addition to extra work and lost resources, the lack of global and regional standardization cause communication disruptions, delays, incomplete information flows and limited visibility.

6.1.3 Current value creation

In addition to the two earlier mentioned research questions, a third research question considering value creation was applied to support analyzing the current state of value creation. The research question is as follows:

What is value creation and, how to identify it?

The factors that currently create value for the customers in the Logistics Control Tower are concluded in Figure 23.

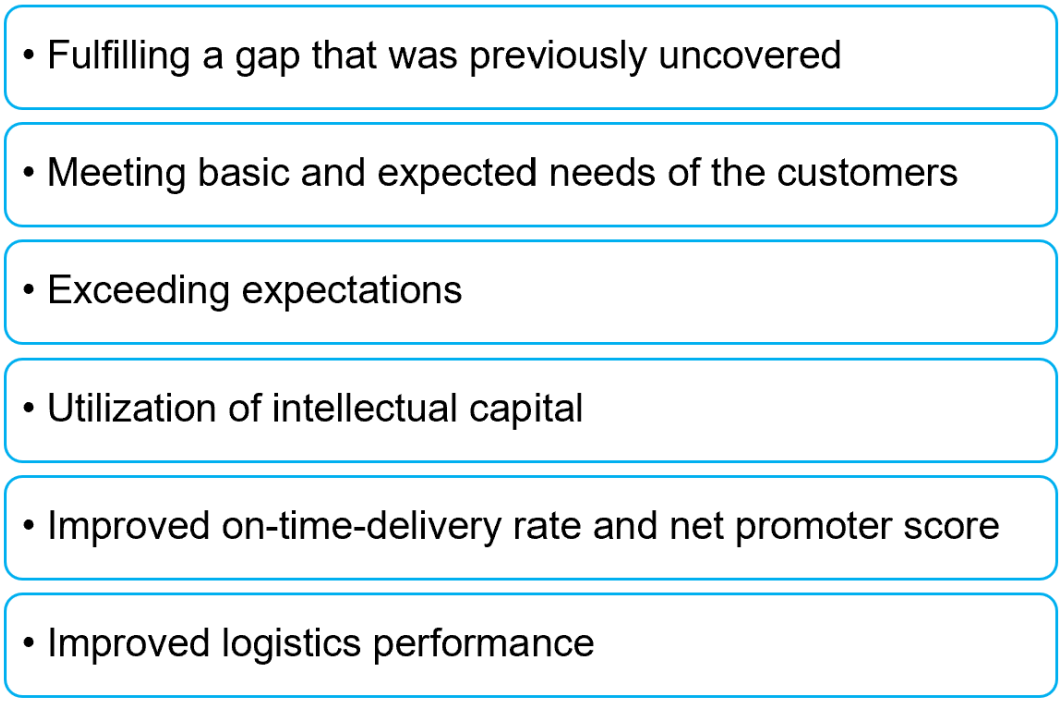

Figure 23: The current value-creating objects in the Logistics Control Tower

The customer value is created by **fulfilling a gap in the case company that was previously uncovered**. Fulfilling this uncovered gap enable the Logistics Control Tower to **meet basic and expected customer needs**. Basic needs are needs that don't have an impact on customer satisfaction but failing to fulfil these needs will cause a loss in value

creation (Griffin & Hauser 1993; Xu et al. 2007). As those basic needs were earlier uncovered, it should be argued whether fulfilling these needs create value or not. According to He et al. (2017) and Xu et al. (2007), Fulfilling expected needs will create value and, vice versa, failing to fill those needs will cause a loss in value creation. As the customers of the control tower have given positive feedback about exceeding their needs, it can be assumed that those types of needs are filled.

The covered gap and other tasks in the Logistics Control Tower don't only require time and effort but also knowledge and expertise of logistics and supply chain. It means that the value is created with the intellectual capital in teams, which was identified as the current key strength. Active utilization of intellectual capital combined with given effort **improves case company's on-time-delivery rate and net promoter score** and, thereby, creates value to internal and external end customers.

Other remarkable value-creating activities are related to **improving the global performance of logistics.** For instance, such activities are monitoring and collaborating with logistics service providers, improving logistics transparency, enhancing and distributing logistics-related data and information to stakeholders as well as improving the accuracy and reliability of shipment reports.

6.2 The desired future state of the Logistics Control Tower

One supporting research question focused on defining the desired future state of the Logistics Control Tower. The research question is as follows:

What is the desired future state of the Logistics Control Tower?

To be able to define the desired future state and answer the above research question, it is necessary to understand what are the objects that are valuable for customers. Thereby, another research question was applied:

How to improve customer value creation?

Based on those research questions, the desired future state of the Logistics Control Tower was defined and divided into five sections: attributes, collaboration and customer relationships, tools and technologies, tasks and responsibilities and brand. The desired future state of the Logistics Control Tower is concluded in Table 6.

Table 6: The desired future state of the Logistics Control Tower

Attributes	Collaboration and customer relationships	Tools and technologies	Tasks and responsibilities	Brand
Integrated	Proactive communication and collaboration	Reliable tools	Enable excellent visibility and transparency	Clear brand and brand-image
Agile and flexible	High-level internal customer service	Great TMS	Monitor and control	Value proposition
Quick response time	Review meetings with stakeholders	Automation	Risk management	Well-defined scope
Standardized processes	Customer-dominant logic of service	Centralized data	Support stakeholders and share expertise	
Appropriate resources and workload		Analytics and KPI's	Ensure efficient major flows	
Minimized manual work			Ensure data timeliness	
Intellectual capital			Improve operations	

Found in literature & interviews
Found in interviews
Found in literature

6.2.1 Attributes

The first important attribute of the future control tower is being **well integrated into the global supply chain**. This attribute was emphasized in the theoretical study. It enables effective major flows in the supply chain and efficiency and competitiveness improvements (Zijm et al. 2019) by reducing disruptions in the supply chain (Krajewski et al. 2009). In addition, it enables the organization to develop its agility and flexibility (Sillanpää 2014), which are also important attributes in the future.

The second and third desired attributes of the Logistics Control Tower are to **be agile and flexible enough with standardized and harmonized internal processes**. Standardized and harmonized internal processes mean that all the Logistics Control Tower teams in different regions have the same policies and ways of working. Standardization of processes helps in managing global operations (Fugate et al. 2006). Being agile and flexible means the capability to react and solve all logistics-related issues globally, no matter what is the location or timezone. **Quick response time** is the fourth important attribute. Response time is a key factor in developing the supply chain's performance and competitiveness (Hausman 2002). Achieving quick response requires good agility, flexibility and optimal allocation of workload (Vidyarthi et al. 2009).

The fifth desired attribute is to **have a minimal amount of manual work** in the Logistics Control Tower. Minimized manual work enables the control tower to focus on the most critical and valuable tasks. It is achieved with automation and standardization of

processes. In addition, having standardized processes and seamless collaboration with stakeholders prevents overlapping work from happening. In addition, **the workload and available resources in the control tower must be aligned**. It is the sixth desired attribute as it enables to maintain efficiency. Appropriate resources are a critical success factor that enables good management (Certo and Certo 2011) and collaboration between stakeholders in the supply chain (McKeller 2014; Ohlsson & Han (2018).

The seventh desired attribute is **intellectual capital (IC)**. As mentioned in Chapter 5.1.1, IC is a remarkable and very important strength of the Logistics Control Tower. The control tower aims to be an expert organization that supports other organizations, and thereby, a high usage level of IC is crucial. IC is connected to a company's competitiveness (Manzari et al. 2012), which is why managing IC and achieving net benefits with it requires continuous attention (Roos et al. 2006).

6.2.2 Collaboration and customer relationships

Proactive communication and collaboration were emphasized in the literature and interviews. Accurate and quick communication between partners is a key success factor (Farooqui 2010). Proactive information exchange, for instance, about schedule changes and bottlenecks, enable cost reductions, value enhancements, collaborative planning activities and competitive advantages (Farooqui 2010; McKeller 2014). Collaboration is important to maintain aligned goals, processes, roles and responsibilities with stakeholders. If supply chain collaboration and communication are on a low level, external collaboration and customer relationship management will be difficult (McKeller 2014). Proactive communication and collaboration with external stakeholders are also important as they enable the control tower to steer stakeholders, gain important visibility and build trust.

High-level internal customer service was emphasized in the literature and interviews. Aligned goals, good synergy and positive feelings are the key elements in building successful customer service and relationships (Farooqui 2010). Successful customer service drives the focus from costs to value and improves risk management (McKeller 2014). As the Logistics Control Tower is a supportive function that aims at creating customer value, maintaining high-level internal customer service is crucial. For example, solving stakeholders' issues, quick responses, and proactive information sharing is important. In the future, internal customer segmentation will be useful to improve customer service and customize service offerings to match the needs of the customers (Marshall et al. 1998).

Review meetings with stakeholders are part of the collaboration and high-level internal customer service. However, it was emphasized in the literature and during the interviews. Review meetings enable the control tower and its stakeholders to review past, receive feedback, understand each other better, have updated information and plan upcoming operations. Understanding customer requirements and asking customers to assess the service and its provider against the requirements are part of high-level internal customer service, and thereby, review meetings are a key success factor in the future (Marshall et al. 2019).

Customer-dominant logic of service (CDL) was identified in the literature. As mentioned, the Logistics Control Tower aims to be heavily internal customer-focused value providing service function, and thereby, exploiting customer-dominant logic of service is the correct perspective to utilize as it positions the customer in the centre (Heinonen et al. 2010). In the customer-dominant logic of service, an important matter is to investigate how customers live their lives (Heinonen et al. 2013) and what do they do with services to reach their objectives (Heinonen et al. 2010). This matter will also be important in the control tower as they are required to understand their customers thoroughly to be able to support them. Earlier mentioned meetings have a significant role in utilizing CDL as those meetings enable them to understand how, where and when the control tower must be involved to support the value formation process. The control tower should design its services and value offerings based on what its customers need (Heinonen & Strandvik 2015).

6.2.3 Tools and technologies

Reliable tools are crucial for the Logistics Control Tower as all the tasks are done with digital tools. Reliable tools were emphasized in the literature and interviews. Accurate, quick, reliable and well-functioning tools enable the control tower to perform their tasks and responsibilities efficiently and on time. Reliable tools prevent from sharing of distorted information, increased lead times and user errors, and thereby improves flexibility and responsiveness (Zijm et al. 2019). Reliable tools enable the control tower to increase visibility and strengthen the cooperation between partners (Christopher 2016; Paksoy et al. 2021).

A great transportation management system (TMS) was one of the most emphasized matters during the interviews. TMS is the core digital tool in the Logistics Control Tower, which is why user-friendly, versatile, reliable, and high-end TMS is critical. The TMS must be completely integrated into other internal and external systems enabling diverse real-time data from all supply chain and logistics activities. It must allow the control tower to

manage and examine logistics-related costs. In addition, it must have good reporting and data and information management capabilities, which enables, for example, consolidation of shipments and optimized freight spend. A high-end TMS also means that it should require a minimal amount of manual work.

Automation was recognized in the interviews. All simple and repeating tasks in the Logistics Control Tower must be automated. It improves reliability, productivity and response time, releases a remarkable amount of resources, reduces risks, enables consistent processes and improves employee satisfaction.

The need for centralized data was also identified during the interviews. Centralized data improves transparency and visibility, saves time, reduces manual work and improves the quality of reporting. In this case, the data should be centralized to TMS as it is the core digital tool, and thereby, it should contain all the necessary and helpful data from various sources.

Analytics and key performance indicators (KPI) were emphasized in the literature and interviews. The Logistics Control Tower should have a high usage level of analytics. It should provide valuable insights about operations that support understanding needed solutions, reducing costs and improving efficiency (Bulusu & Abellera 2021). In addition, it should support daily tasks as well as decision-making processes (Isik et al. 2011; Bulusu & Abellera 2021). KPI's must be utilized to understand the performance of logistics and the control tower. It enables the control tower to steer its operations and review the success and, it also improves stakeholders' visibility of logistics.

6.2.4 Tasks and responsibilities

Enabling excellent visibility and transparency was emphasized in the interviews. It means that the stakeholders want the Logistics Control Tower to update and maintain data that is related to orders, logistics and supply chain. For instance, better visibility of transportation quote requests was emphasized during the interviews. The visibility and transparency should be improved by focusing on the availability, reliability and accessibility of data. Reports and KPI's are an important way of improving the visibility from stakeholders' viewpoint.

Monitoring and controlling of logistics were emphasized in the literature and interviews. Sakki (2014) and Zijm et al. (2019) defined monitoring as a critical logistics management component. According to the interviews, monitoring of logistics-related activities is important as it enables the case company to stay up-to-date and react to challenges, and thereby, improves visibility. This is also supported by Paksoy et al.

(2020), as they stated that monitoring improves visibility, reduces risks, decreases lead times and improves on-time delivery performance. In addition, monitoring improves the knowledge of the entire supply chain (Zijm et al. 2019). Controlling logistics activities enables the company to satisfy the customer and deliver superior customer value (Vorst 2004; Christopher 2016), and therefore, it is a vital element in logistics management (Harrison & Hoek 2008). It allows the company to increase the performance of the supply chain (Sople 2011). Controlling was emphasized in the interviews as it would improve the case company's logistics performance and prevent risks, and thereby reduce transportation costs.

Risk management was identified in the literature and interviews. It refers to identifying, managing and preventing risks to avoid disruptions (Shahbaz et al. 2017). Supply chain risk management is a critical success factor and, it was also recognized during the interviews (Schoenherr 2009; Faizal and Palaniappan 2014). The Logistics Control tower should focus on time and information risks as it is a service function (Quang and Hara 2017, cited in Ivanov et al. 2019). Identifying, monitoring, documenting, communicating, solving and preventing logistics-related risks were emphasize during the interviews. For example, transportation delays and dated information are important risks to manage in the control tower as those decrease the performance of value flow and thereby affects the end customer (Krishna 2016).

Supporting stakeholders and sharing expertise is an important task as the control tower is a supportive service function with various stakeholders. The core meaning of the Logistics Control Tower is to support other organizations in the case company with logistics-related matters. For instance, supporting stakeholders with transportation arrangements and needed documentation are critical in maintaining good logistics performance. Due to the global supply chain, there are a lot of specific logistics-related requirements globally, and thereby, the control tower is needed to support stakeholders with its logistical expertise. Supporting and sharing expertise allows service improvements (Farooqui 2010), cost reductions, value enhancements and access to wider knowledge and information (Waters 2007).

Ensuring efficient major flows was emphasized in the literature. The major flows in the supply chain have a vital role in business as every business transaction involves information, material or service and money (Rahman & Qureshi 2007). Managing the major flows improves the supply chain's competitiveness and efficiency (Kolinski et al. 2020). Managing major flows allows the company better visibility and transparency as well as time, cost and worry savings (Waters 2007). Optimized flows increase customer

satisfaction (Simatupang et al. 2017), improve business performance, improve value creation (Leng & Zailani 2012) and reduce costs (Harrison & Hoek 2008).

Ensuring data timeliness was emphasized in the literature and interviews. In this case, it is logistics-related data in the case company's information systems. Such data considers, for example, orders, deliveries and risks (Zijm et al. 2019). Ensuring data timeliness enables managing logistics and supply chain visibility, improving the quality of reports as well as decreasing risks. Especially up-to-date external data is critical as it is often related to transportation schedules, and thereby, its timeliness is a critical success factor. Real-time data enable service benefits (Alicket et al. 2016a), agility, connected network, end-to-end transparency and holistic decision-making (Mussomeli et al. 2016).

Improving logistics-related operations was emphasized in the interviews. It means that the Logistics Control Tower should identify and seek logistics-related procedures to be developed. For instance, improving the control tower's internal ways of working, procedures with stakeholders and procedures with external stakeholders is needed. It decreases workload, saves resources, and improves supply chain efficiency and integration.

6.2.5 Brand

Clear brand and brand-image were emphasized in the literature and interviews. According to Allee (2008), brand-image is a way how a company can have an increasing impact on the value the customer perceives. The Logistics Control Tower's brand-image has affects the customers' opinions, assumption and perceptions, and therefore, a clear and well-defined brand is important to have in the control tower.

A value proposition was also found in the literature and interviews. A value proposition is needed as it has an impact on value delivery as the supplier can only propose and support value creation (Vargo et al. 2010). In addition, a value proposition is part of marketing, and thereby, it has an impact on customers' opinions and perceived value. In this case, the Logistics Control Tower's value proposition should propose the value its services provide to the customers. Fulfilling a value proposition is as important as creating one.

Well-defined scope was emphasized in the interviews. It means that the control tower must have a clearly defined and well-communicated scope in the case company. The well-defined scope is an important part of brand-image and value proposition. The market areas, business areas and organizations that are covered by the services of the

Logistics Control Tower must be defined. It prevents misunderstandings and extra workload and thereby enable a better quality of services as well as employee and customer satisfaction.

6.3 Action plan and the identified gap

The main research question was applied to identify the critical gap between the current and the desired future state of the Logistics Control Tower and suggest actions that are needed to achieve the desired future state. The main research question is as follows:

How to maximize the Logistics Control Tower value creation?

The main research question was answered with the help of the theoretical study, the results of the interviews, and previous discussions. Based on those, a critical gap was identified and, suggested actions were created. The gap and suggested actions are concluded and presented in Table 7.

Table 7: Identified gap and suggested actions

Identified critical gap	Suggested actions	Priority	Involved
Integration of the control tower teams	-Benchmark different ways of executing tasks between regions	High	CT
	-Standardize and harmonize the best practices in the control tower	High	
Processes	-Standardize processes with internal and external stakeholders	Medium	CT, S
Resources and workload	-Increase headcount	Medium	CT
	-Automate tasks	High	
	-Reduce the amount of manual work	High	
Tools	-Standardize ways of using tools and educate stakeholders	Low	CT, S
	-Improve reliability and swiftness of the tools	Medium	CT
TMS	-Get a new TMS with: • Proper integrations • Data and information management capabilities • Reporting capabilities	High	CC
Data and information management	-Centralize data	Medium	CT
	-Improve the usage of external data	High	
	-Ensure data is up-to-date all the time	High	
Visibility	-Enable analytics	Low	CT
	-Enable metrics and KPI's	Medium	
	-Take over and centralize the management of transportation quote requests	Low	CT, S
	-Improve the visibility of what is being loaded to trucks in warehouses	Medium	CT, S
	-Collaborate with stakeholders to gain visibility into upcoming workload	High	CT, S
Internal marketing	-Build a clear brand	Medium	CT
	-Create a value proposition	Medium	
	-Market the control tower simply and effectively	Medium	
Controlled growth	-Define the scope of work properly	High	CT
	-Create, communicate and utilize growth plan	High	

CT = Control Tower
S = Stakeholders
CC = Case Company

The first column of the above table defines the theme of the gap that requires attention to be able to achieve the desired future state. The second column defines what the suggested actions to fulfil the gap are. The third column defines how urgent the

suggested action is on a scale of high to low. The fourth column defines the parties that are involved in the suggested action.

The first theme, **integration of the control tower teams,** is critical to achieving agile, flexible and efficient management of logistics. It also enables better customer service, quicker response time and increased visibility of tasks inside the control tower.

The second theme, **processes,** is critical as standardized processes with internal and external stakeholders improve visibility, prevent extra and overlapping work, improve logistics management and improve collaboration.

The third theme, **resources and workload,** is critical as appropriate resources and workload are required to have a well-functioning control tower that can produce efficient and valuable services for internal customers. It also improves employee satisfaction.

The fourth theme, **tools,** is critical as all the tasks, communication and collaboration are done with digital tools, and thereby the tools define the capabilities and efficiency of the control tower. For instance, tools have a significant effect on response time.

The fifth theme, **TMS,** is critical as it is the main tool in the control tower. The control tower needs to have a TMS that is versatile, reliable and modern. It enables better agility, flexibility, efficiency, visibility, transparency, efficient execution of tasks, reduced manual work and more effective usage of resources.

The sixth theme, **data and information management**, is critical as the tasks and responsibilities of the control tower are based on logistics-related data and information. Good data and information management allow better customer service, increased visibility and transparency, reduced manual work and quick response time.

The seventh theme, **visibility**, is critical as it also defines the efficiency of tasks in the control tower. It also improves customer satisfaction and allows the control tower and its stakeholders to make better decisions.

The eighth theme, **internal marketing**, is critical because other organizations in the case company need to understand what is the control tower, what does it do and what is value it provides.

The ninth and last theme, **controlled growth**, is critical as it allows the control tower to use its resources effectively. It decreases misunderstandings and confusion and enables the control tower to focus on its core tasks. Those benefits allow better agility and flexibility, efficient execution of tasks, increased customer satisfaction and quicker response time.

7. CONCLUSIONS

7.1 Summary of the results

The research was able to answer all the research questions through theoretical study and empirical study. The theoretical study also created a basis for successful empirical study. The empirical study was executed as a case study, which utilized semi-structured interviews. The interviews were conducted in two rounds. The first-round interviews consisted of ten interviews that focused on the current state of the Logistics Control Tower. During the first-round interviews, eight control tower employees and two stakeholders were interviewed. The second-round interviews consisted of six interviews that focused on the desired future state of the Logistics Control Tower. All the six interviewees on the second-round were stakeholders. In total, the empirical research consisted of sixteen interviews. The answers of the interviews were analyzed with qualitative practices. The analysis of the qualitative data included transcribing, combining, coding, theming and refining.

With the help of the theoretical study, the current state of the Logistics Control Tower was defined and divided into themes that were classified either as strengths, challenges or value-creating objects. The identified strengths were ambition and diversity of the teams, recognized development areas and future state, good understanding of customers, risk management and utilization of global tools. The identified challenges were overload of work, lack of resources, manual work, poor internal marketing, poor reliability of tools, poor data and information management, current transportation management system, utilization of BI and analytics and lack of standardization. The identified value-creating objects were fulfilling a gap in the case company, meeting the needs of the customers, exceeding expectations, utilization of intellectual capital, improved on-time-delivery rate and net promoter score and improved logistics performance.

The desired future state was also identified with the help of the theoretical study. The desired future state was divided into five dimensions. Those dimensions were attributes, collaboration and customer relationships, tools and technologies, tasks and responsibilities and brand. Each of the dimensions consists of important components that were identified during the empirical research.

After defining the current and desired future state of the Logistics Control Tower, a critical gap between those states was identified. The gap was divided into nine components that

were integration of the control tower teams, processes, resources and workload, tools, transportation management system, data and information management, visibility, internal marketing and controlled growth. After the gap was identified, suggested actions were presented to fulfil the critical gap and to be able to achieve the desired future state of the Logistics Control Tower.

7.2 Evaluation of the research

The research was conducted as a case study, which is why the research strongly focuses on the case company. The goal of the research was to investigate Logistics Control Tower's value creation in the case company. The first objective was to define the current state of the Logistics Control Tower and, the second objective was to identify the desired future state of the Logistics Control Tower. From the objective point of view, the research was able to meet those goals and answer the research questions. The research was conducted within a six month timeframe. The timeframe limited the scope of the theoretical study as well as the number of conducted interviews.

The theoretical study focused on value creation and supply chain and logistics management. There is a great amount of literature available around those topics, and thereby the theoretical part of the research focused on giving a comprehensive understanding of those subjects to answer research questions and create a basis for the empirical research. The number of citations from each source was considered to have a broad perspective, avoid monotonous data and have valid information.

The data in the empirical research was collected with semi-structured interviews. Semi-structured interviews were built around specific themes, which affects the type of data gathered. Semi-structured interviews emphasize some of the themes more than others, and thereby some of the topics can be left out and, vice versa, some topics are gone through comprehensively. The interviewees were selected with a specific sampling method which also affects the results of the research.

Every step and action of the research is described as detailed as possible to maintain its reliability and repeatability. However, as mentioned in Chapter 4.2, the Logistics Control Tower is a new function in the case company that is continuously evolving. The changes in the control tower caused by the continuous development affect the repeatability of the research, and thereby the results may be different if the research is repeated.

7.3 Future areas of research

First, increasing the sample size of the interviews could offer more valuable information. Interviewing a greater number of the Logistics Control Tower employees would give more detailed and wider perspectives. In addition, a greater number of stakeholders could also be beneficial as it would enable diverse perspectives from various organizations. Bigger sample size could enable a more comprehensive investigation of the current and desired futures states of the control tower. A more comprehensive investigation could also find more gaps between the current and desired future state. In addition, if the timeframe was extended, more detailed data could be taken into account, which could offer interesting viewpoints. In this case, many tiny details had to be left out because of the timeframe.

In the future, research that focuses only on a few carefully selected customers could also be beneficial. It could allow the Logistics Control Tower to understand those customers better and create a superior value for them. This research considered technical and humane aspects. In the future, research that focuses only either on technical or humane aspects could offer more valuable information around those aspects. In addition, future research could focus either on value creation or supply chain and logistics management. It could allow one to understand one of these subjects more detailed, enabling diverse viewpoints.

Repeating the research in the future could be also beneficial as the Logistics Control Tower is quickly evolving. Repeated research could enable richer and updated data as the control tower would have developed significantly.

8. REFERENCES

Achtenhagen, L., Melin, L. & Naldi, L. (2013). Dynamics of Business Models – Strategizing, Critical Capabilities and Activities for Sustained Value Creation, Long Range Planning, Vol. 46(6), pp. 427-442.

Albores, P., Bititci, U. S., Martinez, V. & Parung, J. (2004). Creating and Managing Value in Collaborative Networks, International Journal of Physical Distribution and Logistics Management, Vol. 34(3-4), pp. 251-268.

Alicke, K., Glatzel, C. & Karlsson, P.-M. (2016b). Big data and the supply chain: The big-supply-chain analytics landscape, McKinsey. Available: https://www.mckinsey.com/business-functions/operations/our-insights/big-data-and-the-supply-chain-the-big-supply-chain-analytics-landscape-part-1

Alicke, K., Rachor, J. & Seyfert, A. (2016a). Supply Chain 4.0 – the next-generation digital supply chain, McKinsey. Available: https://www.mckinsey.com/business-functions/operations/our-insights/supply-chain-40--the-next-generation-digital-supply-chain

Allee, V. (2008). Value network analysis and value conversion of tangible and intangible assets, Journal of Intellectual Capital, Vol. 9(1), pp. 5-24.

Antai, I. (2011). Operationalizing Supply Chain vs. Supply Chain Competition, Helsinki: Hanken School of Economics & Imoh Antai.

Anttila, P. (2014). Tutkimisen taito ja tiedon hankinta, Metodix. Available: https://metodix.fi/2014/05/17/anttila-pirkko-tutkimisen-taito-ja-tiedon-hankinta/

Attong, M. & Metz, T. (2013). The Business Process Improvement Manual: Change or Die, Boca Raton: Taylor & Francis Group, LLC.

Azeroual, O. & Theel, H. (2018). The Effects of Using Business Intelligence Systems on an Excellence management and Decision-Making Process by Start-Up Companies: A Case Study, International Journal of Management Science and Business Administration, Vol. 4(3), pp. 30-40.

Babin, B. J. & Attaway, J. S. (2000). Atmospheric Affect as a Tool for Creating Value and Gaining Share of Customer, Journal of Business Research, Vol. 49(2), pp. 91-99.

Bahadur, W., Aziz, S. & Zulfiqar, S. (2018). Effect of employee empathy on customer satisfaction and loyalty during employee-customer interactions, Cogent Business & Management, Vol. 5(1), pp.1-21.

Bailey, T., Barriball, E., Dey, A. & Sankur, A. (2019). A practical approach to supply-chain risk management, McKinsey. Available: https://www.mckinsey.com/business-

functions/operations/our-insights/a-practical-approach-to-supply-chain-risk-management

Ballantyne, D., Williams, J. & Aitken, R. (2011). Introduction to service-dominant logic: From propositions to practice, Industrial Marketing Management, Vol. 40(2), pp. 179-180.

Bateman, T. S., Snell, S. A & Konopaske, R. (2017). Management: Leading & Collaborating in a Competitive World, Twelfth Edition, New York: McGraw-Hill Education.

Bergström, J. & Svensson, M. (2010). Value creation and relationships in transformation. Linkoping: Linköpings Universitet.

Bititci, U. S., Ackermann, F., Ates, A., Davies, J., Garengo, P., Gibb, S., MacBryde, J., Mackay, D., Maguire, C., Meer, R., Shafti, F., Bourne, M. & First, S. U. (2011). Managerial processes: business process that sustain performance, International Journal of Operations & Production Management, Vol. 31(8), pp. 851-891.

Blanchard, D. (2010). Supply Chain Management Best Practices, Second Edition, New Jersey: John Wiley & Sons, Inc.

Bober, P. (2014). Simulation for IT Service Desk Improvement, Quality Innovation Prosperity, Vol. 18(1), pp. 47-58.

Bozarth, C. C. & Handfield, R. B. (2013). Introduction to Operations and Supply Chain Management, Third Edition, New Jersey: Pearson Education, Inc.

Brocke, J. & Roswermann, M. (2014). Business Process Management, Wiley Encyclopedia of Management, Vol. 7.

Bulusu, L. & Abellera, R. (2021). AI Meets BI: Artificial Intelligence and Business Intelligence, Boca Raton: Taylor & Francis Group.

Cakir, E., Temel, E. & Akel, G. (2017). Classification of Customer Requirements Using Kano Model: A Research on Shopping Malls, Tokyo: Kaoru Ishikawa International Congress on Business Administration and Economy-II.

Camilleri, M. A. (2017). Travel Marketing, Tourism Economics and the Airline Product: Understanding Customer Needs and Wants, Springer.

Cardoni, A., Kiseleva, E. & Taticchi, P. (2020). In Search of Sustainable Value: A Structured Literature Review, Sustainability, Vol. 12(2), pp. 615.

Carter, P. L., Monczka, R. M., Ragatz, G. L. & Jennings, P. L. (2009). Supply Chain Integration: Challenges and Good Practices, Arizona: CAPS Research.

Certo, S. C. & Certo, S. T. (2011). Modern Management: Concepts and Skills, Twelfth Edition, New Jersey: Prentice Hall.

Chen, H., Chiang, R. H. L. & Storey, V. C. (2010b). Business Intelligence Research, MIS Quarterly, Vol 34.

Chen, J. C., Li, Y. & Shady, B. D. (2010a). From value stream mapping toward a lean/sigma continuous improvement process: an industrial case study, International Journal of Production Research, Vol. 48(4), pp. 1069-1086.

Chibba, A. & Rundquist, J. (2009). Effective Information Flow in the Internal Supply Chain: Results from a Snowball Method to Map Information Flows, Journal of Information & Knowledge Management, Vol. 8(4), pp. 331-343.

Christopher, M. (2016). Logistics & Supply Chain Management, Fifth Edition, New York: Pearson Education.

Cova, B. & Salle, R. (2008). Marketing solutions in accordance with the S-D logic: Co-creating value with customer network actors, Industrial Marketing Management, Vol. 37(3), pp. 270-277.

Daft, R. L. (2009). Management, Ninth Edition, Mason: Cengage Learning.

Darko, S., Terkper, V. D., Novixoxo, J. D. & Anning, L. (2018). Assessing the Effect of Lead Time Management on Customer Satisfaction, International Journal of Developing and Emerging Economies, Vol. 6(1), pp. 1-22.

Davenport, T. H. (1992). Process Innovation: Reengineering Work through Information Technology, Boston: Harvard Business School Press.

Dean, J. (2020). Challenges in Supply Chain Management, Wisconsin School of Business. Available: https://wsb.wisc.edu/news/school-news-blog/2020/09/02/challenges-in-supply-chain-management

DeLayne Stroud, J. (N.d). The Kano Analysis: Customer needs are ever changing, ISIXSIGMA. Available: https://www.isixsigma.com/tools-templates/kano-analysis/kano-analysis-customer-needs-are-ever-changing/

Drollinger, T., Comer, L. B. & Warrington, P. T. (2005). Development and validation of the active empathetic listening scale, Psychology and Marketing, Vol. 23(2), pp. 161-180.

Dubey, S.K., Singh, R., Singh, S. P., Mishra, A. & Singh, N. V. (2020). A Brief Study of Value Chain and Supply Chain, Mahima Publications, Vol. 194, pp. 177-183.

Durugbo, C., Tiwari, A. & Alcock, J. R. (2014). Managing integrated information flow for delivery reliability, Industrial Management & Data Systems, Vol. 114(4), pp. 628-651.

Edvardsson, B., Tronvoll, B. & Gruber, T. (2011). Expanding Understanding of Service Exchange and Value Co-creation: A Social Construction Approach, Journal of the Academy of Marketing Science, Vol. 39(3), pp. 327-339.

Eichorn, F. L. (2004). Internal Customer Relationship Management (intCRM): A Framework for Achieving Customer Relationship Management from the Inside Out, Problems and Perspectives in Management, Vol. 2(1), pp. 154-177.

Evans, S., Fernando, L. & Yang, M. (2017). Sustainable Value Creation – From Concept Towards Implementation, Sustainable Manufacturing, Sustainable Production, Life Cycle Engineering and Management, pp. 203-220.

Faizal, K. & Palaniappan, PL. K. (2014). Risk Assessment and Management in Supply Chain, Global Journal of Researches in Engineering, Vol. 14(2).

Farooqui, S. U. (2010). Encyclopaedia of Supply Chain Management, Mumbai: Himalaya Books Pvt. Ltd.

Felice, F., Monfreda, S., Petrillo, A., Nenni, M. E., Iannone, R., Introna, V., Giuiusa, A. & Carlo, F. (2013). Operations Management, InTech.

Fugate, B., Sahin, F. & Mentzer, J. T. (2006). Supply Chain Management Coordination Mechanisms, Journal of Business Logistics, Vol. 27(2), pp. 1-43.

Galletta, A. (2013). Mastering the Semi-Structured Interview and Beyond, New York: New York University Press.

Ghasemi, M. H. & Gholami, L. (2016). Knowledge Management and Value Creation Strategies, Journal of Applied Environmental and Biological Sciences, Vol. 6(3), pp. 277-280.

Gong, S. & Cullinane, K. (2018). Finance and Risk Management for International Logistics and The Supply Chain, Amsterdam: Elsevier Inc.

Griffin, A. & Hauser, J. R. (1993). The Voice of the Customer, Marketing Science, Vol. 12(1), pp. 1-27.

Griffin, R. W. (2012). Management: Principles and Practices, Eleventh Edition, Mason: Thomson South-Western.

Grover, V. & Kettinger, W. J. (1998). Business Process Change: Concepts, Methods and Technologies, Harrisburg: Idea Group Publishing.

Grönroos, C. & Helle, P. (2010). Adopting a service logic in manufacturing, Journal of Service Management, Vol. 21(5), pp. 564-590.

Grönroos, C. & Ravald, A. (2011). Service as business logic: implications for value creation and marketing, Journal of Service Management, Vol. 22(1), pp. 5-22.

Grönroos, C. (2011). Value co-creation in service logic: A critical analysis, Marketing Theory, Vol. 11(3), pp. 279-301.

Grönroos, C., Strandvik, T. & Heinonen, K. (2015). The Nordic School – Service Marketing and Management for the Future: Value Co-Creation, Helsinki: Hanken School of Economics, pp. 69-81.

Guggenberger, T., Schweizer, A. & Urbach, N. (2020). Improving Inter-Organizational Information Sharing for Vendor Managed Inventory: Towards a Decentralized Information Hub Using Blockchain Technology, IEEE Transactions on Engineering Management, Vol. 67(4), pp. 1074-1085.

Gulyaz, E. & Veen, J. (2015). How Logistics & Supply Chain can Create and Appropriate Customer Value, Nyenrode Business Universiteit.

Gummerus, J. (2013). Value Creation Processes and Value Outcomes in Marketing Theory: Strangers or Siblings? Marketing Theory, Vol. 13(1), pp. 19-46.

Haksever, C., Chaganti, R. & Cook, R. G. (2004). A model of Value Creation: Strategic View, Journal of Business Ethics, Vol. 49(3), pp. 295-307.

Haracic, M., Tatic, K. & Harcic, M. (2018). The Improvement of Business Efficiency Through Business Process Management, Journal of Economics and Business, Vol. 16(1), pp. 31-43.

Harmon, P. (2019). Business Process Change: A Business Process Management Guide for Managers and Process Professionals, Fourth Edition, Cambridge: Eslevier Inc.

Harmon, R., Demirkan, H., Hefley, B. & Auseklis, N. (2009). Pricing Strategies for Information Technology Services: A Value-Based Approach, 42nd Hawaii International Conference on Systems Science: Proceedings, 5-8.

Harrison, A. & Hoek, R. (2008). Logistics Management and Strategy: Competing through the supply chain, Harlow: Pearson Education Limited.

Hausman, W. H. (2002). Supply Chain Performance Metrics, The Practice of Supply Chain Management, Vol. 62(1), pp. 61-73.

He, L., Ming, X., Li, M., Zheng, M. & Xu, Z. (2017). Understanding customer requirements through quantitative analysis of an improved fuzzy Kano's model, Journal of Engineering Manufacture, Vol. 231(4), pp. 699-712.

Heinonen, K. & Strandvik, T. (2015). Customer-dominant logic: Foundations and implications, Journal of Services Marketing, Vol. 29(6-7), pp. 472-484.

Heinonen, K., Strandvik, T. & Voima, P. (2013). Customer dominant value formation is service, European Business Review, Vol. 25(2), pp. 104-123.

Heinonen, K., Strandvik, T., Mickelsson, K., Edvardsson, B., Sundström, E. & Andersson, P. (2010). A customer-dominant logic of service, Journal of Service Management, Vol. 21(4), pp. 531-548.

Hidjaja, C. (2018). Top Supply Chain Management Challenges & How to Overcome Them. Available: https://blog.vision33.com/top-supply-chain-management-challenges-and-how-to-overcome-them

Hines, T. (2013). Supply Chain Strategies: Demand Driven and Customer Focused, Second Edition, Abingdon: Routledge.

Hsieh, P.-F., Lee, C.-S. & Ho, J. C. (2012). Strategy and process of value creation and appropriation in service clusters, Technovation, Vol. 32(7-8), pp. 430-439.

IFAC. (2020). Understanding Value Creation, New York: International Federation of Accountants.

Isik, O., Jones, M. C. & Sidorova, A. (2011). Business Intelligence (BI) Success and The Role of BI Capabilities, Intelligent Systems in Accounting, Finance and Management, Vol. 18(4), pp. 161-176.

Islam, D. M. Z., Meier, J. F., Aditjandra, P. T., Zunder, T. H. & Pace, G. (2013). Logistics and supply chain management, Research in Transportation Economic, Vol. 41(1), pp. 3-16.

Ivanov, D. & Sokolov, B. (2010). Adaptive Supply Chain Management, London: Springer.

Ivanov, D., Tsipoulanidis, A. & Schönberger, J. (2019). Global Supply Chain and Operations Management, Second Edition, Cham: Springer.

Jahangiri, M. H. & Cecelja, F. (2014). Modelling Financial Flow of the Supply Chain, International Conference on Industrial Engineering and Engineering Management, Vol. 1(1), pp. 1071-1075.

Jahanshahi, A. A., Nawaser, K. & Brem, A. (2019). The Effects of Customer Capital on Customer Response Speed and Innovativeness: The Mediating Role of Marketing Capability, International Journal of Innovation Management, Vol. 23(6), pp. 1-25.

Janvier-James, A. M. (2011). A New Introduction to Supply Chains and Supply Chain Management: Definitions and Theories Perspective, International Business Research, Vol. 5(1), pp. 194-207.

Javaid, T. & Siddiqui, D. A. (2018). Supply Chain Responsiveness and Supply Chain Performance: The Role of Supply Chain Risk Management, SSRN Electronic Journal.

Jayaswal, B. K., Patton, P. C. & Zultner, R. E. (2007). The Design for Trustworthy Software Compilation Understanding Customer needs: Software QFD and the Voice of the Customer, New Jersey: Pearson Education, Inc.

Jiao, J. & Chen, C.-H. (2006). Customer Requirement Management in Product Development: A Review of Research Issues, Concurrent Engineering, Vol. 14(3), pp. 173-185.

Kaipia, R. (2007). Supply Chain Coordination – Studies on Planning and Information Sharing Mechanisms, Helsinki: Riikka Kaipia, Helsinki University of Technology.

Kaipia, R. (2009). Coordinating Material and Information Flows with Supply Chain Planning, International Journal of Logistics Management, Vol. 20(1), pp. 144-162.

Kaplinsky, R. & Morris, M. (2001). A Handbook for Value Chain Research, International Development Research Centre.

Karpen, I. O., Bove, L. L. & Lukas, B. A. (2011). Linking Service-Dominant Logic and Strategic Business Practice, Journal of Service Research, Vol. 15(1), pp. 21-38.

Kaushik, V. & Walsh, C. A. (2019). Pragmatism as a Research Paradigm and Its Implications for Social Work Research, Social Sciences, Vol. 8(9), pp. 255.

Kazemi, Y. (2019). How The Modern Supply Chain Is Evolving, Forbes. Available: https://www.forbes.com/sites/yasamankazemi/2019/06/27/how-the-modern-supply-chain-is-evolving/

Keong Choong, K. (2008). Intellectual capital: definitions, categorization and reporting models, Journal of Intellectual Capital, Vol. 9(4), pp. 609-638.

Kolinski, A., Dujak, D. & Golinska-Dawson, P. (2020). Integration of Information Flow for Greening Supply Chain Management, Cham: Springer.

Krajewski, L. J., Ritzman, L. P. & Malhotra, M. K. (2009). Operations Management: Processes and Supply Chains, Ninth Edition, New Jersey: Prentice Hall.

Krishna, S. (2016). The Five Major Flows in Supply Chain, Brandalyzer. Available: https://brandalyzer.blog/2016/03/23/the-five-major-flows-in-supply-chain/

Krol, K. & Zdonek, D. (2020). Analytics Maturity Models: An Overview, Information, Vol. 11(3), pp. 1-19.

Kumar, D. & Rajeev, P. V. (2016). Value Chain: A Conceptual Framework, International Journal of Engineering and Management Sciences, Vol. 7(1), pp. 74-77.

Laihonen, H., Hannula, M., Helander, N., Ilvonen, I., Jussila, J., Kukko, M., Kärkkäinen, H., Lönnqvist, A., Myllärniemi, J., Pekkola, S., Virtanen, P., Vuori, V. & Yliniemi, T. (2013). Tietojohtaminen, Tampere: Tampereen Teknillinen Yliopisto.

Larson, P. D. & Rogers, D. S. (1998). Supply Chain Management: Definition, Growth and Approaches, Journal of Marketing Theory and Practice, Vol. 6(4), pp. 1-5.

LeMay, S., Helms, M. M., Kimball, B. & McMahon, D. (2017). Supply chain management: the elusive concept and definition, The International Journal of Logistics Managements, Vol. 28(4), pp. 1425-1453.

Leng, L. F. & Zailani, S. (2012). Effects of Information, Material and Financial Flows on Supply Chain Performance: A Study of Manufacturing Companies in Malaysia, International Journal of Management, Vol. 29(1), pp. 293-313.

Li, G., Yan, H., Wang, S. & Xia, Y. (2005). Comparative analysis on value of information sharing in supply chains, Supply Chain Management, Vol. 10(1), pp. 34-46.

Lu, D. (2011). Fundamentals of Supply Chain Management, Dr. Dawei Lu & Ventus Publishing ApS.

Mahto, R. V. & Davis, P. S. (2012). Information Flow and Strategic Consensus in Organizations, International Journal of Business and Management, Vol. 7(17), pp. 1-12.

Mallali, P. D., Gopalkrishan, B. & Shiva Prasah, H. C. (2019). Six Sigma approach for Reducing the SLA's Resolution time: a case in IT services enabled Industry, International Journal of Mechanical Engineering and Technology, Vol. 10(1), pp. 1080-1094.

Manjunath, M., Shiva Prasad, H. C., Keerthesh Kumar, K. S. & Deepa, P. (2014). Value Stream Mapping: A Lean Tool, International Journal of Business & Management, Vol. 2(4), pp. 100-104.

Manzari, M., Kazemi, M., Nazemi, S. & Pooya, A. Intellectual capital: Concepts, components and indicators, Management Science Letters, Vol. 2(7), pp. 2255-2270.

Marshall, G. W., Baker, J. & Finn, D. W. (1998). Exploring internal customer service quality, Journal of Business & Industrial Marketing, Vol. 13(4-5), pp. 381-392.

Martinsuo, M., Mäkinen, S., Suomala, P. & Lyly-Yrjänäinen, J. (2016). Teollisuustalous kehittyvässä liiketoiminnassa. Helsinki: Edita.

McKeller, J. M. (2014). Supply Chain Management Demystified, New York: McGraw-Hill Education.

Medberg, G. (2016). How do Customers Perceive Value-In-Use? Helsinki: Hanken School of Economics & Gustav Medberg.

Menken, I. (2009). The Business Process Management Guide: Practical Methodology and Guidelines to Successful BPM Implementation and Improvement, Emereo Publishing.

Mentzer, J. T., DeWitt, W., Keebler, J. S., Min, S., Nix, N. W. & Smith, D. C. (2001). Defining supply chain management, Journal of Business Logistics, Vol. 22(2), pp. 1-25.

Meroni, G. (2019). Artifact-Driven Business Process Monitoring: A Novel Approach to Transparently Monitor Business Processes, Supported by Methods, Tools, and Real-World Applications, Cham: Springer Nature Switzerland AG.

Min, H., Lim, Y. & Magnini, V. P. (2014). Factors Affecting Customer Satisfaction in Responses to Negative Online Hotel Reviews: The Impact of Empathy, Paraphrasing, and speed, Cornell Hospitality Quarterly, Vol. 56(2), pp. 223-231.

Mohapatra, S. (2013). Business Process Reengineering: Automation Decision Points in Process Reengineering, New York: Springer Science.

Morana, J. (2018). Logistics, London: ISTE Ltd.

Mussomeli, A., Gish, D. & Laaper, S. (2016). The rise of the digital supply network: Industry 4.0 enables the digital transformation of supply chains, Deloitte. Available: https://www2.deloitte.com/content/dam/insights/us/articles/3465_Digital-supply-network/DUP_Digital-supply-network.pdf

Negash, S. (2004). Business Intelligence, Communications of the Association for Information Systems, Vol. 13(13), pp. 177-195.

Neubert, G., Ouzrout, Y. & Bouras, A. (2004). Collaboration and integration through information technologies in supply chains, International Journal of Technology Management, Vol. 28(2), pp. 259-273.

Ng, I., Parry, G., Smith, L., Maull, R. & Briscoe, G. (2012). Transitioning from a goods-dominant to a service-dominant logic, Journal of Service Management, Vol. 23(3), pp. 416-439.

Ohlsson, J. & Han, S. (2018). Prioritising Business Processes: Design and Evaluation of the Priorisation and Categorisation Method (PCM), Cham: Springer Nature.

Olajide, S. E., Lizam, M. & Olajide, E. B. (2016). Understanding the Conceptual Definitions of Cost, Price, Worth and Value, Journal of Humanities and Social Science, Vol. 21(9), pp. 53-57.

Olszak, C. M. (2020). Business Intelligence and Big Data: Drivers of Organizational Success, Boca Raton: Taylor & Francis Group, LLC.

Olubunmi, A. F. & Amos, D. (2019). Evaluation of Diagnostic Analysis and Predictive Analysis for Decision Making, Third Biennial International Conference on Transition from Observation to Knowledge to Intelligence (TOKI).

Osterwalder, A. & Pigneur, Y. (2010). Business Model Generation. New Jersey: John Wiley & Sons, Inc.

Page, S. (2010). The Power of Business Process Improvement: 10 Simple Steps to Increase Effectiveness, Efficiency, and Adaptability, New York: AMACOM.

Paksoy, T., Kochan, C. G. & Ali, S. S. (2020). Logistics 4.0: Digital Transformation of Supply Chain Management, Boca Raton: Taylor & Francis Group, LLC.

Peng Wong, W. & Yew Wong, K. (2011). Supply chain management, knowledge management capability, and their linkages towards firm performance, Business Process Management Journal, Vol. 17(6), pp. 940-964.

Pfohl, H.-C. & Gomm, M. (2009). Supply chain finance: optimizing financial flows in supply chains, Logistics Research, Vol. 1(3-4), pp. 149-161.

Quayle, M. (2006). Purchasing and Supply Chain Management: Strategies and Realities, First Edition, London: IRM Press.

Rahman, M. S., Anwar, A., Ferdous Azam, S. M. & Abdelfattah, F. A. (2015). A Conceptual Study on Supply Chain Management in Creating Customer Value, Journal of Social Sciences Research, Vol. 1(3), pp. 32-36.

Rahman, Z. & Qureshi, M. N. (2007). Integrating the supply chain flows for Business Effectiveness, Studies in Business and Economics, Vol. 13(1), pp. 5-20.

Rainer, K., Prince, B. & Watson, H. (2017). Management Information Systems, Fourth Edition, New Jersey: John Wiley & Sons, Inc.

Rajah, N., Musa, H., Nipis, V., Krishnan, P. K., Suppiah, S. & Ahmad, A. F. N. (2018). Global Supply Chain Management: Challenges and Solution, International Journal of Engineering and Technology, Vol. 4(34), pp. 447-454.

Ramees Rahman, M. & Safeena, P. K. (2016). Customer Needs and Customer Satisfaction, Ernakulam: Central marine Fisheries Research Institute.

Ranta, T. (2005). Organizational Value Creation and Destruction in Corporate Venturing. Helsinki: Helsinki University of Technology.

Reichhart, A. & Holweg, M. (2007). Creating the customer-responsive supply chain: a reconciliation of concepts, International Journal of Operations & Production Management, Vol. 27(11), pp. 1144-1172.

Roos, G., Fernström, L., Piponius, L. & Rastas, T. (2006). Aineeton pääoma: Johdon käsikirja, Helsinki: Edita.

Rubinstein, A. (2012). Response Time and Decision Making: A “Free” Experimental Study, Judgment and Decision Making, Vol. 8(5), pp. 1-29.

Saarijärvi, H., Puustinen, P., Yrjölä, M. & Mäenpää, K. (2017). Service-dominant logic and service logic-contradictory and/or complementary? International Journal of Services Sciences, Vol. 6(1), pp. 1-25.

Sakki, J. (2014). Tilaus-toimitusketjun hallinta: Digitalisoitumisen haasteet, Vantaa: Jouni Sakki Oy.

Salunke, S. S. & Hebbar, S. (2015). Value Stream Mapping: A Continuous Improvement tool for Reduction in Total Lead Time, International Journal of Current Engineering and Technology, Vol. 5(2), pp. 931-934.

Sangar, A. B. & Iahad, N. B. A. (2013). Critical Factors that Affect the Success of Business Intelligence Systems (BIS) Implementation in an Organization, International Journal of Scientific & Technology Research, Vol. 2(2), pp. 176-180.

Saunders, M. N. K., Lewis, P. & Thornhill, A. (2019). Research methods for business students, Eight edition, New York: Pearson Education.

Schoenherr, T. (2009). Logistics and Supply Chain Management Applications Within a Global Context: An Overview, Journal of Business Logistics, Vol. 30(2), pp. 1-25.

Shahbaz, M. S., Rasi, R. Z. RM., Ahmad, F. B. & Rehman, F. (2017). What is Supply Chain Risk Management? A Review, Advanced Science Letters, Vol. 23(9), pp. 9233-9238.

Sidorchuk, R. (2015). The Concept of “Value” in the Theory of Marketing, Asian Social Science, Vol. 11(9), pp. 320-325.

Sillanpää, I. (2014). Implementing supply chain strategy, Acta Wasaensia 310, Vaasa: Vaasan yliopisto.

Simatupang, T., Piboonrungroj, P. & Williams, S. J. (2017). The emergence of value chain thinking, International Journal of Value Chain Management, Vol. 8(1), pp. 1-18.

Smith, A. (2000). An Inquiry into The Nature and Causes of The Wealth of Nations, Fifth edition, London: Methuen & Co., Ltd.

Smith, J. B. & Colgate, M. (2007). Customer Value Creation: A Practical Framework, Journal of Marketing Theory and Practice, Vol. 15(1), pp. 7-23.

Sople, V. V. (2011). Supply Chain Management: Text and Cases, India: Pearson.

Srinivasan, R. (2011). Business Process Reengineering, New Delhi: Tata McGraw Hill Education Private Limited.

Steiner, F. & Harmon, R. (2009). The Impact of Intangible Value on the Design and Marketing of New Products and Services: An Exploratory Approach, International Conference on Management of Engineering & Technology, pp. 2066-2079.

Strandvik, T. & Heinonen, K. (2015). The Nordic School – Service Marketing and Management for the Future: Essentials of Customer Dominant Logic, Helsinki: Hanken School of Economics, pp. 111-128.

Swanborn, P. (2010). Case study Research: What, Why and How? First edition, London: SAGE.

Thai, V. V. (2012). Competency requirements for professionals in logistics and supply chain management, International Journal of Logistics, Vol. 15(2), pp. 109-126.

Tracey, M., Lim, J. & Vonderembse, M. A. (2005). The impact of supply-chain management capabilities on business performance, Supply Chain Management: An International Journal, Vol. 10(3), pp. 179-191.

Tuomisaari, H., Peltonen, J., Nyberg, T. R., Dong, X. & Nyman, G. (2013). Value Capture and Value Creation in High-Velocity Networked Environments, IEEE International Conference on Service Operations and Logistics, and Informatics, pp. 552-557.

van der Vorst, J. G. A. J. (2004). Supply Chain Management: theory and practices, Bridging Theory and Practice, pp. 105-128.

Vargo, S. L. & Akaka, M. A. (2009). Service-Dominant Logic as a Foundation for Service Science: Clarifications, Service Science, Vol. 1(1), pp. 32-41.

Vargo, S. L. & Lusch, R. F. (2004). Evolving to a New Dominant Logic for Marketing, Journal of Marketing, Vol. 68(1), pp. 1-17.

Vargo, S. L. & Lusch, R. F. (2014). Service-dominant logic: Premises, perspectives, possibilities, Cambridge: Cambridge University Press.

Vargo, S. L. (2009). Toward a transcending conceptualization of relationship: a service-dominant logic perspective, Journal of Business & Industrial Marketing, Vol. 24(5-6), pp. 373-379.

Vargo, S. L., Lusch, R. F., Akaka, A. M. & He, Y. (2010). Service-Dominant Logic: A Review and Assessment, Review of Marketing Research, Vol. 6, pp. 125-167.

Vargo, S. L., Maglio, P. P. & Akaka, M. A. (2008). On value and value co-creation: A service systems and service logic perspective, European Management Journal, Vol. 26(3), pp. 145-152.

Vidyarthi, N., Elhedhli, S. & Jewkes, E. (2009). Response time reduction in make-to-order and assemble-to-order supply chain design, IIEE Transactions, Vol. 41(5), pp. 448-466.

Vijayan, G., Mukherjee, A., Kamarulzaman, N. H. & Vaiappuri, S. K. N. (2016). Strategic Value Creation in a Supply Chain, Handbook of Research on Global Supply Chain Management, IGI Global, pp. 186-204.

Vogt, P. W., Gardner, D. C. & Haeffele, L. M. (2012). When to Use What Research Design, New York: The Guildford Press.

Voima, P., Heinonen, K. & Strandvik, T. (2010). Exploring Customer Value Formation – A Customer Dominant Logic Perspective, Helsinki: Hanken School of Economics Working Papers, no. 552.

Volkov, D. & Garanina, T. (2008). Value Creation in Russian Companies: The Role of Intangible Assets, Journal of Knowledge Management, Vol. 6(1), pp. 63-74.

Walker, W. T. (2016). Supply Chain Construction: The Basics for Networking the Flow of Material, Information, and Cash, Boca Raton: Taylor & Francis Group, LLC.

Waters, D. (2007). Supply Chain Risk Management: Vulnerability and Resilience in Logistics, London: Kogan Page Ltd.

Watson, H. J. (2013). All About Analytics, International Journal of Business Intelligence Research, Vol. 4(1), pp. 13-28.

Weske, M. (2019). Business Process Management: Concepts, Languages, Architectures, Third Edition, Berlin: Springer-Verlag GmbH Germany.

Widjaja, J. T. (2020). How analytics maturity models are stunting data science teams, towards data science. Available: https://towardsdatascience.com/how-analytics-maturity-models-are-stunting-data-science-teams-962e3c62d749

Winkelhaus, S. & Grosse, E. H. (2020). Logistics 4.0: A systematic review towards a new logistics system, International Journal of Production Research, Vol. 58(1), pp. 18-43.

Wirtz, J. & Mattila, A. S. (2003). Consumer responses to compensation, speed of recovery and apology after a service failure, International Journal of Service Industry Management, Vol. 15(2), pp. 150-166.

Woodruff, R. B. (1997). Customer value: The next source for competitive advantage, Journal of the Academy of Marketing Science, Vol. 25(2), pp. 139-153.

Woodside, A. G., Golfetto, F. & Gibbert, M. (2008). Customer value: Theory, research, and practice, Advances in Business Marketing and Purchasing, Vol. 14, pp. 3-25.

Xu, Q. L., Jiao, R. J., Yang, X., Helander, M. G., Khalid, H. M. & Anders, O. (2007). Customer Requirements Analysis Based on an Analytical Kano Model, International Conference on Industrial Engineering and Engineering Management 2007.

Zieger, S. (2018). Logistics, Victorian Literature and Culture, Vol. 46(3-4), pp. 749-752.

Zijm, H., Klumpp, M., Regattieri, A. & Heragu, S. (2019). Operations, Logistics and Supply Chain Management, Cham: Springer.

APPENDIX A: THE FIRST-ROUND INTERVIEW FRAME 1

Background

1. Could you describe to me your current position, responsibilities and relationship with logistics?

General

2. What are the current strengths of the Logistics Control Tower?
3. What are the current challenges in the Logistics Control Tower?
4. Which of the current tasks are the most important and value-adding in your opinion?
5. Are there currently any tasks that are unnecessary or non-value-adding, in your opinion?
6. How would you describe the Logistics Control Tower's current way of working?
7. In your opinion, does the Logistics Control Tower have an impact on the on-time delivery level and the net promoter score?

Resources, tools and processes

8. Are there currently enough tangible and intangible resources available?
9. Processes:
    a. Are there standardized processes, and are they working well?
    b. In your opinion, what processes are good and why?
    c. What processes require development and why?
10. Tools:
    a. What tools are the most important?
    b. What tools are good, in your opinion?
    c. What tools are poor, in your opinion?
11. What kind of metrics would be important and useful?
12. Is the current usage level of analytics sufficient?
    a. If not, what kind of support should it provide?

Relationships

13. In your opinion, does the Logistics Control Tower have enough understanding about customers' requirements and goals?
14. In your opinion, is a collaboration with other organizations on a sufficient level?
    a. If not, what kind of collaboration is missing and, what kind of improvements are needed?

Future

15. How could the response time be improved?
16. What kind of tools would be valuable, or how should the existing ones be developed?
17. What processes or task would be important to automate?
18. Is there something to which the Logistics Control Tower should have better access or visibility?

19. Is there anything related to the topic and control towers we missed, or you would like to add?

APPENDIX B: THE FIRST-ROUND INTERVIEW FRAME 2

Background

1. Could you describe to me your current position, responsibilities and relationship with the Logistics Control Tower?

Knowledge and experiences

2. Could you tell me what do you know about the Logistics Control Tower?
3. Could you tell what kind of experiences do you have with the Logistics Control Tower?
4. What is the reason why you utilize the services of the Logistics Control Tower?
5. How would you describe the current level of communication and collaboration with the Logistics Control Tower?
6. Is the current response time sufficient, or should it be improved?
7. In your opinion, is the Logistics Control Tower's current way of working reactive, active or proactive?
8. Does the Logistics Control Tower do something that is non-value-adding from your point of view?
9. Does the Logistics Control Tower understand and meet the expectations and requirements towards it?
10. What are the most important tasks of the Logistics Control Tower, in your opinion?
11. Does the Logistics Control Tower have an impact on the on-time delivery level and the net promoter score, in your opinion?

Future

12. Should the Logistics Control Tower have more responsibilities?
13. Should the Logistics Control Tower market themselves more?
14. What kind of metrics should be utilized to measure the performance of the Logistics Control Tower?
15. What type of data should be available or produced by the Logistics Control Tower?
16. How should the Logistics Control Tower be developed, in your opinion?

17. Is there anything related to the topic we missed, or you would like to add?

APPENDIX C: THE SECOND-ROUND INTERVIEW FRAME

1. Could you describe your current position and relationship with logistics?

2. Could you tell me what kind of logistics-related challenges you know there is or have encountered?
3. Could you tell me what comes to your mind when you think about a function called Logistics Control Tower?
4. Could you tell me what do you know about Metso Outotec's Logistics Control Tower?
5. In what processes or topics do you think the Logistics Control Tower could support you and your organization?
6. What logistics activities do you think should be centralized to Logistics Control Tower?
7. Do you see the Logistics Control Tower as Transportation-focused or involved in more supply chain?
8. How do you envision communication with the Logistics Control Tower? E.g. One harmonized communication channel vs. multiple channels that depend on the topic.
9. In your opinion, what kind of tools should the Logistics Control Tower have and utilize to make it a successful operation?
10. What type of data should be available or produced by the Logistics Control Tower?

11. Is there anything related to the topic we missed, or you would like to add?

APPENDIX D: THE IDENTIFIED GAP BETWEEN THE CURRENT AND THE DESIRED FUTURE STATE OF THE LOGISTICS CONTROL TOWER AND SUGGESTED ACTIONS

Identified critical gap	Suggested actions	Priority	Involved
Integration of the control tower teams	-Benchmark different ways of executing tasks between regions	High	CT
	-Standardize and harmonize the best practices in the control tower	High	
Processes	-Standardize processes with internal and external stakeholders	Medium	CT, S
Resources and workload	-Increase headcount	Medium	CT
	-Automate tasks	High	
	-Reduce the amount of manual work	High	
Tools	-Standardize ways of using tools and educate stakeholders	Low	CT, S
	-Improve reliability and swiftness of the tools	Medium	CT
TMS	-Get a new TMS with: • Proper integrations • Data and information management capabilities • Reporting capabilities	High	CC
Data and information management	-Centralize data	Medium	CT
	-Improve the usage of external data	High	
	-Ensure data is up-to-date all the time	High	
Visibility	-Enable analytics	Low	CT
	-Enable metrics and KPI's	Medium	
	-Take over and centralize the management of transportation quote requests	Low	CT, S
	-Improve the visibility of what is being loaded to trucks in warehouses	Medium	CT, S
	-Collaborate with stakeholders to gain visibility into upcoming workload	High	CT, S
Internal marketing	-Build a clear brand	Medium	CT
	-Create a value proposition	Medium	
	-Market the control tower simply and effectively	Medium	
Controlled growth	-Define the scope of work properly	High	CT
	-Create, communicate and utilize growth plan	High	

CT = Control Tower
S = Stakeholders
CC = Case Company