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Assessing and Improving the Quality and Reliability of Company X as a Supplier

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ABSTRACT:

Product quality, delivery reliability, and effective communication are critical factors in supplier performance, especially in B2B context. Supplier quality and reliability can be evaluated through customer satisfaction, which is why organizations should focus on maintaining and improving it. Customer satisfaction also leads to loyalty and long-term relationships between a customer and supplier. This study aimed to evaluate the performance of a case company operating in energy industry and to identify improvement areas to enhance customer satisfaction and operational efficiency. The study was conducted as a single case study using both qualitative and quantitative methods. Internal insights were gathered through semi-structured employee interviews while external customer perceptions were collected with questionnaire. The collected data was analysed through thematic and statistical analyses to find strengths and weaknesses as well as areas for improvement.

The results of the research indicated that product quality is perceived as a strength at the case company, while delivery reliability and responsiveness to customers' problems were identified as areas to be improved. Correlation tests showed that ease of communication had the strongest relationship with customer satisfaction when compared to product quality and on-time delivery, which highlights the importance of focusing on proactive and effective communication strategies. Similarities and differences between customer and employee perceptions were observed, and main differences were found to be regarding delivery performance and responsiveness. The results also indicated that due to the operational context of the case company, several factors cannot be influenced by the case company because they are dependent on the supplying factories who produce and deliver the products.

The study provided knowledge of the current state at the case company as well as useful recommendations for improving communication processes, delivery monitoring, and coordination with supplying factories. Furthermore, the study contributes to the theory by providing empirical evidence for the positive influence of communication into customer satisfaction. The study also demonstrated that analysing both internal and external perceptions of the performance, an organization can gain a comprehensive overview of their current operational state.

KEYWORDS: Supplier quality, Supplier reliability, Customer satisfaction, B2B supply chain

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TIIVISTELMÄ:

Tuotteen laatu, toimitusvarmuus ja tehokas kommunikointi ovat kriittisiä tekijöitä toimittajan kilpailukyvyille, varsinkin B2B kontekstissa. Toimittajan laatua ja luotettavuutta voidaan arvioida asiakastyytyväisyyden kautta, minkä takia on tärkeää, että yritykset keskittyvät sen ylläpitoon ja kehittämiseen. Asiakastyytyväisyys johtaa myös lojaalisuuteen sekä pitkäaikaisiin suhteisiin asiakkaiden ja toimittajien välillä. Tämän työn tarkoituksena oli arvioida energia-alalla toimivan kohdeyrityksen suorituskyky sekä tunnistaa kehityskohteita asiakastyytyväisyyden ja operatiivisen toiminnan parantamiseksi. Tutkimus toteutettiin yksittäisenä tapaustutkimuksena, jossa käytettiin sekä laadullisia että määrällisiä tutkimusmenetelmiä. Yrityksen sisäisiä näkemyksiä kerättiin puolistrukturoiden haastattelujen avulla, ja ulkoisia havaintoja asiakkailta kerättiin kyselylomakkeen kautta. Kerätylle datalle toteutettiin teemalliset ja tilastolliset analyysit vahvuuksien, heikkouksien sekä kehityskohteiden löytämiseksi.

Tutkimuksen tulokset osoittivat, että tuotteen laatu koetaan kohdeyrityksen vahvuutena, kun taas toimitusvarmuutta ja asiakkaiden ongelmiin reagoimista tulisi kehittää. Korrelaatiotestit näyttivät, että kommunikoinnin helppoudella oli suurin yhteys asiakastyytyväisyyteen verrattuna tuotteen laatuun ja toimitusvarmuuteen, mikä korostaa proaktiivisten ja tehokkaiden kommunikointistrategioiden tärkeyttä. Yhtäläisyyksiä ja eroja asiakkaiden sekä työntekijöiden välillä havainnoitiin, ja suurimmat erot liittyivät toimitus- ja reagointikykyihin. Tulokset osoittivat myös, että kohdeyrityksen toimintamallin vuoksi moniin asioihin ei voida suoraan vaikuttaa, koska ne ovat riippuvaisia tehtaista, jotka valmistavat ja toimittavat tuotteet.

Tutkimus antoi tietoa kohdeyrityksen nykytilasta sekä hyödyllisiä suosituksia viestintäprosessien, toimitusten seuraamisen, sekä tehtaiden kanssa tapahtuvan kommunikoinnin parantamiseen. Lisäksi, tutkimus tukee olemassa olevaa teoriaa tarjoamalla empiirisiä tuloksia viestinnän tärkeydestä asiakastyytyväisyyteen. Tutkimus osoitti myös, että analysoimalla sekä sisäisiä että ulkoisia havaintoja suorituskyvystä, yritykset voivat saada kattavan kokonaiskuvan nykyisestä toimintatilastaan.

AVAINSANAT: Toimittajan laatu, toimittajan luotettavuus, asiakastyytyväisyys, B2B toimitusketju

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1 Introduction

In today's highly competitive markets, customers increasingly expect their suppliers to deliver high-quality products, timely deliveries, and responsive communication and service (Artsiomchyk & Zhivitskaya, 2015). At the same time, supply chains have become more globalized than ever involving several stakeholders, long geographical distances and complex information flows. These developments have led organizations having to focus on supplier quality and reliability, as even a minor disruption can lead to delays, higher costs, and even reduced customer satisfaction (Olimjonovich & Ibragim, 2024). Consequently, companies must continuously evaluate and improve their performance in order to maintain competitive advantage in the markets.

Supplier quality and reliability is often evaluated through several key factors, such as product quality, delivery reliability, cost, and overall service performance (Dania et al., 2023; Sharma, 2022; Abdolshah, 2013). Supplier quality and reliability have been described as the ability to meet and exceed customer expectations continuously over time in all the aforementioned areas (Monczka et al., 2009; Abdolshah, 2013; Huang & Keskar, 2007). Product quality has been mentioned to be a critical factor in supplier evaluation, which is why maintaining it is essential for ensuring high customer satisfaction. Also, maintaining high delivery reliability promotes customer satisfaction, but especially in global supply chains, it requires close collaboration and coordination among the stakeholders. In addition to product quality and delivery reliability, factors such as communication and responsiveness are important attributes in maintaining long-term customer-supplier relationships (Ferro-Soto et al., 2025). Effective communication supports faster problem resolution, improves transparency and enhances the collaboration between the stakeholders. All these elements are important in business-to-business (B2B) environment, where reliable performance and customer satisfaction leads to long-term relationships and loyalty (Arthur et al., 2024).

This thesis aims to explore the quality and reliability of the case company that operates as a supplier for customers in Finland. This will be done by gathering information from

the company employees to get insights into the current situation and also by conducting a survey for the customers to receive feedback and external perceptions. The main purpose of the thesis is to evaluate the current state of supply quality, delivery reliability, and overall service performance, and to identify areas that could be improved and therefore enhance overall customer satisfaction and operational efficiency.

1.1 Research gap, questions, and objectives

Previous literature has separately examined supplier quality and reliability, supplier performance, supply chain quality management, and customer satisfaction in B2B context (e.g. Abdolshah, 2013; Arthur et al., 2024; Pacholeck et al., 2023; Ferro-Soto et al., 2025). Even though extensive number of studies have been conducted regarding these themes, relatively few studies have combined several themes together. In addition, majority of the studies only include one perspective, most of the time the customer perspective, into the research when focusing on improving customer satisfaction and supplier performance (Hoe & Mansori, 2018; Chakraborty et al., 2007; Raišienė & Raišys, 2022). Few studies combine both internal employee insights and external customer perceptions to evaluate supplier performance (Ambrose et al., 2010). Additionally, there is a lack of studies conducted with similar operational context, as the case company does not have in-house production, and therefore purchases the products from other factories. This structure creates additional challenges in communication, coordination, delivery reliability and service performance, yet they are not empirically studied. As a result, this study aims to explore and connect these themes within B2B supplier context by combining both internal insights and external customer perceptions. This research gap is illustrated in figure 1 below.



Figure 1 Research gap.

The figure above highlights how the mentioned themes are usually not integrated into research but rather are often studied separately. Based on the identified research gap, the following objectives were defined to guide the research:

1. Assess customer perceptions of case company's supply quality, delivery reliability, and service performance through feedback and survey analysis.
2. Compare and align customer perceptions with employee insights to identify gaps and validate strengths.
3. Identify key improvement areas based on perception-performance alignment to enhance overall supplier performance and customer satisfaction.

These objectives will guide research design, data collection and analysis process. By addressing the objectives, the study seeks to provide clear understanding of the current state of supplier quality and reliability in the case company and to identify improvement areas from both customer and internal perspectives. To address the objectives in a

structured way and guide the empirical study, the following research questions were formulated:

1. What are the key factors that affect a supplier's quality and reliability?
2. What procedures and processes should be improved to enhance supply quality, delivery reliability and service performance of the case company?

1.2 Company description and problem definition

The thesis is done in collaboration with a case company that operates in the energy industry. The organization has operations around the world, but the thesis only focuses on a specific team in Finland, which will be referred as the case company in the thesis. The case company purchases products from the factories within the same global organization, and sells the products to domestic customers, meaning that they rely on external production. This also means that all information between the customer and supplying factories go through the case company. The figure 2 below illustrates the operational context of the case company.

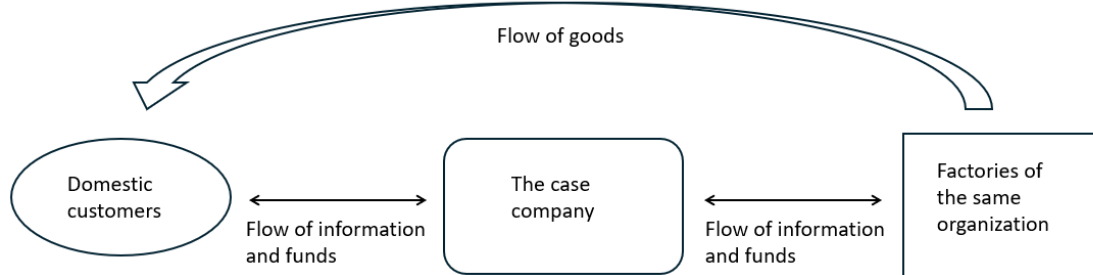


Figure 2 Operational context of the case company.

Due to this operational structure, the case company heavily relies on effective communication and cooperation from the supplying factories. Since the production happens on external facilities, the case company has a limited amount of control on the

manufacturing and delivery schedules. This dependency increases the importance of correct and timely information flow between the factories, the case company, and the customers. It has been noted that any delays in information sharing or disruptions along the supply chain have had a direct influence on the final delivery times and even customer satisfaction. In addition, some challenges have been identified regarding, for example, design approval process, responsiveness to customer inquiries, and the overall service performance. These challenges highlight the importance of this study, since the aim is to improve supplier performance and overall customer satisfaction.

Given the importance of supplier performance in maintaining long term relationships with customers, there is a need to evaluate the current state of the case company's operations as it further can enhance the performance perceived by customers. By including both customer and employee perspectives, the study seeks to identify gaps and weaknesses that could be improved at the case company. In addition to academic results, the study provides practical improvement ideas for the case company.

1.3 Scope of the study and limitations

This study focuses on evaluating supplier performance of a specific team from specific company in Finland. Even though the organization operates globally, the study and analysis are limited to one team and its customers. The scope of the research includes supplier quality and reliability, communication practices, service performance and other related themes. Manufacturing activities and their improvements are excluded from the study as those are the supplying factories' responsibility. The analysis of the effects of improvement suggestions is also excluded from the thesis, because the focus is on the current state of the processes.

The study is limited to a single company operating in energy industry, which is why the results may not be generalized to other companies or industries. Furthermore, the study focuses on customers located in a specific geographical location, which may have an

effect on the final results. In addition, the results show the operational conditions of the time of the data collection, meaning that the results may change over time. Lastly, the operational context of the case company may limit the results, because several factors examined are dependent on the supplying factories. This means that all aspects of supplier performance are not controlled by the case company and therefore it may have an influence on the study.

1.4 Structure of the thesis

The thesis consists of five main chapters: introduction, literature review, methods, results, and discussion and conclusions. The introduction chapter provides background information and the justification for conducting the research, and it also presents the research questions and objectives. Literature review presents the theory of the study as well as some of the previous research conducted within similar themes. The main themes of literature review are supplier quality and reliability, supply chain quality and reliability, customer satisfaction in B2B context, and finally, order fulfilment strategies are briefly discussed, because the case company has experienced similar challenges that the literature have presented regarding ETO environment. After this, the methods of the thesis are presented and justified. The next chapter presents the results of the employee interviews and the customer survey. The results are also supported by some statistical test. The thesis ends with discussion and conclusion chapter, where the results are discussed in accordance with the previous research. That chapter also provides theoretical contributions and managerial implications derived from the research.

2 Literature review

This chapter reviews existing literature about supplier quality and reliability in B2B context. The chapter begins by defining supplier quality and reliability, and key attributes that customers use when evaluating suppliers are identified. This is followed by the theories of supply chain quality and reliability and common challenges affecting supply chain performance are introduced. The chapter then reviews the literature regarding customer satisfaction in B2B context, and finally, order fulfilment strategies are introduced to provide insights on how the operational context influence supplier performance. The chapter concludes with the synthesis of the literature and formulation of the hypotheses that will guide the empirical study.

2.1 Supplier quality and reliability

Supplier quality and reliability are critical factors of effective supply chain performance, as the supplier plays essential role in the process of continuity of raw materials (Dania et al., 2023). Supplier quality refers to the supplier's ability to meet, preferably exceed, customer expectations or requirements in areas such as product and service quality, delivery reliability, after sales support, and price (Monczka et al., 2009; Abdolshah, 2013). Supplier reliability refers to the capability to meet the requirements consistently over time. For buying companies, it is essential to choose high quality and reliable suppliers, since lower quality supplier may cause risks such as low product quality, late deliveries, higher costs and increased lead times (Al-Abdallah et al., 2014).

Supplier quality and reliability have been researched a lot during recent times, as today's competitive environment among organizations requires customer to continuously improve their operations and performance (Al-Abdallah et al., 2014). For the customer, the benefits of a high-quality supplier are simplified procurement process, higher product quality and clear communication, which further helps to build long-ter relationship with the supplier (Widjaja & Darmawan, 2022; Dania et al., 2023). Therefore, understanding

how customers evaluate their suppliers is essential as the criteria directly affects the supplier selection.

Research regarding supplier quality and reliability has brought up the main attributes that customers are focusing on when evaluating their suppliers. A literature review conducted by Noshad and Awasthi (2015) revealed that supplier quality evaluation has four main criteria, which are product quality, service quality, process quality, and organizational quality. Product quality includes attributes such as defect rate, reliability of quality, and performance, whereas service quality focuses on warranties and claim policies, responsiveness, and ease of communication. Process quality refers to quality of shipments, and delivery performance, and lastly, organizational quality includes continuous improvement programmes, quality certifications and quality team visits.

Similar results to Noshad and Awasthi's (2015) research show the literature review by Abdolshah (2013), who focused on the specific supplier selection criteria that emerged in the literature. Abdolshah's (2013) research showed that three most discussed evaluation criteria in the literature were price, quality, and delivery. Most discussed evaluation criteria also included after sales service, technical capability, and reputation and position in the industry. Even though these were the most discussed criteria in the literature, Abdolshah (2013) only concluded that quality is the most important factor in the supplier evaluation process. Similar result was found earlier, when Sila et al. (2006) found out that quality is the most important factor for customers in comparison to price and trust. Dania et al. (2023) conducted frequency analysis based on 25 research articles, and their conclusions were that product quality is the most frequent factor to use in assessing supplier performance.

In addition to product quality, it has been researched that customers are satisfied with suppliers that focus on on-time deliveries, an excellent customer care, and lower costs (Dania et al., 2023; Abdolshah, 2013). Even though cost is one of the most discussed factors in supplier quality and reliability, it has been noticed that its importance is lower

compared to other factors. Abdolshah (2013) provides a list of supplier evaluation criteria based on their importance, in which cost is on the sixth place. Sila et al. (2006) state that if the cost of the product is too high, it cannot satisfy the customer regardless of the high quality. Research conducted by Lin et al. (2005) revealed that even though cost is a critical element for the customers, it plays only a minor role in overall satisfaction.

Several research emphasize that involving customers into organization's operations can help to increase quality and reliability as a supplier (Sila et al., 2006; Kuei et al., 2008; Karamouz et al., 2021). Kuei et al. (2008) also points out that it is essential for customers and suppliers to have shared values and same perceptions in order to create value for the customers. Customer involvement and perception alignment can be done through feedback surveys, closer collaboration, and regular meetings, all of which can help both supplier and customer identify the areas of improvement (Karamouz et al., 2021). The results of the research conducted by Sila et al. (2006) state that companies should not only rely on internal views when developing quality standards but also involve customer input in order to achieve the best results.

Even though focusing on product quality, delivery reliability, and cost is important for a high-quality supplier, supplier-customer relationships and trust are essential in today's competitive market. Building trust between customers and suppliers promotes long-term relationships, which further has positive impact on customer satisfaction (Arthur et al., 2024). Arthur et al. (2024) conducted research focusing on commitment, trust, customer satisfaction, and customer loyalty in B2B context. Their findings imply that trust between supplier and customer has a significant effect on overall satisfaction and that satisfaction also improves customer loyalty. Nagati and Rebolledo's (2013) research also concludes that trust is essential between customer and supplier because higher trust between the parties encourages to exchange sensitive information and engage in more open communication. However, contrary to these findings, Al-Abdallah et al. (2014) argue that trust-based relationships with suppliers do not have significant impact on the customer's performance. The differences in research findings suggest that the

importance of trust between customer and supplier may vary between industries and the natures of supply chain relationship.

Customers today have increasingly high expectations for a supplier to deliver the correct products specified to their needs (Pereira et al., 2019). Depending on the product usage scenario, customer perceptions may vary meaning that the product must be designed to meet each customer's requirements (Sun et al., 2023). It is evident that customers will choose supplier that can design products to meet their requirements, even though the cost increases (Sun et al., 2023). Juniani et al. (2022) state that supplier's ability to design products for specific customer needs improves customer satisfaction and reduces complaints, which supports the development of long-term relationships between the customer and supplier.

Taking into consideration previous research regarding supplier quality and reliability, it can be concluded that customers' views on supplier quality typically focus on product quality, cost, delivery reliability, communication, customization, and overall trust and relationship. However, it cannot be universally defined which are the most important attributes, as customers may value different factors depending on the situation, and expectations and priorities are different between each customer depending on their needs. Since supplier performance is dependent on the supply chain that the supplier is part of, it is essential to examine supply chain quality and reliability as well. Understanding the whole supply chain process provides an overview of how supplier performance is formed and what additional factors affect customer satisfaction.

2.2 Quality and Reliability in Supply Chains

Supply chain can be defined as two or more organizations that are linked by material, information, or financial flows in order to deliver products or services to the end customer (Sila et al., 2006; Stadtler, 2005). Even though typical supply chains usually include suppliers, manufacturers, distributors and retailers, the customer is the main focus of

the chain, because as Sila et al. (2006) states, the main purpose of any supply chain is to fulfil customer needs as well as generate profit during the process. Basic supply chain can be structured as seen in figure 3. As seen from the figure below, goods flow only from upstream of the chain to downstream stakeholders, whereas information and funds flow in both directions of the supply chain. In many cases, supply chains remind more of network rather than linear chain illustrated below, due to manufacturers receiving products from several suppliers followed by supplying several distributors (Chopra & Meindl, 2007).

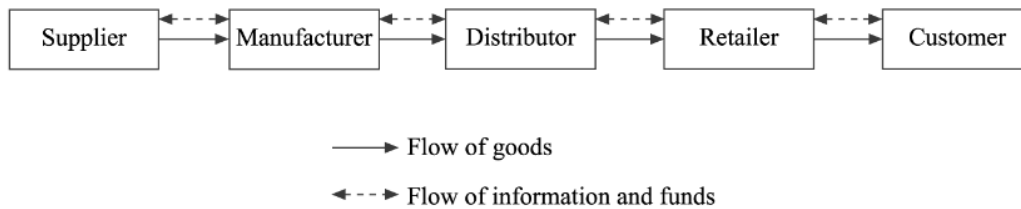


Figure 3 Basic supply chain structure (Chopra & Meindl, 2007).

Most companies or organizations in supply chain serve as a supplier but are also customers (Sila et al., 2006). However, the common goal for all members in supply chain should be to satisfy the final customer or the end user of a product (Sila et al., 2006). Chen et al. (2017) states that due to globalization, supply chains are nowadays longer as well as more complex than before which has led to uncertainty and vulnerability across the whole supply chain. Since all members of supply chain are connected through different flows, a disruption in upstream process or facility can have a negative impact on downstream processes and end-customer satisfaction (Chen et al., 2017).

In order for a company to sustain competitive advantage as well as operational efficiency, quality and reliability are crucial aspects of supply chain (Ganapatrimahan et al., 2014). In general, quality can be defined in multiple different ways. Quality has historically been focused more on the product meeting its standards and specifications, but during last decades, quality definitions have shifted towards customer-centric views (Yang, 2017;

De Giovanni, 2024). De Giovanni (2024) states that quality is the degree to which a product or service meets customer expectations in multiple areas, such as performance and predefined specifications. The modern understanding of quality has spread to cover also areas such as customization, sustainability, and ethics (De Giovanni, 2024). While quality focuses on fulfilling the customer needs and expectations, reliability highlights the predictability of performance.

Reliability is commonly defined as the likelihood that a product or system will perform its intended function under specified conditions (Chen et al., 2017; Jia et al., 2018). It is probabilistic, meaning that it shows how consistently a specific product or system performs over time rather than at one single moment. Reliability can also be described as quality over time, indicating that it can be fully assessed only after the product or service has been used for some time (Meeker & Escobar, 2003). Typical reliability indicators are, for example, failure rates, failure probability, and mean time between failures, all of which demonstrate how the product will perform over the lifecycle (Friederich & Lazárova-Molnar, 2024). Meeker and Escobar (2003) highlight that although quality is essential for a product, it is insufficient on its own if the product does not meet the reliability standards.

The concepts of quality and reliability extend also to the context of supply chains. Supply chain quality does not have a universal definition in the previous literature, but it can be viewed as a process in which defect-free components that meet certain requirements are manufactured and delivered to the end customer within the expected timeframe (Sila et al., 2006). Supply chain quality not only focuses on product but also the information that flows from supply chain member to another (Hani, 2022). Kuei et al. (2011) researched previous literature to define nine areas of supply chain management that directly connects to supply chain quality. These areas are further explained in table 1 below.

Table 1 Supply chain quality areas (Adapted from Kuei et al., 2011).

Area	What it includes
Sourcing quality	Supplier capability, supplier quality, supplier–buyer relationship, procurement and inventory accuracy, transportation quality and delivery reliability
Supplier relationship quality	Trust, adaptation, communication and co-operation
Product development quality	Concept design, prototype testing and detail design
Order fulfilment process quality	Promised lead time, on-time delivery, rush orders (when needed), stock-out rate, undamaged deliveries, accurate orders, accurate invoices, availability of delayed information, and convenient order placement procedures
Manufacturing quality	Performance, features, reliability, conformance, durability, serviceability, aesthetics and perceived quality
Distribution quality	Personal contact quality, order release quantities, information quality, ordering procedures, order accuracy, order condition, order quality, order discrepancy handling and timeliness
Customer relationship quality	Reliability, responsiveness, assurance, empathy, and tangibles
Reverse logistics quality	Reduce, recycle, reuse, and disposal
E-quality	Aesthetics, information content, accessibility, performance, serviceability, features, dependability, purpose, usability, capability, and timeline

Supply chain quality is driven by four key dimensions that are supply chain competence, critical success factors, strategic components, and supply chain quality practices (Kuei et al., 2008). The drivers are seen in the figure 4 below. Kuei et al. (2008) state that for a company to improve their supply chain quality, there should be various advantages over competitors. This implies that both company and their supply chain partners should

work towards improved product quality, higher delivery reliability and delivering value to end customer. Kuei et al. (2008) highlights that improving supply chain quality requires coordinated improvements of all organizations within the chain as they all serve the same end customer. This can be done, for example by conducting supplier/buyer meetings to review specific processes that might affect the quality.

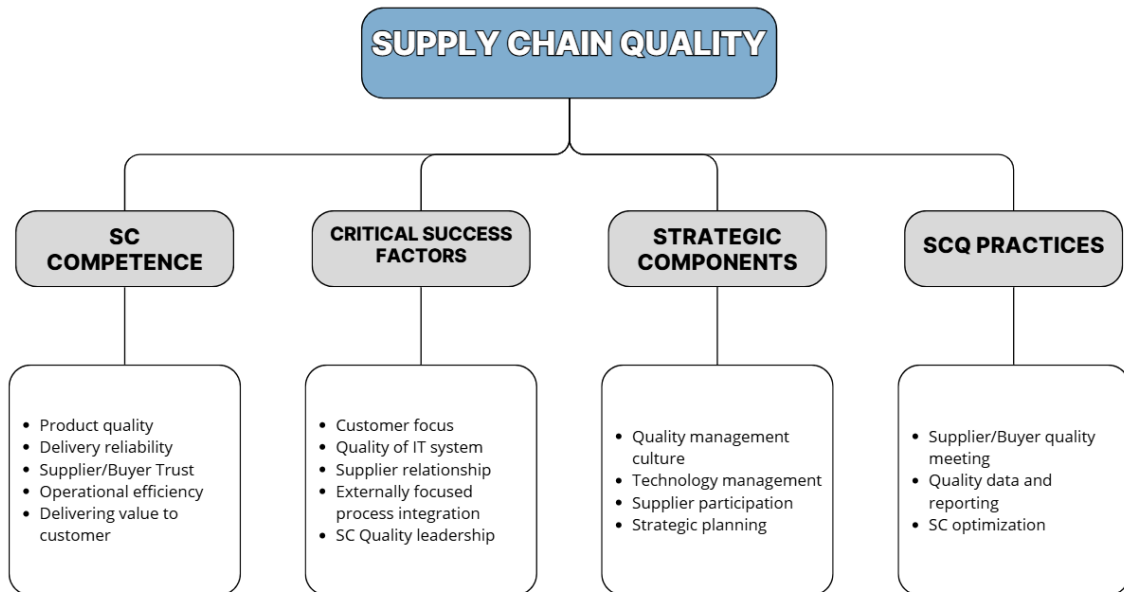


Figure 4 Supply chain quality dimensions (Adapted from Kuei et al., 2008)

The first supply chain quality dimension is supply chain competence, which includes factors such as product quality, delivery reliability, and supplier/buyer trust. As discussed before, these are factors that customers usually require from a supplier. The next dimension of supply chain quality is critical success factors. The most important critical success factors in context of supply chain quality have been found to be collaborative partnerships, focusing on customers, and the quality of IT systems (Kuei et al., 2008; Talib & Hamid, 2014). The third supply chain quality driver according to Kuei et al. (2008) is strategic components, which include elements such as quality management culture, supplier participation, and strategic planning. The impact of these is dependent on how well the strategies are introduced and managed along the supply chain. The last supply chain quality dimension presented by Kuei et al. (2008) is supply chain quality practices, which

include for example, quality meetings among customer and supplier, and supply chain optimization.

Unlike supply chain quality, the reliability of supply chain is defined several ways. Chen et al. (2017) defines supply chain reliability as the ability of a supply chain to consistently meet the end customer's demand and requirements even in the case of internal or external disruptions and before mitigation strategies are applied. Shevtshenko et al. (2022) state that supply chain reliability is often measured by on-time deliveries, correct quantities, and excellent quality. In addition, Lukinskiy et al. (2014) mention that reliable supply chain can carry out all its functions under certain conditions and accordance with the contracts between the parties. Taking into consideration the conventional definition of reliability and supply chain reliability, it can be noticed that there are similarities between them. Jia et al., (2018) note that conventional reliability concepts also apply to supply chains. Many of the reliability concepts can be applied to supply chain for a product life cycle aspect and the typical reliability indicators are relevant in evaluating supply chains.

Supply chain reliability becomes more complex as the supply chains expand and become more globalized (Jia et al., 2018; Chen et al., 2017). Figure 5 illustrates the supply chain network in which there are several stakeholders in the upstream as well as downstream of a supply chain. Each node in the network represents an enterprise, supplier, or customer, and as can be seen from the figure, each node delivers material and information to the end customer (Jia et al., 2018). This implies that the reliability of each individual node has a direct impact on the end-customer satisfaction, while disruptions in any part of the chain have a negative impact on all downstream stakeholders. Therefore, it is important to understand supply chain reliability as a whole process rather than focus on individual entities.

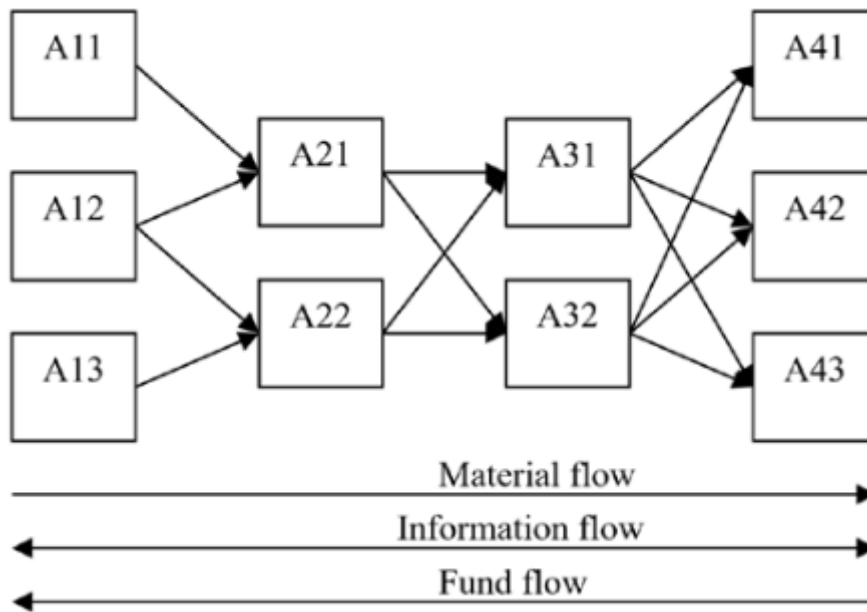


Figure 5 Supply Chain Network Structure (Jia et al., 2018).

Based on the definitions and concepts discussed, it can be concluded that supply chain quality and reliability are highly connected in order to achieve end-customer satisfaction. While supply chain quality is more focused on the products and information being as the customer requires, supply chain reliability focuses on meeting customer expectations continuously, even in cases of disruptions (Sila et al., 2006; Hani, 2022; Jia et al., 2018; Chen et al., 2017; Shevtshenko et al., 2022). To improve both quality and reliability of supply chains, companies must adapt supply chain quality management practices into their processes as it is essential for achieving competitive advantage (Lin et al., 2004).

2.2.1 Supply chain quality management

Supply chain quality management (SCQM) combines traditional supply chain management (SCM) with quality management (QM). Supply chain management is defined as the strategic approach of functionalities from production to distribution where the goal is to enable conditions for process optimization, operational efficiency, and continuous improvement (Lin et al., 2004; Kuei et al., 2011). Quality management on the other hand

refers to approach that integrates customer focus, strategic planning, and quality tools to ensure consistent organizational performance and competitiveness on the market (Robinson & Malhotra, 2005). Combining SCM and QM is essential as the ability to meet only set goals is not enough in today's competitive environment (Hussain et al., 2019). Figure 6 below illustrates how SCM and QM connect into SCQM.

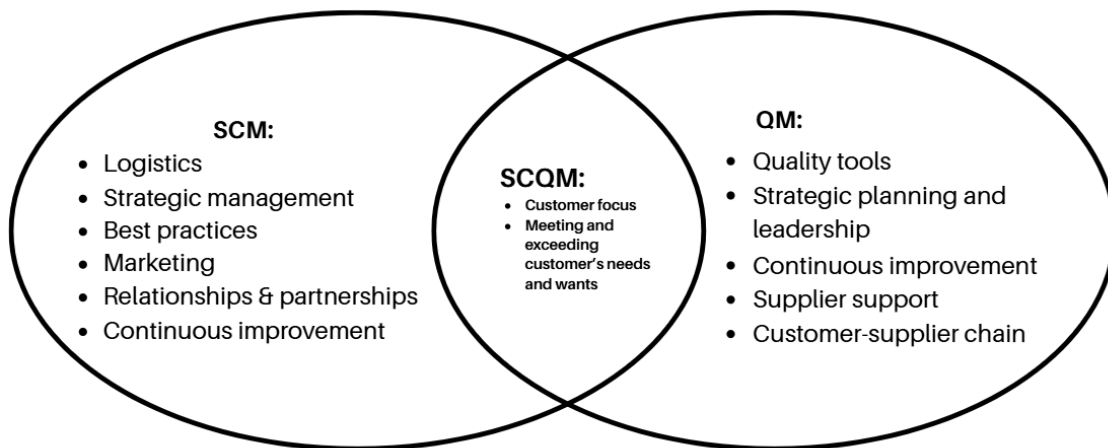


Figure 6 SCM combined with QM (Adapted from Soltani et al., 2011)

Kuei et al. (2011) defines SCQM as follows:

- SC = a production-distribution network
- Q = Meeting market demands correctly, and achieving customer satisfaction rapidly and profitability
- M = enabling conditions and enhancing trust for supply chain quality

In other words, SCQM refers to the coordinated integration of business processes and partners along the supply chain, with the intention to measure, analyse and continuously improve products, services, and processes (Robinson & Malhotra, 2005). The main goal of SCQM is to create value and ensure that both intermediate and end customers are satisfied (Robinson & Malhotra, 2005; Abdallah et al., 2021). The concept of SCQM was first introduced in the early 2000s, by Robinson & Malhotra (2005) and since then it has gotten increased attention to academic research.

SCQM performance can be measured by multiple different measures. Karamouz et al. (2021) investigated the literature regarding SCQM performance and found that the measures can be classified into three categories that are customer perspective, company perspective and supplier perspective. Some of the measurements can be seen from table 2 below. By focusing on all the perspectives, companies can improve their business performance as well as relationships with suppliers and customers.

Table 2 Quality performance measurement (Adapted from Karamouz et al., 2021).

Perspective	Factors
Customer perspective	Understanding customer needs Market research Customer survey Customer retention After sales service Customer complaints
Company perspective	Sales growth Profit Purchase price Delivery reliability On-time delivery Quality of delivered goods Defect rate Order processing time
Supplier perspective	Buyer-supplier partnership Reliability and responsiveness of supplier Supplier delivery performance Warranty Technology and information sharing Certifications

SCQM and its benefits have been researched a lot during this decade (Abdallah et al., 2021; Kuei et al., 2008; Karamouz et al., 2021; Lin et al., 2005; Bastas & Liyanage, 2018; Hong et al., 2019). Abdallah et al. (2021) conducted research where quantitative model was applied to identify the benefits that SCQM brings to overall supply chain

performance. Their research revealed that SCQM practices have positive effects on supply chain agility, meaning that the companies integrating those practices have the ability to rapidly respond to changing requirements from the customer. The changes mentioned in the study are product features, delivery time changes, and customized orders. These results are supported by research conducted by Bastas and Liyanage (2018), whose paper indicated that improved supply chain performance is one of the main advantages of SCQM. Furthermore, Bastas & Liyanage (2018) note that improved customer satisfaction is commonly discussed advantage in academic literature.

A different perspective on SCQM is offered by Hong et al., (2019), whose research indicated that SCQM practices do not have a significant positive impact on supply chain and operational performance. Similarly, Lin et al. (2005) noticed that quality management practices do not have influence on organizational performance directly. The studies showed that companies might not have the understanding of the SCQM benefits and they are not willing to implement the strategies into their operations. Lin et al. (2005) points out that some organizations use quality management strategies only as a management concept rather than a tool to enhance performance.

2.2.2 Common challenges affecting supply chain quality and reliability

As supply chains are becoming longer, more globalized and more complex, the disruptions, risks, and challenges are more common. The risks and challenges can be classified into internal risks (e.g. transportation and quality failures, demand fluctuations) and external risks (e.g. pandemics, geopolitical matters), both of which are important for a supplier to acknowledge (Duong et al., 2023; Lukinskiy et al., 2014). Duong et al. (2023) state that internal risks are events that occur directly from an organization's or its supply chain partners' practices whereas external risks are events that the supplier cannot control.

Duong et al. (2023) divides internal supply chain risks into three categories, that are supply risk, operational risk, and demand risk. Supply risk refers to the possible disruptions

of an individual supplier, and it includes, for example, supplier bankruptcy, inability to handle volume demand changes, transportation breakdowns, and inability to meet quality requirements. Operational risks on the other hand include changes in design, information delays, and price fluctuations. Demand risk includes areas such as market changes, high competition, and order fulfillment errors. Lukinskiy et al. (2014) defined internal supply chain failures in more detail, which can be seen from table 3 below.

Table 3 Internal supply chain failures (Lukinskiy et al., 2014).

Group of failures	Description	Example
Failures in quantity	The deviation of actual quantity of goods in the supply from planned	Shortage, overload, etc.
Failures in quality	Inconsistency of the actual quality of goods agreed in the order	Wetting of cargo, cargo damage, etc.
Failures in nomenclature	Inconsistency of the actual delivery of the ordered nomenclature	Incorrect complete set unit load, etc.
Failures in document	Incorrect execution of documents or errors in their treatment between SC members	Loss or error in compiling documents, etc.
Failures in the informing	Errors in the process of exchange of information between SC members	Late information about the arrival, etc.
Temporary failures	Disruption of a schedule of operations in the SC	Delayed loading or late arrival of the vehicle, etc.

Group of failures	Description	Example
Equipment failure	Failures of technical equipment used in the supply chain	Breakage of the vehicle, material handling equipment, etc.

External supply chain failures have not been discussed in the literature as much as internal supply chain failures, as such events cannot be controlled by members of the supply chain. Some of the external supply chain risks and failures are natural disasters, government restrictions, political instability, as well as war and terrorism (Duong et al., 2023; Lukinskiy et al., 2014). Duong et al. (2023) found out from their research that even though external risks might lead to higher chances of internal risks, they also create opportunities for companies. Being aware of those risks make companies adjust their supply chains to become leaner and more integrated. By focusing and acknowledging both internal and external risks, suppliers are more likely to perform better and achieve higher customer satisfaction.

2.3 Customer satisfaction in B2B context

As discussed earlier in the paper, meeting end-customer needs and requirements should be the main priority of a supplier. Achieving customer satisfaction in business-to-business (B2B) sales is crucial as those customers satisfied will stay loyal to the supplier and they will continue to purchase goods and services. In B2B context, customer satisfaction is not only about product quality, but it encompasses the relationship between the partners, value creation, and the ability to adapt to changing business needs (Raišienė & Raišys, 2022; Arthur et al., 2024). Customer satisfaction is also defined as the customer's comprehensive evaluation of how a supplier performs compared to expectations (Arthur et al., 2024).

Customer satisfaction is dependent on factors such as value alignment, service/product quality, and relationship quality (Sharma, 2022; Huang et al, 2019; Gaudenzi et al., 2020).

It has been researched also that customization, and adaptation has an impact on B2B customer satisfaction (Raišienė & Raišys, 2022; Sharma, 2022). Additionally, several research highlights the importance of trust between the businesses to be one of the main attributes in achieving customer satisfaction. Table 4 below concludes the most discussed factors and descriptions that are mentioned in the recent literature regarding customer satisfaction in B2B sales.

Table 4 Customer satisfaction factors.

Factor	Description	Mentioned in
Value alignment	How well supplier supports the customer's business goals	Raišienė & Raišys, 2022; Pacholek et al., 2023
Service/product quality	Reliability, performance, consistency	Sharma, 2022; Huang et al., 2019; Raišienė & Raišys, 2022; Gaudenzi et al., 2020; Chakraborty et al., 2007;
Relationship quality	Trust, commitment, communication, and mutual understanding	Arthur et al., 2024; Sharma, 2022; Pacholek et al., 2023; Ferro-Soto et al., 2025;
Customization and flexibility	Ability to adapt to changing customer needs	Sharma, 2022; Gaudenzi et al., 2020;

Trust between supply chain partners has been found to be a foundation for achieving strategic goal and overall customer satisfaction (Pacholek et al., 2023). Arthur et al. (2024) state that trust between customer and supplier develops when the customer believes that a supplier will keep their promises and the supplier is able to deliver competent products meeting the customer's needs. Arthur et al. (2024) also note that when there is a high level of trust among B2B partners, satisfaction for both partners increases. Ferro-Soto et al. (2025) highlights that trust in B2B relationships is essential as it plays a key role in maintaining the partnerships. The studies conducted by Arthur et al. (2024) and Ferro-Soto et al. (2025) both imply that trust has a significant effect on customer satisfaction. These results can be explained by the supplier's ability to deliver high-

quality products and services that fulfil customer needs, which further enhances customer satisfaction and builds trust between the partners (Arthur et al., 2024). While trust is an important element in customer satisfaction on its own, it also supports loyalty and long-term relationships between customer and supplier.

The correlation between customer satisfaction, trust, and commitment in B2B sales has been studied by several researchers over the decades. Sales-Vivó et al. (2020) found that a higher level of trust in B2B sales increases the commitment of a customer, meaning that they are more likely to maintain the relationship with a supplier. Similar results are provided by Arthur et al. (2024), whose research proved that customer satisfaction increases if B2B partners are willing to maintain long-term relationships and make long-term investments. Also, research conducted by Mukherjee et al. (2023) showed that shorter contract length between a customer and a supplier has a negative impact on customer satisfaction, meaning that committed, long-term customers are more satisfied overall. Lastly, Ferro-Soto et al. (2025) highlights that in order to achieve high satisfaction in B2B relationships, trust and commitment are essential.

It has been researched that customer satisfaction has a direct positive impact on customer loyalty. Huang et al. (2019) found in their research that customers are more satisfied with suppliers that provide high quality services. Furthermore, they found out that higher customer satisfaction leads to higher customer loyalty. Similar results were provided by Arthur et al. (2024), who found a positive correlation between trust and customer satisfaction, that further had a direct positive impact on customer loyalty. Sharma (2022) conducted research focusing on customer satisfaction and loyalty in the B2B market, and the results showed that customer satisfaction has an effect on attitudinal and behavioural loyalty. In conclusion, customer loyalty is affected by customer satisfaction, which is formed from customer expectations, product and service quality, perceived value, and relationships among partners (figure 7).



Figure 7 Customer loyalty formation (Adapted from Lee & Bellman, 2008).

Different ways of enhancing customer satisfaction and loyalty have been brought up in literature. Firstly, it is crucial for a supplier to know their customers' needs, preferences, and expectations in order to measure and improve customer satisfaction (Pacholek et al., 2023). Ferro-Soto et al. (2025) states that one of the main things in creating customer loyalty is to foster open and honest communication between B2B partners. Chakraborty et al. (2007) also note that supplier's communication with its buyers should be focused on in order to improve relationship quality. This allows a supplier to build stronger relationships with customers, which in return has a positive effect on satisfaction and loyalty. Ferro-Soto et al. (2025) also mention that implementing guidelines for conflict situations and evaluation for opportunistic behaviours will help to minimize challenges and risks in the supplier-customer relationships.

Sharma (2022) emphasizes the importance of focusing on core components (quality, delivery, cost), technical advancements (collaboration, adaptation, information), and social aspects (ease of negotiating) for a supplier to achieve maximal customer satisfaction and loyalty. Her research showed that all those three aspects with seven attributes influence

customer satisfaction, which is directly related to customer loyalty. This means that it is important to not only focus on product and service quality but also strengthen the relationship through information sharing and close collaboration. Sharma (2022) also notices that in technology industries, customers value ease of negotiating and coordinating over product quality, delivery, and cost, meaning that customers rather work with suppliers that have fewer problems in their operations. On the other hand, Sharma (2022) states that product design and quality have a direct impact on customer satisfaction and loyalty, particularly in context where technical performance is critical to customer's operations.

Overall, customer satisfaction is a key aspect of success in B2B relationships (Huang et al., 2019). Customer satisfaction and loyalty is often linked to long-term success of an organization, which also leads to the company having advantage over competitors and increased success on the markets (Pacholtek et al., 2023). Schüller et al. (2025) state that main driver of customer retention is customer satisfaction, meaning that those customers satisfied are more likely to maintain long-term relationship with certain supplier. Satisfied customers are also less likely to switch supplier, even though competitor might offer better prices for a single order (Pacholtek et al., 2023; Schüller et al., 2025).

2.4 Order fulfillment strategies: ETO, MTO, ATO

There are different strategies for order fulfillment that have been brought up in literature. This chapter will focus on three of the strategies, that are assemble-to-order (ATO), make-to-order (MTO), and engineer-to-order (ETO). ATO and MTO are introduced briefly, but ETO will be discussed in more detail. This is because ETO is the most complicated approach of these leading to more issues and difficulties along the order-delivery process, and the case company has experienced similar issues that the literature have presented regarding ETO environment.

These three approaches are used in different situations due to the different characteristics of each strategy. The main differences between the three approaches are lead time, cost, and customization (Atan et al., 2017; Willner et al., 2014; Fortes et al., 2023). The strategies also differ from each other according to the phase at which customer involvement occurs and when the customer order is received (see figure 8 below). As seen from the figure 8, assemble-to-order is more forecast based, meaning that sometimes customers can order products when they are already in production. When make-to-order strategy is used, production can begin as soon as customer order is received. Lastly, engineer-to-order is the most customizable option of these three strategies, and it can be seen that the customer is involved already in the engineering phase of the product.

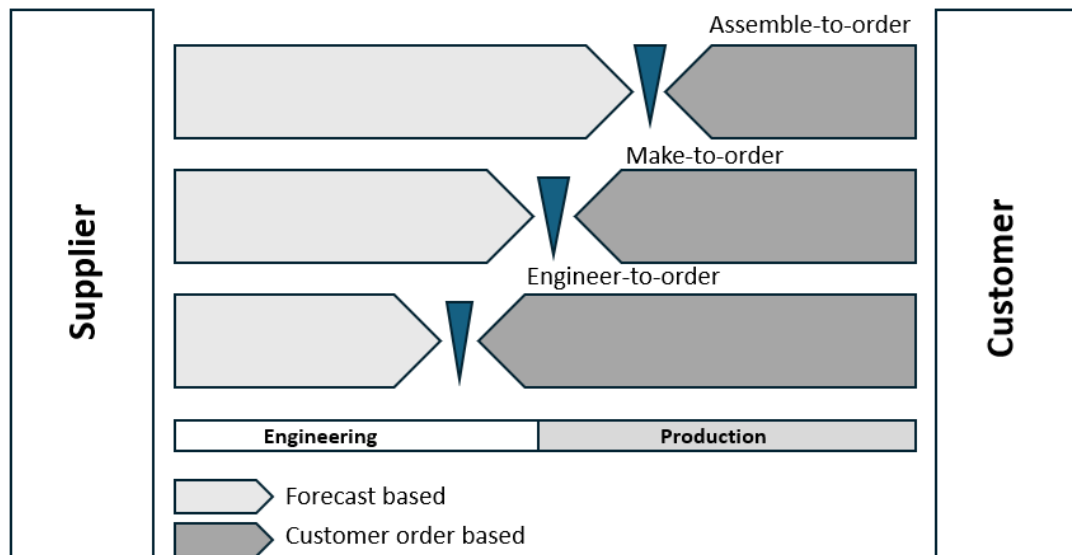


Figure 8 Order penetration point (Adapted from Willner et al., 2014)

Assemble-to-order process is defined as a production method that meets the customer demand by assembling premanufactured parts and components into end products (Wang et al., 2013; Willner et al., 2014). In ATO system, the main input is the customer demand, which can be either forecasted or directly received from the customer (Atan et al., 2017). Atan et al. (2017) states that usually ATO systems work in a way that the components for a certain product are procured well in advance, but the main assembly only

starts after the customer order is received. An advantage of ATO system is shorter lead time compared to MTO and ETO systems, and it applies best when the final assembly can be done quicker than what the lead-time of a product is (Atan et al., 2017).

Make-to-order process works in a way that the customer can select product design from pre-defined solutions (Willner et al., 2014). After the selection, the products are manufactured accordingly. Even though MTO products are sometimes characterized as customized products, Willner et al., (2014) points out that that usually the engineering design and other specifications are finalized before the customer order is received. MTO products have longer lead time compared to ATO products, but the interactions between a customer and supplier are similar (Willner et al., 2014). Willner et al. (2014) says that the customer-supplier interactions are primarily limited to sales phase, including request for quotation, quotation, and order placement, as well as the delivery phase. Key strengths of MTO products are flexibility, and quick decision making, but it is important for the manufacturers to focus on price, delivery time, and reliability, as those are the most competitive attributes (Saniuk & Waszkowski, 2016).

Engineering-to-order is the most complicated and the most customizable option of all the strategies. Fortes et al. (2023) says that ETO products are typically manufactured in companies that are dedicated to manufacturing complex products. In order to meet customers' specifications, ETO products usually go through a workflow in which the product design, bill of material details, and required drawings are generated for each product individually (Fortes et al., 2023). In ETO process, the customer is highly involved in the specifications of a product, and products are often designed to meet specific customer needs. The main ETO characteristics can be seen in figure 9 below.

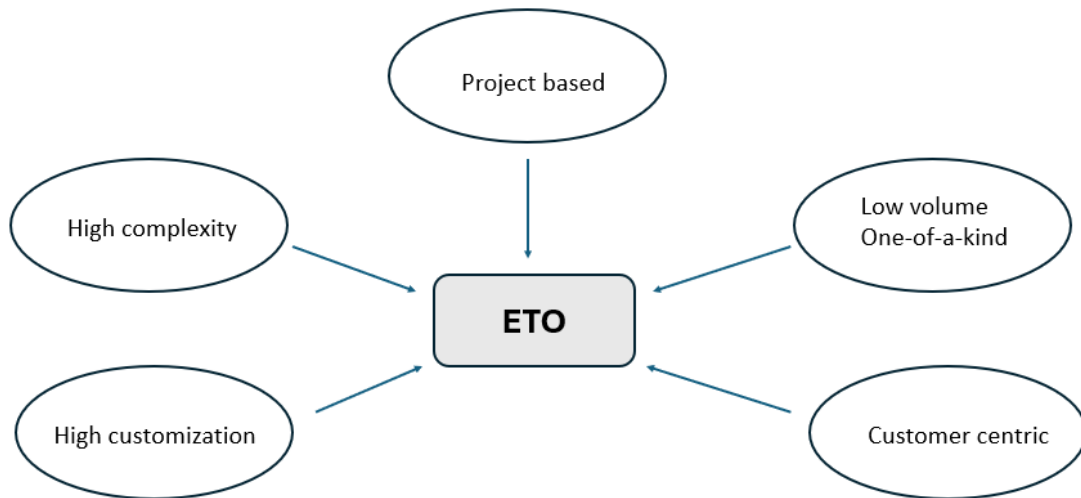


Figure 9 ETO characteristics (Adapted from Fortes et al., 2023).

Previous literature has brought up several challenges regarding ETO production. The main challenge mentioned is prolonged lead time and delayed deliveries (Sigurjónsson et al., 2025; Fortes et al., 2023; Yang, 2013). Additionally, increased costs in production and delivery, barriers in information processing, and the lack of technical knowledge are often associated as challenges in ETO production (Willner et al., 2014; Fortes et al., 2023). All these challenges occur because of the complexity of the process and because of the several stakeholders that are involved in the process. Willner et al. (2014) states that the customer specifications must be discussed between the customer, sales, and engineering departments, meaning that even a small change can lead to several feedback loops.

Fortes et al. (2023) emphasize that usually when customer requirements change in the later stages of engineering, it can lead to all the issues mentioned above. This is why companies should have a clear understanding of customer requirements in the early stages of the project. Zhou et al. (2024) conducted research focusing on the connection between design changes and lead time, concluding that if more time is spent on the initial design of the product, it reduces the overall lead time. This is because there are less feedback loops between the stakeholders and therefore the process can progress quicker.

In addition to operational complexity, ETO strategy has direct effect on product quality, reliability and customer satisfaction. Because products are designed for each customer by different requirements and there is only limited amount of standardization, the risk of design errors and rework increases (Fortes et al., 2023; Zhou et al., 2024). These factors can negatively affect delivery reliability and overall customer satisfaction. To ensure that customer specifications and requirements are met, suppliers should focus on effective coordination, clear communication, and process control along the whole supply chain (Iakymenko et al., 2018).

2.5 Synthesis of literature

This literature review focused on supplier and supply chain quality and reliability, customer satisfaction in B2B sales and different order fulfilment strategies. The reviewed literature highlights that supplier quality and reliability are multidimensional topics that are affected by both internal supply chain capabilities as well as external supply chain performance. The literature also indicates that if a supplier wants to increase their quality and reliability, it is important to focus on enhancing customer satisfaction.

While customers mainly evaluate suppliers based on product quality, delivery reliability, cost, and communication, these attributes are influenced by the whole upstream supply chain rather than only the supplier. Prior literature also highlights that supply chain quality management practices have a direct effect on customer satisfaction in B2B context. Any failures in supply chain coordination, information flow or quality management can reduce customer satisfaction, even when the supplier's own performance is strong. Additionally, the literature indicates that ETO environments increase the possibility of supply chain errors, such as late deliveries and higher costs, implicating that communication and clear processes between the stakeholders are essential in such cases. These themes combined create the theoretical framework for the thesis, and it is illustrated in figure 10 below.

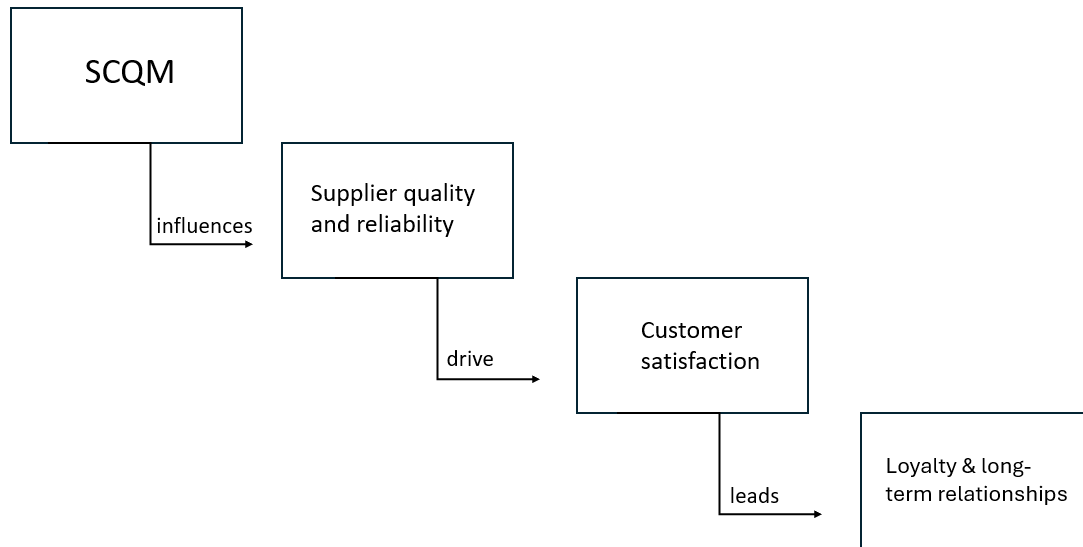


Figure 10 Theories of the thesis combined.

The figure above shows that supply chain quality management influences supplier quality and reliability, as the main goal of SCQM is to continuously improve the processes of a specific company. On the other hand, supplier quality and reliability further drive customer satisfaction, especially in B2B context. Furthermore, improved customer satisfaction leads to loyalty and long-term customer-supplier relationships which should be the goal for all organizations. Based on the literature and this framework, it can be concluded that a company wanting to improve their quality and reliability as a supplier should first identify the areas in their operations and supply chain that could be improved. That can be done, for example, by investigating customer needs as well as looking into the current state of the supplier's operations. After that, SCQM practices should be applied where possible. Also, it is important for a supplying company to identify risks that can occur along the supply chain and come up with risk mitigation strategies in order to achieve maximal customer satisfaction.

Previous literature highlights that the main attributes of supplier quality and reliability are related to quality of the product and on-time deliveries. In addition to these factors,

the thesis will focus on improving the overall service performance of the company. As discussed earlier, supplier quality and reliability include several factors beyond product quality and delivery reliability, such as the information flow to up- and downstream supply chain, and warranties and claim policies.

The previous literature provides examples of how a supplier can improve their supply quality and delivery reliability. In a business context where a supplier does not have production of their own but rather purchases products from other suppliers, four options for making the improvements have been introduced by Krause et al. (2000). Krause et al. (2000) explain that a buying company who experiences disruptions with their suppliers can either invest in personnel, resources, and time to increase supplier performance or they may change to another supplier who performs better. They also mention that one possibility is to move production to own facilities, or alternatively, they can combine one or more ways. Additionally, Aloul et al. (2017) note that implementing communication, coordination, and cooperation among stakeholders can improve supplier's operations and overall end-customer satisfaction.

Improving delivery reliability requires also knowledge of the current markets, as well as having seamless communication with customers and factories that supply the products. A company should also build trust with their customers, as it enhances communication and information sharing, which further improves customer satisfaction. Lastly, the literature suggests that especially in environments where design changes are possible, close collaboration with the customer and supplier is essential. Also, based on the literature, streamlining the design approval process by requesting any change as early as possible, mitigates the risk of delay and cost change.

Taken into consideration prior research and literature, the following hypotheses are formed:

H1 = Product quality has direct effect on customer satisfaction in B2B context.

H2 = On-time deliveries have direct effect on customer satisfaction.

H3 = Ease of communication has a weaker effect on customer satisfaction compared to product quality and delivery reliability.

H4 = Higher customer satisfaction is associated with stronger intention to purchase products in the future.

Although previous literature has examined supplier quality, supply chain reliability, and customer satisfaction separately, there is limited amount of empirical research that combines both customer and internal perspectives in order to improve supplier quality and reliability. As a result, there is a lack of understanding of how internal supply chain performance aligns with the customer's perceptions and how both views can be utilized in the improvement process. This study addresses this gap by examining supplier quality and reliability in B2B context by combining internal employee insights and external customer perceptions to find strengths and weaknesses of current operations. The study aims to identify how supplier performance and customer satisfaction can be improved, especially in environment where the supplier operates without their own production and relies on upstream factories for manufacturing and delivering the products to the end customer.

3 Methods

This chapter presents the methods that were used to complete the research as well as the justifications for each methodological choice. First, the research design is presented, which is followed by the explanations of data collection and analysis for both qualitative and quantitative data. Lastly, the chapter discusses the reliability and validity of the thesis.

3.1 Research design

The research was conducted as a single case study by using mixed method approaches. A single case study was used in this study as it allows the researchers to deepen the knowledge of a specific phenomenon (Gustafsson, 2017). A case study has been also described to be suitable for research where a phenomenon is studied in real-life context (Yin, 2009). The choice of single case study was justified for the thesis as the objective was to analyse the current state of the case company's operations in depth, which then allows to identify the strengths and weaknesses, as well as areas for improvement. The study is both exploratory and descriptive in nature, as it seeks to understand the operational processes of the case company through qualitative and quantitative data.

The thesis uses qualitative and quantitative data, meaning that mixed method approach is used. Creswell & Zhou (2007) define mixed method approach as collecting both qualitative and quantitative data, which are then combined to understand a specific problem from multiple perspectives. In this research, qualitative data was gathered from semi-structured interviews with the case company's employees to get insight into how the company currently operates and how the operations are seen from the internal point of view. Quantitative data was collected through a self-completion survey that was sent to the customers of the case company. The goal of the survey was to get information of how the customers perceive different processes of the case company. Qualitative and

quantitative data were integrated to assess the perceptions and performance of the company.

3.2 Data collection and analysis

This chapter presents how qualitative and quantitative data were collected and analysed.

3.2.1 Qualitative data

As stated earlier, the qualitative data for the thesis was collected through semi-structured interviews. The interviews were conducted with the case company employees from a specific team, which led to the total number of interviews to be 7 (table 5). The team is responsible for domestic sales in Finland, but the products are purchased from factories in other countries. This means that purposive sampling was used for the interviews, and that has a direct influence on the trustworthiness of research (Adeoye-Olatunde & Olenik, 2021). Two of the interviewees worked in customer service / sales support, and five interviewees worked in sales. The interviewees from sales had several different job titles, but those have been excluded from the thesis to remain the anonymity of participants. Before the interviews, the participants were informed of the background and the reason for the research, and the interview questions were provided to them. The interview questions were developed based on the previous literature regarding similar themes, but also in way that benefits the case company. The interview questions can be found in the appendix 1. It was also informed to the interviewees that even though the interviews would be recorded, their identity would remain anonymous.

Table 5 Interviewees.

Inter-viewee	Function	Length	Product group
1	Customer service / sales support	52 min	1, 2
2	Customer service / sales support	42 min	1, 2

Inter-viewee	Function	Length	Product group
3	Sales	49 min	1
4	Sales	29 min	1
5	Sales	35 min	2
6	Sales	53 min	2
7	Sales	72 min	1

All the interviews were held through Microsoft Teams due to the differences in location between the participants and the researcher. The interviews were semi-structured, which ensured that all the important topics and themes would be covered with all participants (Karatsareas, 2022). Semi-structured approach for interviews was also chosen for its flexibility, as it allows the conversation between the participants, and the interviewees can express their views and opinions through their own experiences (Karatsareas, 2022). All the interview questions were discussed with every participant to receive a comprehensive overview of the same topic from several perspectives.

The interviews were recorded in Microsoft Teams, which also provided the transcripts of the discussions. The transcripts were then corrected manually to avoid any misunderstandings later in the analysis process. The interviews were held in Finnish, and the answers were translated into English when the results were written. The translation process was mainly done by the researcher, but tools such as Google Translate and Copilot were occasionally used to support the process. Analysis of the interview data started with familiarizing with the transcribed interview data. All the interviews were read multiple times to gain deep understanding of the answers and discussions. Thematic analysis was then used, as it helps a researcher to identify, analyse, and report themes and patterns from a specific dataset (Braun & Clarke, 2006). Interviews were first marked with initial codes, which later helped to generate larger themes by combining similar codes under a main theme. After the themes were generated, the results could be reported. The interviews provided usable results for both research questions, especially the

second question that was regarding the improvement of processes and procedures to enhance supplier quality and reliability.

3.2.2 Quantitative data

Quantitative data for the thesis was collected through a feedback survey that was sent to the customers of the case company. The survey included similar themes that were discussed during the interviews, but the goal was to gain customers' perceptions of the case company's operations. The survey was created based on the previous literature, and it also contained themes provided by the case company, therefore it provides academic and practical results.

The primary goal of the survey was to collect and analyse the data regarding perceived quality and reliability at the case company from the customers' point of view. The survey was distributed via email to 100 customers from 48 organizations. Out of the 100 emails sent, 5 were undeliverable due to the contact person not working in a certain organization anymore, so 95 valid emails were sent. The contact information for each customer was collected from the case company's CRM (customer relationship management) database to ensure the compliance with data protection regulations. The CRM database included each customer's permission to be contacted by email, and the survey was only sent to those who had allowed it. This limited the number of possible customers that the survey could have been sent to, meaning that the answers received were also limited due to that matter. The answers from customers were collected with Microsoft Forms and the survey remained open for two weeks. One reminder message was sent during the timeframe to increase the overall response rate. A total of 38 responses were received, resulting in response rate of 40 %.

The customers were informed about the reason for survey, and it was also stated that answering is voluntary and anonymous. The survey included instructions for completion along with the researcher's contact information for any questions or validating the

authenticity of the survey. The survey included 22 questions/statements that were divided into 5 main themes. The survey was created in Finnish, since all participants were from Finnish companies. In addition to that, the customers were asked to rate 8 different factors when evaluating suppliers. Lastly, the survey included 3 open questions that were voluntary. All survey questions and statements can be found in appendix 2. The statements in the survey were measured using a five-point Likert scale (1 = strongly disagree, 5 = strongly agree). In addition, if the respondent felt that they do not have sufficient information to evaluate a specific process, they were able to answer "I can't say". Those responses were treated as missing values in the data analysis process.

The analysis of quantitative data started by exporting the survey answers to Microsoft Excel and transforming the answers into numerical form. Descriptive statistics were used to retrieve means and standard deviations of the answers, which provided the overall view of the customer perceptions. All the answers were analysed in the context of the research questions of this thesis, but some parts of the survey focused more on addressing specific research questions and hypotheses. To answer the first research question, the part that was taken strongly into consideration was the customers' answers to the supplier evaluation factors. Those answers were analysed by using one way ANOVA to find out if some factors statistically differed from others. The ANOVA results were further analysed by conducting Tukey HSD (honestly significant difference) post hoc tests on the four highest ranked factors to evaluate whether there was statistical evidence of some factors being significantly more important and could therefore be determined as key factors that affect supplier quality and reliability.

To answer the second research question, one statement from each important theme was chosen to represent certain processes and procedures. The table 6 below shows which statements were chosen for each of the processes. The processes were analysed by using one way ANOVA to see if any answer mean was statistically different than others, followed by Tukey HSD post hoc tests for in-depth analysis. Tukey HSD was conducted on the four lowest ranked processes and procedures to provide statistical evidence if some

of those processes were evaluated significantly lower than others and therefore could be classified as processes to be improved.

Table 6 The chosen statements for each theme.

Statement number	Statement	Theme/process /procedure
5	Communication with Company X is easy and questions are answered in a timely manner.	Customer service
6	Technical details are mutually understood with Company X before the order is placed.	Technical detail alignment
7	Order confirmation is clear, and it comes quickly after the order is placed.	Order processing time
8	Delivery schedule is usually the same as what is promised during the quotation phase.	Delivery time accuracy
15	The products received from Company X meet our quality expectations.	Product quality
18	Delivery documentation and packaging meet our requirements.	Documentation and packaging
19	When issues occur, Company X handles them quickly.	Responsiveness to problems

To test the hypotheses presented earlier in this thesis, Pearson correlation tests were conducted to see whether the chosen factors (product quality, on-time delivery and ease of communication) had a positive impact on overall customer satisfaction or not, and which of them had the strongest relationship. Also, correlation test was conducted between overall customer satisfaction and the intention to purchase products in the future. The correlation test was conducted by using Excel's own data analysis tool, that provided the p-values of the correlation relationships as well as the correlation coefficients. The

hypotheses formulated in this thesis were accepted by using the criteria described in table 7 below.

Table 7 Acceptance criteria of the hypotheses.

Hypothesis	Acceptance criteria (p = p-value, r = correlation coefficient)
1	Pearson correlation test (product quality ~ overall customer satisfaction): $p < 0,05$ & $r_{pq} > 0$
2	Pearson correlation test (on-time delivery ~ overall customer satisfaction): $p < 0,05$ & $r_{otd} > 0$
3	Pearson correlation test (product quality ~ overall customer satisfaction): $p < 0,05$; Pearson correlation test (on-time delivery ~ overall customer satisfaction): $p < 0,05$; Pearson correlation test (ease of communication ~ overall customer satisfaction): $p < 0,05$; $r_{eoc} < r_{pq}$; $r_{eoc} < r_{otd}$;
4	Pearson correlation test (overall customer satisfaction ~ intention to purchase products in the future): $p < 0,05$ & $r > 0$

3.3 Reliability and validity

Reliability and validity are used in research to examine how well the study could be reproduced in similar conditions, and how the chosen method performs in a specific conditions (Ahmed & Ishtiaq, 2021). Reliability and validity also measure the quality and credibility of research (Olmsted, 2024). Andersson et al. (2024) state that research validity can further be divided into internal, external, and construct validity. For this

research, reliability and validity was ensured, for example, in consistent and standardized data collection methods.

Internal validity of qualitative semi-structured interviews was assured by the consistent interview guide for each participant, and the answers were also analysed in similar manner. That also increases the reliability of qualitative data collection and analysis. In addition, purposive sampling was used to make sure that participants had enough knowledge for being able to participate in the interviews. The findings from the interviews were supported with direct quotes to ensure that any interpretations were based on the data. Even though the research results were obtained from a specific company, they can be generalized to other organisations to some extent, supporting the external validity of the research. Lastly, the interview questions were developed with the help of previous literature and theories, which supports construct validity.

The answers from the customer survey were measured in standardized Likert-scale, and it was developed with the help of prior literature, supporting construct validity. In addition, the hypotheses presented earlier support the construct validity by combining theories with actual measurements. The quantitative data was analysed by using appropriate statistical analyses, which ensures the internal validity. The reliability of quantitative data collection was ensured by all respondents receiving the same questionnaire form with the same answer choices, reducing any possible variation in the answering process. To conclude, the use of multiple data sources strengthened the overall validity of the research through methodological triangulation (Noble & Heale, 2019). The use of triangulation by multiple data sources and methods also reduces the possible bias that could have arisen from only using a single method or data source (Noble & Heale, 2019).

4 Results

This chapter presents the results of the internal company interviews as well as the customer survey. First, the results of the interviews are explained, and it is followed by the customer survey results. The chapter concludes with the results of statistical analyses. The main goal of the chapter is to present the comprehensive picture of the case company's operations and also the customer perceptions received through the survey.

4.1 Internal interviews

This section presents the results of the interviews. The main goal of the interviews was to explore how the case company's employees perceive their current operations, and what they think could be improved to enhance customer satisfaction. The section starts with employees' views of information flow and communication, and that is followed by the results of current state of the drawings approval process. After these, deliveries, customer relationships and perceptions of reliability are presented. Lastly, the section presents current strengths and weaknesses obtained from the interviews.

4.1.1 Information flow and communication

This chapter will focus on the information flow and communication at the case company. Both internal communication and external information sharing were discussed with the interviewees, and the interviews revealed several important factors that will be discussed. This chapter will include results regarding communication and information sharing with the customers of the case company as well as the factories supplying the goods. Also, internal communication among the team was discussed briefly with some interviewees.

One of the main themes obtained from the interviews was that the case company operates as an important link between customers and factories, meaning that communication and information flow should be open towards upstream and downstream of supply chain. The interviewees described their roles and responsibilities clearly, which makes communication clearer for everyone and helps create structured internal coordination. Participants from sales function pointed out that their responsibilities include the technical coordination between customers and factories. In contrast, interviewees from customer service explained their roles focus more on supporting sales through operational tasks, such as order handling, deliveries, and invoicing, meaning that any technical aspects are excluded from their work.

“We are in contact with the customers, and also with the factories, meaning our suppliers. So, we are kind of a link between them. Whatever questions come from the customers related to deliveries, invoicing, or similar, non-technical matters, we handle them.” (1)

“I handle the customer interface and provide technical-commercial support toward the customer, and I also do quotation calculations together with the factories...we always work as a link between the factory and the customer.” (6)

During every interview, it became clear that communication from the case company to customers is clear and concise. In the beginning of projects, communication with the customers was seen to be clear, and no big challenges was brought up during the interviews. Interviewees 3, 5, and 7 pointed out that with long-term customer, the communication might be smoother since they already know the processes, specifications and delivery times of the case company. Long-term customers usually have all the specifications correct when the order is placed, whereas new customers typically have more questions and uncertainty of what is needed for the order, said interviewee 3. On the other hand, interviewee 6 mentioned that even though new customers might have more questions, it is not time consuming or complicated with them either. Regarding the early

communication with customers, it was said by interviewee 4 that the type of project has more impact on how the communication works rather than the longevity of the customer relationship. It is evident that with bigger and unique projects, early communication is more time consuming as there are more details to be discussed.

From the customer service perspective, communication with the customer starts when order is placed. With new customers, there are tasks that need to be done in the case company's ERP system, which can delay the order handling process slightly. After the customer order is placed to the system, the communication is consistent regardless of the person handling the order. Interviewee 2 said that after the order is placed, communication is clear as every parameter and specification is written in the order and quotation. Interviewee 1 pointed out that emails sent to the customers usually have a structured and standardized format, which makes the communication clearer and more consistent between different customer cases. The standardized format ensures that customers receive necessary information despite the differences in individual handling.

"The main point is that the message we send should be quite consistent, also later when we have deliveries. We should communicate certain key things and remember to include the important information, so that it does not depend on which employee is sending the message." (1)

The communication toward customers happens mainly through email, said all the participants. Most of the interviewees also contacts customers by phone, especially when the matter is urgent. Additionally, interviewees from sales noted that with long-term customers, communication practices become familiar, meaning that they know whether someone likes to be contacted by phone or by email. Interviewees 2 and 7 emphasize that even when communication happens through phone, a follow-up email should be always sent afterwards to avoid any misunderstandings and to ensure that key information is documented. Furthermore, interviewee 6 noted that meeting new customers

in person is important for ensuring clear communication and building trust between a customer and supplier.

It was obtained from the interviews, that during early stages of project, the communication with customers is frequent and more active compared to other stages of the project. However, especially for products with long lead-times, the communication after the order is placed may become very minimal. Interviewee 1 noted that in such cases, the customer should be contacted somehow before the delivery to provide them updates on how the process is progressing. Otherwise, there might not be any communication towards customer before delivery. Maintaining communication towards customer in the middle stages of the process also requires close collaboration with the case company's factories as they are the primary source where the information of any delays or progress comes from.

"After the order and drawing approval phase, there is often a long quiet period before delivery because we have long lead times. It would be good to have some checkpoints where we review if the order is still on schedule." (1)

Since customer communication during all stages of a project somehow depends on the production progress, the interviews highlighted the importance of the upstream information flow, particularly the communication between the case company and its factories. Participants from sales said that during quotation phase, they are in contact with the factories similarly as they are in contact with the customers. Interviewee 6 noted that sometimes the quotation-order phase might be delayed, as the factories often start asking the details when official order is placed. This can lead to additional questions and specifications, which is often followed by several feedback loops.

All interviewees highlighted that there are differences between factories in terms of how their operations support the case company's work. Interviewees 3, 4, and 6 noted that the level of support is heavily dependent on the project manager or contact person that

is assigned for the case company. In addition, interviewee 1 noted that cultural differences influence working practices, which effects on the support and responsiveness that the company receives. Four participants also emphasized that the differences between factories are mainly related to information sharing and how willing the factories are to provide updates regarding delays or other problems. Interviewee 5 noted that issues with the factories and their lack of communication reflects straight to the case company operations, especially when the end customer requires answers or information that comes from the factory.

The interviews revealed that the case company has arranged weekly or bi-weekly meetings with certain factories, depending on the size of order backlog. Weekly meetings with a factory provide useful information for the case company and it helps to provide timely updates of deliveries for end customers. Interviewee 1 noted that regular meetings enable problems to be identified as early as possible, which allows customers to be informed about possible delays as soon as they arise. Also, interviewee 3 said that the customers require updates of their orders regularly, and that can be done by having the meetings with factories. Regular meetings with some of the factories has helped the case company to learn how each other operate and it has also fostered more open collaboration between partners.

However, it was also discussed during the interviews, that regular meetings are only necessary with the case company's largest suppliers. Interviewees from customer service pointed out that it would not be necessary to conduct meetings with suppliers that only have a few deliveries during the year. Nonetheless, interviewee 1 emphasized that with these smaller suppliers, there is a risk of not receiving regular updates of the of the orders, which can lead to delays and lack of information form factories to case company and further to customers. Therefore, more proactive follow-up would be required from the case company, while factories should also provide information more regularly. Interviewee 7 also notes that even though unpredictable events would occur, the factories should provide information more actively.

“We should actively ask the factories what the status of our orders is, but surely, they should also inform us if there are any delays. It should go both ways.” (2)

A strong theme obtained from the interviews was that the case company communicates effectively with customers during the later stages of project, especially before and during deliveries. Interviewees noted that customers are always informed about any changes that there might be regarding their order and delivery time as soon as possible. Prior to delivery, customers are contacted and informed that their order is ready for delivery, and at the same time the delivery instructions are specified. Interviewee 1 noted that from the customer point of view, that is good customer service since it could also be possible to deliver products without informing the customer. Additionally, interviewee 5 commented that case company handles the information flow towards customer in a way that they do not have to monitor the progression of the order themselves. All the necessary information is provided regularly as the case company manages the follow-ups with the factories.

Several participants indicated that communication challenges regarding the deliveries typically arise when information is not shared from the factories early enough. However, interviewee 2 stated that certain disruptions are not controlled by the factories, which can lead to information gaps along the supply chain. In particular, for deliveries coming from further away, the delivery date informed by the factory can change due to external reasons, and updates may be received slower than wanted. This can create uncertainty for the customers, said interviewee 2. Interviewee 1 also highlighted that one of the main challenges during the deliveries are related to the customer receiving correct information about the arrival time of their order. This is especially difficult as the deliveries involve third party forwarders and many stakeholders are included in the process.

In summary, the interviewees agreed that communication towards customers is usually good and questions are answered in timely manner. In some cases, the communication

with customers could be more proactive, especially with orders that have long lead times. Because the case company operates as a link between the factory and the customer, communication towards factories should also be concise and clear. However, the interviewees noted that there are differences in communication between different factories, and it should be improved somehow to receive more regular updates regarding the orders and other questions. The case company conducts regular meetings with their largest suppliers, which has improved the communication and information sharing.

4.1.2 Drawing approval process

The drawing approval process was one of the main themes in the interviews, as it has brought up some challenges for the case company. Although some participants noted that the process has been improved somehow already, the interviews indicated that there are still areas of improvement in the process. In some cases, the process goes through without any disruptions, but sometimes it requires increased work from the case company as well as the design, project management, and production planning teams from the case company's suppliers. This can lead to increased costs and sometimes the delivery time is delayed.

The interviewees' opinions varied regarding whether the customers have a clear understanding of technical specifications when the order is placed. Some participants indicated that customers are aware of all the specifications early in the process, while others stated that requirements are not always clear in the beginning. A consistent observation across the interviews was that electrical values are usually correct from the beginning, while mechanical specifications and design related details might change later in the process. Interviewee 4 also noted that in some cases, the customer is only interested about the price and delivery time of a certain products, meaning that other specifications may still be unclear. Furthermore, it was also noted that it depends on the product and project of how well the specifications are described. For more standardized products, the design cannot be changed therefore no specification is needed. On the other hand, more

complex products can be customized and design can be changed, and that is when the specifications are needed.

“Well, they do not necessarily have a clear understanding of technical requirements, not always. It also depends very much on product, because our product portfolio is quite extensive.” (7)

“Yes, generally they know them [technical requirements] quite well, and that is also what we expect.” (5)

The drawing approval process was described as relatively clear by all the interviewees from sales. Despite the factory that processes an order, the process is similar across the suppliers. The drawings are sent from the factory to the salesperson of the case company, who then forwards the documents to the customer for review. A deadline is set for approval, which in some cases is too short. Interviewees 5 and 6 noted that in most cases, the process goes smoothly without any delays, but sometimes the approval time is not enough. This happens mostly in cases where there are more stakeholders in the downstream supply chain, meaning that the customer of the case company is not the end customer of the whole project. This situation can easily lead to delays in the order processing, and it may also have an impact on the delivery time. Even though the approval period was said to be too short sometimes, interviewee 5 stated that extending the approval time has a direct impact on lead time, which can affect the customers' purchasing decisions. Majority of interviewees emphasized that it should be clearly explained and communicated to customers that how important it is to adhere to the schedule to avoid any unnecessary delays.

“We have to clearly explain, when the drawings are sent for approval, that what it affects and how important it is to receive the approval on time. A lot depends on good communication whether we receive the approval back on time or not.” (6)

During the interviews, much attention was given to the timing of the design changes. Most participants agreed that the majority of changes from the customer comes when the first drawings are sent to them, after the order is placed and processed. Interviewee 4 noted that for customers, this is easier as they can place the order and receive the best possible delivery time without having to think about the design changes early in the process. On the other hand, it was a common understanding among interviewees, that it would be better to receive the changes as early as possible, preferably during the quotation phase. By receiving the changes early, it would reduce the workload from the case company as well as the factories, who are responsible for providing the drawings.

“It would be better if the changes came early during the quotation phase, since we send the standard drawings to the customer at that stage. Then we could discuss whether the changes are necessary and what cost impacts they might have. This way, the factory could be informed already when placing the order, and the customer would avoid unexpected additional costs later during the project.” (7)

Even though the participants mutually agreed that receiving design changes from the customer at an early stage would benefit the process, some challenges regarding that were identified. Interviewee 7 noted that in some cases, the project is still in a very early stage when quotation is requested, meaning that all the design details might not have been discussed yet. Interviewee 6 further explained that sometimes there are not enough resources to discuss with the customer about the technical specifications, when the order is not officially secured yet. In contrast, interviewee 3 mentioned that customers have been encouraged to deliver all the design changes as early as possible, as later modifications might have direct impact on the price of the product. It was also mentioned by interviewee 5 that sometimes meetings are conducted with the customer and their technical employees, which enables them to discuss all the changes at early stages of the project. As a result, when the official drawing approval period begins, no further modifications may be required.

When discussing about the effect of the design changes on delivery time, the interviewees provided several different examples and perspectives. For products with longer lead times, a small delay in approval process might not influence the final delivery date. In contrast, products with shorter lead times were explained to be much more sensitive to delays, meaning that even small delay in the approval often result to postponing the delivery. The effect also depends on the timing that the change request is received. Changes requested in the given approval timeframe should not delay the delivery of any product whereas later requested design changes were reported to affect the final delivery date in most cases. Interviewees 2, 5 and 6 believe that the customers understand the effect of design changes to the delivery time, whereas others noted that customer might not understand the consequences of the changes. Interviewee 7 clearly explained that regardless of the size of the design change, the process will start from the beginning and therefore even small changes might extend the total lead time, which might be something that the customers are not aware of. Interviewee 5 concluded that customers will understand the consequences, especially when they are explained clearly and communicated early in the process.

“They do understand that as long as the design is not approved, nothing progresses. So yes, they understand that changes always have some kind of effect on delivery time.” (5)

Although the drawing approval process goes smoothly in most cases, the interview data indicates that it also includes bottlenecks and improvement areas. It was noted by interviewee 7 that even though the process itself is relatively clear, it is often too time consuming overall. Especially when changes are requested by the customer, it was reported that receiving updated drawings from the factory takes longer than it should. This might be due to the increased workload in the factory; therefore, it is something that cannot be influenced by the case company. Additionally, participants noted that sometimes it might be also unclear that what could be changed in the design and what is the cost of

the changes. While factories usually provide a schedule for approval, in some cases it is not received, which makes the more difficult to manage.

“We have factories that do not send the schedule for the drawings and approval. It would be good to have the schedule because if delivery time depends on the approval of drawings, then that should be known when placing the order.” (1)

The participants provided several suggestions for improving the drawing approval process, to make it more efficient for each stakeholder. A commonly mentioned improvement was that preliminary drawings should be provided for the customers, so that any potential change requests could be identified early in the process. Interviewees also mentioned that it would be beneficial to clearly specify in the quotation which elements can be modified, as this would help customers to recognize possible changes in advance. If some design change that a customer could do is not clearly mentioned, the customer might notice the need for the change too late in the process. In addition, interviewees suggested that better resource allocation would allow more time for early discussions and technical negotiations with customers. A few participants also noted that, if possible, the drawings should be standardized to serve more customers, especially for subcontractors whose end customer is the same. This standardization has already been done to some extent, but it was reported that, if possible, it should be done for even more products and customers.

An improvement area commonly discussed during the interviews was the way that the process is executed currently, as it relies primarily on email communication. Interviewees noted that especially during vacation times, there might be gaps in the information sharing, because some critical things might be missed when covering for a colleague. Interviewee 3 also stated that the deadline for approval could be missed if the person handling the approval process is absent, and others are not paying enough attention to the deadlines. To address this, interviewee 3 suggested that there should be a system

that alerts relevant people about upcoming deadline, to ensure that those would not be missed in any case.

To summarise the drawing approval process, the interviewees noted that customer should know the technical specifications already in the quotation or order phase, as it would reduce the needs for separate approval processes later in the timeline. Also, all factories should provide a schedule for approval, because it would bring more clarity to the process. The interviewees said that providing preliminary drawings to the customers and at the same time informing what could be changed in a certain product would reduce especially the change requests that happen too late. In addition, better resource allocation could allow the sales people to be more proactive towards customers, and more time could be used in technical discussions.

4.1.3 Deliveries: delays and reliability

The interview data showed that, overall, the case company manages the deliveries effectively and the customers are informed about upcoming deliveries well in advance. Once production is completed, the customers are informed about upcoming delivery, and all the relevant documents are provided to them. However, because deliveries are planned and booked by the case company's supplier rather than the case company itself, many factors cannot be influenced by the participants interviewed. Nevertheless, what became evident during the interviews was that even though there might occur events that affect and delay the deliveries, timely communication with customers is essential as it maintains reliability and transparency throughout the delivery process.

A unified theme obtained from the interviews was that the communication towards customer is excellent at the case company. Interviewee 6 noted that all the processes regarding deliveries are transparent and especially the coordination of logistics, that is managed by the customer service, was seen to be clear and effective. In addition, interviewee 2 explained that because the customer wants to know when the products are

arriving, a tracking number provided by the supplier increase the transparency and makes it easier to track the delivery. Overall, any bigger problems with case company's operations regarding the deliveries was not reported at any interview.

"The customer is kept informed about the schedule, so I do not see any major problems in the delivery process." (4)

When discussing about delays regarding the deliveries, participants provided several explanations and examples of possible events that can affect the final delivery time. In contrast to the previous paragraph, it was reported that all the major disruptions and delays occur from the suppliers' side rather than the case company's operations. The only possible delivery time delay maybe occurring from the case company's operations was reported to be regarded to the drawing approval process. Several participants noted that if approval is not given in the provided timeframe, it may have an impact on delivery time. But as discussed earlier, the customers are clearly informed during the approval process that late submission may influence delivery time which is why the approval is usually submitted on time.

Another factor highlighted in the interviews was that usually the delivery time delays occur when the suppliers have component shortages or production capacity is full. Interviewee 6 noted that even though the direct supplier of the case company operates reliably, their upstream supply chain might face problems which impacts directly on the deliveries of the case company. This observation was supported by interviewee 3, who mentioned that bankruptcies among sub-supplier have occurred and it has had a direct impact on many orders and their delivery schedules. Participant 1 emphasized that in such situations, the information sharing from the supplier side should be more transparent so that every stakeholder, including the end customer, could be prepared for potential delays. In addition, interviewee 4 noted that some factories schedule their production in a too optimistically, which often leads to delays as the capacity fully booked at the factory.

“There are capacity issues. That is what has been happening now, because the demand has increased sales have grown, but production has not been able to increase the capacity.” (7)

“Of course, subcontractors and upstream supply chains are one factor. Even if our factory has done a great job and everything is on schedule, a component from a subcontractor might be delayed. Quite often these kinds of delays influence the final delivery time.” (6).

The interviewees noted that there are also some disruptions during the delivery that can delay the final delivery time. These were reported to be external factors, that are not in the hands of a factory either. Interviewee 2 indicated that, for example, deliveries coming outside the EU have different procedures, meaning that there are customs processes that can have an impact on the final delivery date. Also, each type of freight used have different external risks that can occur during the delivery, for example, sea freight has its own risks, whereas deliveries by truck have different risks, such as capacity problems, said interviewee 3.

“Some of the problems arise from the factors beyond the factory’s control, so even though they do their best, everything does not always go smoothly.” (2)

Delivery reliability at the case company was describes as good by some interviewees, while others noted that there is still need for improvement. Interviewee 1 explained that it would be important to deliver products on time, as late deliveries may cause difficulties for customers and increased costs for the case company. Interviewee 1 also noted that deliveries are prioritized in the workflow if needed, so that the customers receive their orders on time. Interviewee 3 felt that most of the time, the delivery reliability is sufficient, which was supported by interviewee 6 who said that most of the time delivery reliability is predictable. In contrast, interviewee 7 explained that delivery reliability is the main thing that should be improved, even though it might be difficult due to external

factories being the ones producing the products. Interviewee 7 continued that especially when the capacity has increased in certain factories, the prediction of final delivery times is difficult, as many times the production is planned in a too optimistic way. However, common theme regarding delivery reliability was that clear and proactive communication towards customers and factories can improve the reliability and enhance customer experience.

“Even if our delivery reliability suffers due to some factories, we are still able to directly communicate with the customer. They can easily contact us, and we can clarify the situation with the factory. I hope that this brings added value.” (2)

In conclusion, deliveries from the case company to the customer usually go smoothly without any major disruptions. Deliveries are prioritized in the workflow, so that the customers receive timely updates of their delivery and so that products would arrive on time. Delivery delays usually occur due to the capacity problems, missing components or other disruptions during the production process. Also, during the deliveries, external factors, such as customs procedures, might delay the delivery. The case company effectively tries to inform customers about any changes regarding the delivery schedule, but the interviewees noted that more updates is needed from the factories supplying the products. When discussing about the delivery reliability, some said that it is currently sufficient, while others noted that it should be improved. However, the improvement might be difficult since demand has increased, and production might have been planned too optimistically in the supplying factories.

4.1.4 Customer relationships and reliability

Customer relationships, as well as differences between long-term customers and new customers, were discussed in the interviews, and several perspectives were provided. As discussed earlier, the quotation-order process was generally described to be smoother with long-term customer, as they usually know what information must be provided and

how the processes work in the case company. The interviewees also noted that arranging deliveries with regular customers is more straightforward, especially when products are consistently delivered to same warehouse location. However, this is only a case for a few customers, as it was said that many times the products are delivered directly to the customer's construction site, which requires more communication regardless of the length of customer-supplier relationship.

"We have customers to whom we deliver products regularly, and those cases tend to run quite smoothly on their own, because we have mutual trust as we know that they are already familiar with our delivery process." (2)

The interviewees expressed varying perspectives on the differences between long-term and new customers. Some participants noted that there are differences in customer expectations, while others said that no bigger differences are experienced. Additionally, some interviewees reported that differences in customer expectations arise more from the customer organization culture and the project context, rather than the duration of the relationship. The common theme observed in the interviews was that all customers presumably expect the same quality and service from the case company, but differences arise when disruptions are experienced.

"Well, the differences are more between the [customer] organizations. I would say that it is largely influenced by the [customer] company culture and how they manage their suppliers. In my opinion, that where the main difference is." (7)

"Our brand is seen as reliable, and we are considered a trustworthy supplier. Both new and long-term customers expect the same level of quality from us." (5)

Long-term customers were described by some participants to be slightly more flexible compared to new customer. Interviewee 2 explained that when most orders and projects are completed without challenges and delays, a long-term customer tend to understand

that a single problematic delivery does not reflect to the overall performance of the case company. Interviewee 4 supported this view by stating that first time customer might perceive the case company as an unreliable supplier, if their first order experience is not positive, for example due to the delivery delays. Interviewee 4 also emphasized that concluding projects without disruptions is particularly important when working with new customers.

“For long-term customers, it is clear that when we have many orders and very successful projects in a row, and then comes one case with some disruptions, they understand that we have had many successful cases but that just happened to be a bad one.” (2)

“If there is a customer who orders one product and that is delayed, then what impression that gives to them? Are we then reliable in their eyes?” (4)

The interviews also indicated that because the long-term customers are familiar with the case company's processes, they also acknowledge where the improvement areas are regarding the whole order to delivery process. Interviewee 1 noted that those customers are probably expecting the case company to improve their processes at least in the areas that disruptions arise regularly. In contrast, it was said that new customers might not have any specific expectations when their initial order is placed. Interviewee 6 explained that because new customers are not familiar with the case company's processes, they might require more information along the way, even in situations where no major problems arise.

When it comes to customer perceptions about the reliability of the case company, all participants agreed that company is generally seen as a trustworthy supplier. Interviewee 3 stated that the way of working is somewhat unique, as domestic customers receive support and service in their own language in all situations. Additionally, several participants commented that the perceived reliability is supported by the local presence

of the case company as well as the relatively short distance of supplying factories, as most of them are in Europe. Interviewee 5 stated that customers perceive the case company as a very reliable supplier which was justified by the fact that the cost of goods might be higher than the competitors', but still the customers continue purchasing the products. Finally, some participants stated that also the perceptions of reliability might differ across the customers, depending on the length of the customer relationship, organization cultures and previous experiences.

"I do believe that it [reliability] turns out to be positive. We have a strong local presence." (7)

"We have a strong brand and reputation, which increases the reliability. Also, our products are certainly seen as high quality." (1)

When discussing about the factors that affect the case company's quality and reliability, most participants argued that product quality is the main contributor in that. Product quality was generally described as sufficient and no major quality problems were brought up. However, the interviewees mentioned that when quality problems occur, the case company reacts quickly and, if necessary, can send employees straight to the customer's site to resolve the problem. This rapid reaction was also mentioned to be a great contributor to the overall quality and reliability. As said before, the products are supplied by the case company's factories, which is why the participants do not have a direct possibility to influence the product quality. Nevertheless, it was reported that all quality issues are forwarded to the supplying factories in order to support continuous improvement.

The interviews also revealed that delivery reliability, market reputation, and the ease of communication influence customers' perceptions of the case company's performance. Regarding delivery reliability, some participants felt that case company usually delivers products on time, while others considered that delivery reliability is not what it could be.

Interviewee 7 noted that although delays in deliveries occasionally occurs, the customers still perceive the case company as a trustworthy supplier due to the high quality in its products. In addition, a few participants said that actions for improving delivery reliability have been taken, for example, conducting the weekly meetings with the largest suppliers.

“Keeping the promised delivery time is probably one key factor, because it causes the customer a lot of difficulties and costs if we do not stay on schedule.” (1)

“I think we are quite open when it comes to communication. We do not hide things, and we explain what happened and then think about possible solutions together.” (6)

Some interviewees felt that the reputation of the case company also strongly influences the customer perceptions, meaning that the overall brand is seen as trustworthy and reliable. Participants also emphasize that effective communication towards customers ensures that they are not left without support in any situation, and any problems that arise are handled in a timely manner. Interviewee 2 further suggested that the customer perceptions are positive due to the whole process of how the case company operates, rather than just a single attribute such as product quality alone. It was also concluded by interviewee 2 that even though delivery reliability is affected by issues at a supplying factory, customers are always kept informed and clearly communicated about any disruptions, and they are also able to contact sales or customer service whenever needed.

In summary, the case company employees feel that customers perceive them as a reliable supplier. The interviewees said that the main thing affecting the perception of reliability was product quality, but also factors such as delivery reliability, market reputation, and clear communication were mentioned. The differences between long- and short-term customers were mentioned mainly be in the flexibility, but more differences are influenced by the organization cultures and project context.

4.1.5 Current strengths and weaknesses

Throughout the interviews, several strengths and weaknesses were identified. One of the main strengths mentioned by several interviewees was that the case company operates in Finland and serves Finnish customers, which was reported to be a positive thing from the customer's point of view. Interviewee 7 explained that the customers are familiar with the sales people at the case company, which makes communication easier and more accessible for them compared to direct communication with the factories. This view was supported by interviewee 1, who mentioned that operating locally in Finland and providing service in Finnish, combined with close communication with supplying factories, enables the case company to provide updates about the customers' orders regularly. Such communication and providing updates possibly would not happen if customers were required to be directly in contact with factories. Lastly, interviewee 3 noted that the response time to any questions is relatively short, even though the demand has increased during the last years.

"One of our strengths is that we operate in Finland and serve customers in Finnish. Also, because we follow up the factories, we are able to send status updates to our customers and warn them if an order will be delayed." (1)

Another strength obtained from the interviews was that the case company has a strong brand reputation and whenever needed, technical support is received from other functions to provide customers the service they need. It was also mentioned that the product portfolio is extensive and every product of the case company is technically competitive on the market. This was supported by some interviewees as they noted that although the cost level is not the lowest compared to competitors, product quality and product life cycle enhances the overall competitiveness. Also, the relatively short distance to the supplying factories was reported to be one of the main strengths of the case company.

“We have good products for practically any need. Technically the products are highly competitive, no matter which product is chosen.” (7)

The interviewees also identified several weaknesses and areas that could be improved. One improvement area discussed was the drawing approval process, which has been explained in more detail earlier in this chapter. In addition, several interviewees explained that current resource allocations at the case company could be improved. The interviews indicated that currently some work tasks are assigned in a way that they may not fully be in scope of employees' primary roles and responsibilities. For example, a few interviewees from sales explained that a big amount of their work includes more project management-type activities rather than actual sales tasks. Interviewee 6 explained that improving the task allocation would enable the salespeople to focus more on the actual sales activities and it would also help more proactive approach to working with customers. Interviewee 2 also noted that current task allocations have a negative influence on the handling of warranty and claim cases as not enough time can be allocated to these issues.

“Changing the resource allocation would allow the salespeople to focus on actual sales tasks rather than doing project management type tasks. That would also allow us to change our work to be more proactive instead of being only reactive.” (6)

“They have too much work that is not their primary responsibility and you can see that the quality of customer service suffers from it. Projects cannot be monitored as closely as they should be, and warranty and claim cases are maybe not handled fast enough.” (2)

Even though communication was generally described to be a strength of the case company, the interviewees felt that information sharing towards and from the supplying factories should be improved. Interviewee 4 explained that communication with some

factories can be challenging, and that these challenges are often due to the differences in factories' communication and responsiveness practices. Similarly, interviewee 2 also felt that some improvements should be made to make the communication between the case company and its suppliers more seamless and effective. In addition, interviewee 6 noted that even though communication toward customer is currently going well, it could be more proactive by listening their needs and expectations more.

“Perhaps we should come up with some kind of closer collaboration with the factories, to make it more seamless and efficient.” (2)

Lastly, it was obtained from the interviews that the case company does not currently utilize any automation tools to support its operative processes. Interviewee 5 suggested that there could be many opportunities for implementing digital tools and solutions, especially in the quotation process. According to the interviewee, preparing quotations could be automated, as currently everything is done manually. This was described as more time-consuming than it should be. This view was supported by interviewee 6 who said the whole case company could exploit digital tools better to enhance efficiency.

4.1.6 Key findings from the interviews

This section presents the key findings from the interviews with the case company employees. The interviews covered themes such as communication and information flow towards customers and supplying factories, drawings approval process, deliveries, customer relationships and reliability, and overall strength and weaknesses. The table 8 below presents the key findings that were observed during the interviews.

Table 8 Summary of interview findings.

Theme	Strengths	Weaknesses	Improvement suggestion
Communication	Local presence; Service language is Finnish;	Information gaps with factories; Reactive towards customers;	More proactive communication; More cooperation with supplying factories;
Drawings approval process	Clear process structure;	Late design changes; Response time from some factories;	Earlier customer involvement; Standardization; Preliminary drawings;
Deliveries	Clear communication; Customers are kept informed;	Delays due to external factors; Optimistic scheduling; Not receiving updates from the factories early enough;	Better upstream transparency; More follow-ups with smaller suppliers;
Customer relationships	Strong brand and perceived reliability; Local presence; Long-term trust;	New customers more sensitive to disruptions; Delivery delays affect the perceptions;	Proactive communication; Focus on first-project success; Systematic follow-up;
Resource allocation	Easy to contact; Strong technical support;	Sales overloaded with PM tasks; Not enough time for primary responsibilities;	Better task allocation;
Digitalization	-	Tools are not used; Too much time spent on manual tasks;	Implement automation tools;

4.2 Customer survey

This chapter will focus on the results of the feedback survey that was sent to the customers. The purpose of the survey was to gather information about the customer perceptions of the case company's operations and what they value the most in a supplier. The survey statements were evaluated through the scale from 1 (strongly disagree) to 5 (strongly agree). In the beginning of the survey, some background information was gathered as it may be helpful in explaining the results later. Figure 11 below shows how the length of the customer-supplier relationship was divided between the respondents. Over half of the respondents (~60 %) had been a customer of the case company over 7 years. Approximately 26 % of the customers reported the length of the relationship to had been 4-7 years, and 13 % have been customers for 1-3 years. This means that most of the customers can be considered long-term.

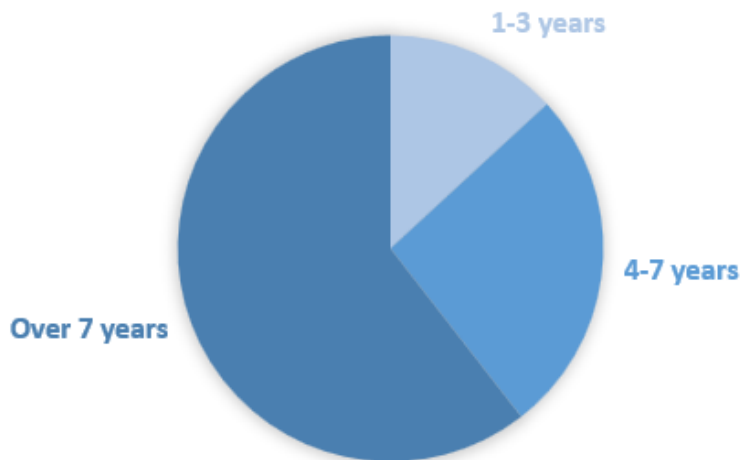


Figure 11 The length of customer-supplier relationship.

The survey also revealed that over half of the customers order products from the case company more than 5 times a year (see figure 12). The amount of respondents that reported the number of orders to be between 2 and 4 in a year was approximately 32 %. Lastly, 11 % of all respondents orders products once a year or less often. The amount of

communication from customers' side towards the case company can be seen in figure 13. It shows that almost 65% of the customers contact the case company at least once a month. The rest, approximately 35%, are in contact less often than that.

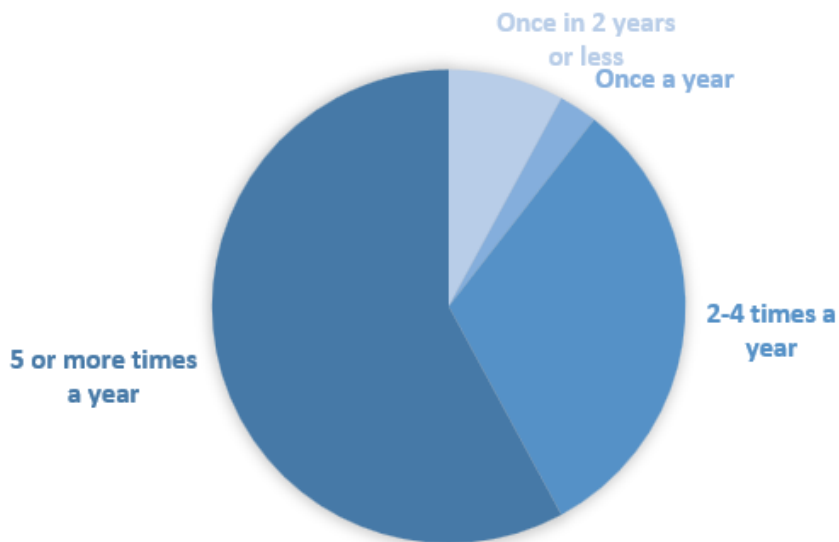


Figure 12 The number of orders per customer.

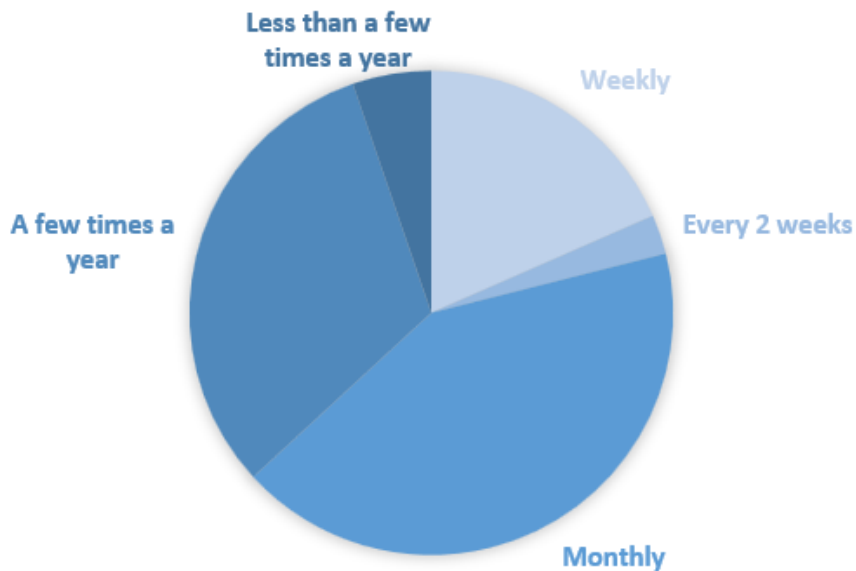


Figure 13 How often the customer contacts the case company.

4.2.1 Communication and order phase

The first part of the survey included statements regarding communication and order phase. These questions provide information about how customers perceive the case company's communication as well as how some processes before delivery work. The statements in this part were regarded to ease of communication, discussion of technical specifications, and the order confirmation process.

Table 9 below shows the results from the survey regarding communication and order phase. The table presents the evaluated statements, which are followed by the number of respondents (n), the mean ratings and the standard deviation. Overall, communication with the case company was evaluated positively, with the mean of 3,64. The respondents felt that technical specifications are clearly discussed before the order is placed, as it received the highest score of all (M = 4,47). The clarity of order confirmation and the schedule that it is received was rated as 3,37. The delivery schedule being the same as in the quotation phase received the lowest rating, which was 2,78. It had also the largest standard deviation (1,72) out of all the statements.

Table 9 Customers' perceptions of communication and order phase.

Statement	n	Mean	Standard deviation
Communication with the case company is easy and questions are answered in timely manner.	38	3,63	1,12
Technical specifications are agreed with the case company before the order is placed.	38	4,47	0,72
Order confirmation is clear and it is received fast enough after the order.	38	3,37	1,38

Statement	n	Mean	Standard deviation
The delivery schedule is usually the same as what was agreed during quotation phase.	37	2,78	1,72

The respondents also had a possibility to give open feedback, which would further help the case company to improve their operations. Regarding communication, some of the respondents mentioned that good customer service and locality of the case company are the strengths that they value. It was further explained that receiving service in their own language makes the cooperation smoother and clearer. Even though some respondents commented that quotations and answers to questions are received in timely manner, some mentioned that answers are generally received too slowly. One respondent commented that this can lead to consideration of alternative suppliers, as currently the response times are too long. In addition, a few respondents noted that the service and communication could be more proactive, and that communication between the case company and its suppliers should be improved.

4.2.2 Drawing approval process

The next part of the survey focused on the drawing approval process, as it was also thoroughly discussed with the employees. Because all products that the case company sells do not require this process, not all respondents answered the next statements. Table 10 below presents the results of this section. It can be seen that the highest mean score was reported for the justification of the changes ($M = 4,47$). In contrast, the lowest mean score was given for the possibility of extending the delivery time when changes are needed ($M = 2,65$). However, this statement also had the largest standard deviation, indicating that some respondents would accept the longer delivery time. Nevertheless, these numbers indicate that customers perceive their changes as necessary, and it is not acceptable for products to have longer delivery times because of the changes.

Table 10 Customer perceptions of drawings approval process.

Statement	n	Mean	Standard deviation
The drawings approval process is clear, and it is easy to follow.	23	3,65	1,34
We usually request changes to drawings to ensure the product fully meets our specific needs.	20	3,90	0,97
The reasons for our requested changes are always well-justified.	19	4,47	0,70
Some of the requested changes could be avoided if the initial drawings or specifications were more detailed.	19	3,74	1,05
We would be willing to accept a slightly longer delivery time if the drawing changes are necessary for quality or safety reasons.	23	2,65	1,40
We would be willing to limit drawing changes to reduce project delays.	19	3,53	1,26

4.2.3 Product and delivery quality

One goal of the customer survey was to get information on the customers' perceptions of the case company's product and delivery quality, as those have been described to be some of the most important factors in supplier performance. When taking product quality into consideration, the results of the survey reveal that overall quality is generally satisfactory for the customers. The customers perceive the products to be reliable and perform as promised, as that statement was scored the highest in this section ($M = 4,52$). The standard deviation for that statement was also the lowest in this section ($SD = 0,64$), which indicates that the answers varied only a little from each other. The results show that the lowest rated mean score was 2,92 and it was related to the deliveries arriving on time. Statistics show that the same statement had the largest standard deviation (SD

= 1,40), meaning that some respondents agree with the statement while others do not agree. Table 11 below presents the results of product and delivery quality.

Table 11 Results of product and delivery quality.

Statement	n	Mean	Standard deviation
The products received from Company x meet our quality expectations.	38	4,42	0,75
Company X's products are reliable and perform as promised.	38	4,52	0,64
Deliveries from Company X arrive on time as agreed.	37	2,92	1,40
Delivery documentation and packaging meet our requirements.	35	4,37	0,943
When issues occur, Company X handles them quickly.	37	3,25	1,21

In addition to the product quality receiving a high mean score, over half of the respondents also mentioned in the open questions, that the quality of the products is currently the main strength of the case company. However, in line with table 8, delivery reliability and delivery times were the main weaknesses that were mentioned. Many respondents felt that current delivery times are too long compared to other suppliers, and also that delivery reliability is not as good as it could be, meaning that promised delivery times are not met. Even though responsiveness to the customers' problems received the second lowest mean score ($M = 3,25$), only a few respondents commented that it should be improved.

4.2.4 Supplier evaluation factors

The survey included a section where the respondents were asked to rank different attributes from scale of 1 (not important) to 5 (very important) based on how important they consider them when evaluating a supplier. This section was included in the survey to get insights into what the customers of the case company value the most in a supplier, as those might differ across the organizations and industries. Figure 14 shows the results of the evaluation factors. As seen from the figure, the customers rank on-time delivery and product quality the highest, and in contrast, customization and documentation the lowest.

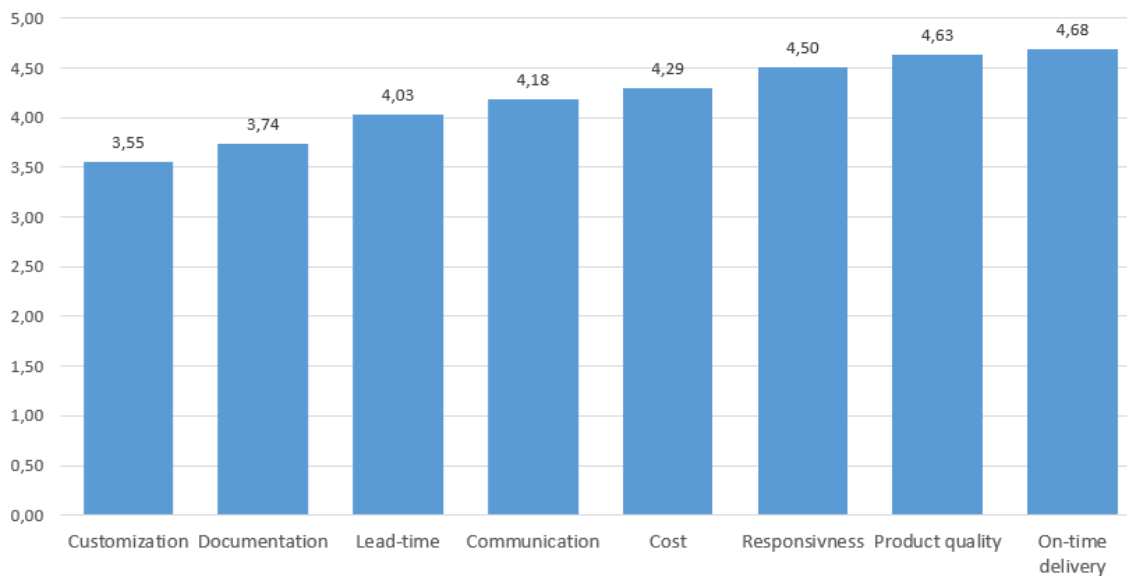


Figure 14 Results of supplier evaluation factors.

4.3 Statistical results

This chapter presents the results of multiple statistical tests. First, the correlations between product quality, on-time delivery, and ease of communication with customers' overall satisfaction with the case company are presented to provide statistical evidence for the hypotheses of this thesis. After that, this chapter provides the results of two

ANOVA and Tukey HSD post hoc analyses, that provide quantitative answers to the research questions of this study. The ANOVA and Tukey HSD analyses were used to statistically identify key factors that generally affect the quality and reliability of a supplier, as well as to point out processes and procedures that could be improved to enhance the case company's quality and reliability as a supplier.

4.3.1 Correlation tests

Correlations between product quality, on-time delivery, and ease of communication with overall customer satisfaction were tested by using two-tailed correlation to test the hypotheses presented in chapter 2.5. The correlation coefficients of the variables are visually illustrated in the figure 15 below.

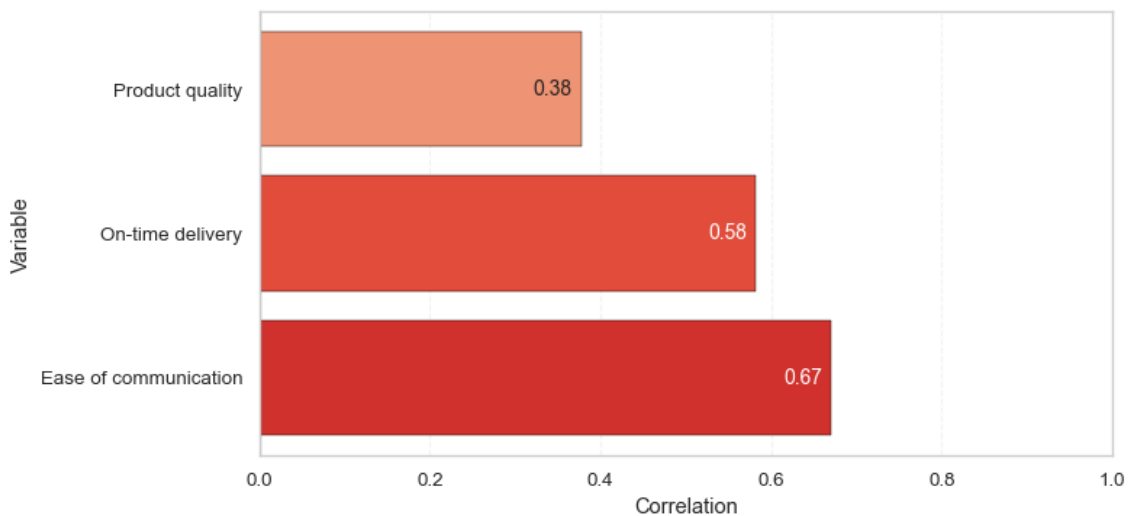


Figure 15 Correlation coefficients of product quality, on-time delivery, and ease of communication with overall customer satisfaction.

After the correlation tests above, the correlation between customer satisfaction and intention to purchase products in the future was tested. The test showed that there is positive correlation between the factors, as the correlation coefficient was 0,67. To evaluate the statistical significance of the correlations between the variables, the p-values of the two-tailed correlation tests are presented in table 12 below.

Table 12 P-values of correlations between variables and customer satisfaction.

Correlation	p-value	Significance ($\alpha < 0,05$)
Product quality ~ overall customer satisfaction	0,0196	Yes
On-time delivery ~ overall customer satisfaction	< 0,001	Yes
Ease of communication ~ overall customer satisfaction	< 0,001	Yes
Overall customer satisfaction ~ intention to purchase products in the future	< 0,001	Yes

The results indicate that all of the chosen variables for H1-H3 have a positive correlation with overall customer satisfaction. Customer satisfaction had the strongest relationship with ease of communication, closely followed by the moderate correlation with on-time delivery. The results show that product quality had the weakest correlation with customer satisfaction out of the included variables. The statistically significant p-values support the correlation results. Additionally, the p-values of the correlations between product quality and on-time delivery with overall customer satisfaction suggest that both hypotheses H1 and H2 can be accepted. However, the correlation tests and their p-values indicate that ease of communication has a stronger positive effect on overall customer satisfaction than product quality or on-time delivery, meaning that H3 can be rejected. Additionally, the results suggest that H4 can be accepted, as the correlation between overall customer satisfaction and intention to purchase products in the future is positive and highly significant.

4.3.2 ANOVA

ANOVA (analysis of variance) and Tukey HSD post hoc analysis were utilized to provide answers to the research questions of this thesis. To provide evidence to the first research

question, one-way ANOVA and Tukey HSD were used to compare the means of the customers' answers to the questions regarding how much importance they give to different factors when generally evaluating a supplier's quality and reliability. This was done to identify the factors that have the biggest effect on supplier quality and reliability. The one-way ANOVA showed that the mean scores differ significantly ($p < 0,001$). Tukey HSD post hoc analysis indicated that the means of the four highest ranked factors seen in figure 14 (on-time delivery, product quality, responsiveness and cost) do not significantly differ from each other, meaning that their order of importance cannot be determined statistically. The full Tukey HSD post hoc analysis p-value table is found in appendix 3.

One-way ANOVA and Tukey HSD were also used to provide evidence to identify the processes that should be improved to enhance the quality and reliability of the case company as a supplier, giving answers to the second research question. This was done by comparing the means of the customers' answers to the statements where they were asked to evaluate different operations and processes of the case company. The ANOVA indicated that the answer means between the chosen questions differ significantly ($p < 0,001$). The means of the answers are visualized in figure 16. Tukey HSD post hoc analysis showed that the three processes with the lowest means (delivery time accuracy, responsiveness to problems, and order processing time) do not differ significantly, so their order also cannot be statistically determined. Customer service, which had the fourth lowest mean, differed significantly from delivery time accuracy ($p = 0,0126$), so it is not ranked among the lowest scoring processes. The full Tukey HSD post hoc analysis p-value table is found in appendix 4.

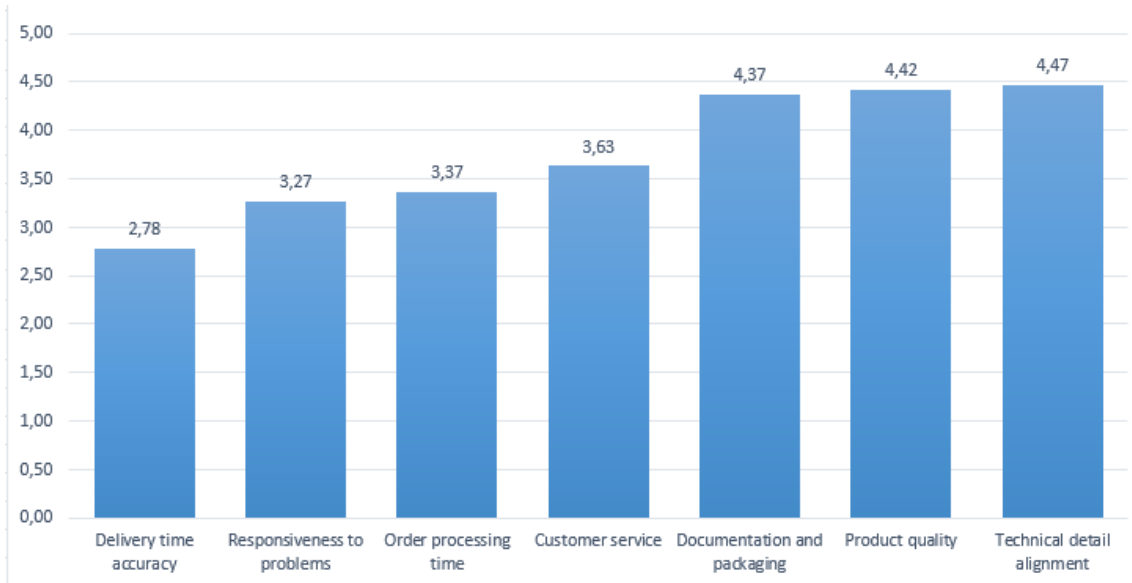


Figure 16 Performance means of case company processes.

4.3.3 Key findings from quantitative results

The goal of quantitative results was to analyse the survey sent to the customers and analyse their answers. The themes that the survey covered were, for example, communication and order phase, deliveries, drawings approval process, and the ranking of supplier evaluation factors. In addition, some statistical tests were performed to test the hypotheses and provide statistical evidence to the research questions. The table 13 below presents key findings from the survey.

Table 13 Key findings from the customer survey.

Theme	Highest ranked factor	Lowest ranked factor
Communication and order phase	Agreement of technical specifications before order is placed	Delivery schedule being the same that promised during quotation phase
Drawings approval process	Justification for changes	Accepting longer delivery time because of the design changes

Theme	Highest ranked factor	Lowest ranked factor
Product and delivery quality	Products being reliable and performing as promised	Deliveries arriving on time
Supplier evaluation factors	On-time delivery, product quality	Customization, documentation quality

The statistical test (correlation, ANOVA) showed that all chosen factors (product quality, on-time delivery, ease of communication) have positive correlation with overall customer satisfaction. Product quality had the lowest correlation, and ease of communication had the strongest correlation. Also, the results show that overall customer satisfaction has a positive correlation with the intention to purchase products in the future. Based on the correlation tests, H1, H2, and H4 were accepted, whereas H3 was rejected. Supplier evaluation factors were further analysed with ANOVA, which showed that four highest ranked factors (on-time delivery, product quality, responsiveness and cost) did not have significant differences among them, and therefore their order of importance cannot be determined. ANOVA was also used to find out which processes are those that should be improved. The test showed that delivery time accuracy, responsiveness to problems, and order processing time were three processes that differed significantly from other measured factors.

5 Discussion and conclusions

This study aimed to examine the current operations of the case company from the customers and internal point of view. Customer perceptions were assessed through quantitative survey, and employee insights were gathered through semi-structured interviews. By analysing both quantitative and qualitative data, strengths, weaknesses, and key improvement areas can be identified to improve supplier quality and reliability.

The interviews revealed that communication towards customer is seen as efficient and no bigger problems were mentioned. Customers, on the other hand, noted that sometimes communication is only reactive and answers are not received quickly enough. This may have a negative impact on the customer-supplier cooperation, as Ferro-Soto et al. (2025) explained that organizations need to implement proactive communication strategies in order to maintain successful relationships. The mean of customer answers regarding the ease of communication and receiving the answer for questions quickly enough was 3.63, which indicates that it could be improved. However, when doing the statistical analysis of the processes that should be improved, ease of communication was ranked the fourth lowest, but differed significantly from the other three meaning that those three should be focused more. Nevertheless, as explained by Kuei et al. (2011), communication influences the relationship quality in supply chains, meaning that it should be focused on in all cases. What was coherent with the interviews and customer survey was that communication and receiving answers from supplying factories should be improved, as now it takes too much time and therefore may influence the customer satisfaction negatively. This supports the findings by Wang and Jotikastriha (2023), and Thiruchelvi et al. (2025) whose studies found that longer response time can directly lead to lower customer satisfaction.

Regarding technical details and the drawings approval process, the customers felt that the details and specifications are agreed with the case company before the order is placed. Most of the interviewees expressed the same view, meaning that the customer and employee perceptions are aligned. When it comes to design changes, it can be

concluded that customers always have justifications for any changes, and they would not be willing to accept longer lead time because of the changes. Some interviewees noted that sometimes changes could be avoided, while others explained that all changes are necessary for the customers. The interviewees explained that the changes could be avoided if the specifications were discussed more before the order is placed, and it was also supported by the customers. This view was also supported earlier by Zhou et al. (2024), whose research showed that lead time can be reduced when more time is spent on initial design. In addition, the interviewees explained that the designs should be standardized more because as Fortes et al. (2023) and Zhou et al. (2024) noted, the lack of standardization can lead to design errors and increased work.

The perceptions of product quality were fully aligned with the interviewees and the customers. The interviews indicated that most of the time, product quality meets the standards, and bigger disruptions are rarely experienced. The same view was provided by the customers, as many of them mentioned that product quality is one of the main strengths of the case company. Maintaining high product quality is important as it is one of the main contributors in customer satisfaction, says Hsu et al. (2024). Hsu et al. (2024) also found that when product quality reaches a certain level, customer tend to value other aspects more. This research supports those findings, as the correlation test showed that product quality had the lowest correlation with customer satisfaction when compared to on-time delivery and ease of communication.

However, when discussing about deliveries, the perceptions differed across interviewees and customers. Some of the interviewees indicated that delivery reliability is sufficient and easy to forecast, while others noted that it should be improved. The quantitative data showed that customers feel that lead time is not usually the same that was promised during quotation phase, and that deliveries do not arrive on time as agreed. It can be clearly obtained from the survey that delivery time accuracy and delivery reliability are factors that the customers are the least satisfied. The findings align with previous research that indicates that late deliveries have a negative impact on customer

satisfaction. For example, Harter et al. (2025) found that late deliveries have greater negative impact than early deliveries have positive impact on customer satisfaction. This suggests that even small delay may have an influence on customer perceptions, therefore improving delivery reliability should be considered to be one of the key factors in enhancing customer satisfaction.

When analysing the key factors that affect supplier's quality and reliability, there were similarities between employee interviews and customer survey. The interviews indicated that product quality is the main contributor in overall supplier quality and reliability, which supports the findings from research studies conducted by Sila et al. (2006), Abdolshah (2013), and Dania et al. (2023). All those studies concluded that product quality is either the most important factor, or it is mentioned the most in previous studies, when discussing about supplier quality and reliability. The customers also ranked product quality as the second most important factor, making the findings more reliable. Also, the correlation test showed that product quality had positive correlation with customer satisfaction which is consistent with the results found by Sharma (2022). However, even though there was positive correlation between product quality and customer satisfaction, the correlation was the weakest when compared to on-time delivery and ease of communication. This might be because the products of the case company are generally high quality and the customers are used to that, so they expect certain quality and therefore value other things more. The results indicate that currently there are no need for actions to improve supply quality. However, if such case happens in the future, Krause et al. (2000) suggest that more time and personnel could be invested into the quality development, or the case company can search for alternative suppliers. In addition, it is important to forward any quality issues to the supplying factories so that they are aware of the disruptions and therefore can continuously improve their products and processes.

Another factor affecting supplier quality and reliability based on this study is on-time delivery. Customer ranked on-time delivery the highest, meaning that it is the most important factor, and it also had stronger correlation with overall customer satisfaction

than product quality had. In addition, the interviews indicated that the case company employees acknowledge that on-time delivery is one of the main factors for customers and it should be improved if possible. On-time delivery has been mentioned to be one of the main criteria in supply chain quality and reliability, which supports the findings from this study (Shevtshenko et al., 2022; Kuei et al., 2011).

The customers ranked also responsiveness to problems and cost to be important factor when evaluating a supplier. From the interviews it was obtained that even though cost is important to customers, product quality and on-time delivery are more important. This view was supported by Abdoslhah (2013), whose study showed that product quality and delivery reliability are more important than cost. However, if the cost of the product is too high, good product quality does not satisfy the customer (Sila et al., 2006). Similar results were obtained from the customer survey, as several respondents felt that sometimes high costs may lead them to using other suppliers.

The interviews indicated that usually the case company responds to problems quickly enough whereas statistical data shows that it is one of the main processes that should be improved, meaning that perceptions are not aligned. To improve the responsiveness to problems at the case company, it requires more open communication and cooperation to supplying factories as well as customers, as that is one of the main ways to improve a company's operations and customer satisfaction (Aloul et al., 2017). In addition, better resource allocation would allow more time to be spent on these matters. Responsiveness of a supplier has been mentioned to be one of the main factors in service quality, meaning that improving it directly translates into improved service performance (Noshad & Awasthi, 2015).

What was interesting in the results of this study was that ease of communication had the strongest correlation with overall customer satisfaction. Some studies (e.g. Dania et al., 2023; Ferro-Soto et al., 2025; Kuei et al., 2008) have mentioned that communication and coordination among supply chain partners have a positive effect on customer

satisfaction, but those studies have not provided statistical evidence to that. A study conducted by Sharma (2022) revealed that ease of negotiating and coordination have positive effect on customer satisfaction, which is similar that the finding in this study. These results provide additional information to existing literature by proving that ease of communication should be focused as much as product quality and delivery reliability, if not more. It can also be concluded that clear communication can improve customer satisfaction even though there were disruptions in product quality or delivery reliability.

The correlation test showed that overall customer satisfaction has a positive effect on the customer's intention to purchase products in the future. This result is consistent with the study conducted by Arthur et al. (2024) whose research showed that higher customer satisfaction leads to customer loyalty. Similar results were found earlier, when Huang et al. (2019), and Hoe and Mansori (2018) examined customer satisfaction and customer loyalty, finding a correlation between them. These results show that organisations should focus on enhancing customer satisfaction as it has been statistically proven to improve customer loyalty and intentions of buying products from the same company in the future.

When discussing about the processes that should be improved to enhance customer satisfaction, one of the main things observed during the interviews was the communication towards supplying factories. Many interviewees explained that communication should sometimes be more open and proactive. Similar answers were provided by the customers, who noted that especially when questions are sent to the supplying factories, answers are received too slowly. Noshad and Awasthi (2015) note that communication is one of the main ways in establishing and maintaining the relationship between stakeholders, which means that the case company should implement strategies to improve both up- and downstream communication in supply chain. This would also directly affect the service performance, and customer satisfaction would be improved. Improved communication would also directly affect delivery reliability and delivery time accuracy, as those require a great amount of input from the supplying factories.

In summary, the results indicate that the most important factors affecting the quality and reliability of a supplier are product quality, on-time delivery, ease of communication, responsiveness to problems, and cost. The customers ranked on-time delivery as the most important factor, and the results show that it is currently a process that should be improved at the case company. In order to improve the overall service performance at the case company, resources could be allocated in a more effective way, which further allows more time to be spent on factors such as drawings approval process and problem resolution. In addition, the statistical test showed that ease of communication has the strongest correlation with customer satisfaction, suggesting that communication processes may have a greater importance on supplier performance than previous literature have indicated. Furthermore, higher customer satisfaction was proven to have a strong correlation with customer loyalty, suggesting that matters in improving and maintaining customer satisfaction should be considered.

5.1 Conclusions

This thesis aimed to examine how supplier quality and reliability are formed and how the case company can improve their processes and customer satisfaction. The literature reviewed for the thesis consisted of themes such as supplier quality and reliability, supply chain quality and reliability, customer satisfaction in B2B context, and order fulfillment strategies with possible challenges that complex orders may encounter. The literature formed the theoretical basis for the research, and following research questions were formed:

1. What are the key factors that affect a supplier's quality and reliability?
2. What procedures and processes should be improved to enhance supply quality, delivery reliability and service performance of the case company?

To fully answer the research questions, interviews with case company employees were conducted, and a questionnaire survey was sent for the customers. The interviews provided qualitative data which was analysed through thematic analysis, and the survey questionnaire was analysed with descriptive statistics, correlation tests and ANOVAs. The use of multiple data sources allowed to analyse the topic from several perspectives, which helped to form comprehensive answers to the research questions. To help in answering above mentioned research questions, specific objectives were defined. The objectives consisted of assessing customer perceptions of the case company's operations and processes, as well as comparing and aligning employee insights with customer perceptions. Through the perception-performance alignment, key improvement areas were identified.

The interviews and customer survey indicated that key factors that affect a supplier's quality and reliability are product quality, on-time delivery, responsiveness to problems, cost, and ease of communication. These results were in line with previous research, making the findings valid and reliable. To answer the second research question, interview and survey data were analysed to find weaknesses in case company's operations that, if improved, would improve the performance and overall customer satisfaction. Employee insights and customer perceptions of the supply quality were aligned in a way that it was described as one of the main strengths of the case company, therefore there is currently no need to implement improvement actions. However, delivery reliability was found to be the most important factor for the customers in supplier evaluation, meaning that it should be focused on more. Lastly, the overall service performance, including factors such as order processing time, responsiveness, overall communication, and drawings approval process, were found to be important for customers meaning that the case company should implement strategies that help to improve those processes.

What became evident in the analysis process was that the communication is the most important factor in overall customer satisfaction. This means that if communication practices are improved, overall customer satisfaction is also likely to improve. In addition,

improving the communication with supplying factories would have positive effect on all the processes needing improvement, as most of the information input comes from there. Additionally, better resource allocation would allow the case company employees to focus on important tasks and to change communication to be more proactive towards customers and suppliers, making the cooperation and coordination more effective for all stakeholders.

5.2 Theoretical contributions

This study contributes to existing literature regarding supplier quality and reliability, and customer satisfaction in several ways. Firstly, the findings of this study provide empirical support for previous studies that have identified product quality and on-time delivery as some of the key factors in supplier quality and reliability (Sila et al., 2006; Abdolshah, 2013; Dania et al., 2023; Shevtshenko et al., 2022; Kuei et al., 2011). The results confirm that those factors are highly important for customer satisfaction in industrial context. In addition, previous findings regarding cost of the product not being as important as product quality and on-time delivery are supported by this research.

Secondly, the study provides important empirical evidence for the strong correlation between ease of communication and customer satisfaction, and further the correlation between customer satisfaction and customer loyalty. Several research (e.g. Dania et al., 2023; Ferro-Soto et al., 2025; Kuei et al., 2008) have noted that communication practices have an effect on overall customer satisfaction, but these statistically proven results confirm this theory. The findings suggest that ease of communication may have more significant role than product quality and on-time delivery in shaping the customer perceptions of a supplier, especially in cases where product quality is perceived sufficient consistently. In addition, this study supports the theory provided by Arthur et al. (2024) that customer satisfaction correlates with customer loyalty.

Thirdly, the study proves that combining customer and supplier perspective provides comprehensive overview of an organization's operations. This approach allows researchers to identify strengths and weaknesses, that could be missed if only one perspective was analysed. The results showed that both perspectives complement each other and helps B2B organizations to gain deeper understanding of their performance and customer expectations. In addition, the findings support the suggestion by Ferro-Soto et al. (2025) that evaluation from multiple perspectives may reveal differences between a company's and customers' perceptions of certain processes. The differences found in this study were mainly related to responsiveness and delivery reliability.

5.3 Managerial implications

In addition to theoretical contributions, the research provides practical suggestions and managerial implications for the case company. The research revealed the factors that are most important for the case company's customers, which provides deeper understanding of current needs of the customers as well as improvement areas for the company. The study also provides knowledge and information of internal and external perceptions, which is useful if improvements are wanted.

The first, and most important area for improvement is the communication practices. Because the case company does not have their own production, the communication with supplying factories plays a major role in overall communication and it has a great influence also on the information sharing with the customers. By improving the communication, the overall service performance could be improved because it would allow the employees to quicker answer any problems that customers may have and therefore it would also improve the responsiveness.

Communication practices could be improved in more advanced resource allocations, which would help the employees to work more proactively with customers and the supplying factories. In addition, one practical way to improve communication with

customers would be to establish clear response time targets for customer inquiries. Even if the final answer could not be provided immediately, letting the customer know that their request has been taken into consideration would improve transparency and customer experience. Also, providing updates for the customers about the progress of their order would increase the transparency of the whole order process. However, providing regular updates for customers also requires improved communication with the factories.

Communication with supplying factories could be further improved by implementing more proactive delivery monitoring practices. For instance, at the beginning of each month, the case company could generate a report that shows all the deliveries for each factory for the following month. The report would allow the employees to monitor the deliveries better, especially with smaller suppliers with whom the case company do not conduct regular follow-up meetings. This could help to identify potential delays earlier, and customers could be informed about any changes in delivery time well in advance. This implementation could also improve delivery reliability, as it was one of the main factors that customers value. In addition, if some disruptions arise regularly with specific factories in the future, the case company should consider starting to conduct follow-up meetings also with smaller suppliers.

Lastly, the study provides some practical improvements for the drawings approval process. Even though these design changes may not have significant influence on the delivery times in all cases, minimizing the feedback loops and increased work allows more time to be spent on other important matters. The case company should try to minimize design changes by ensuring that enough time has been spent on the discussion of technical specifications before the order is placed. If more time is spent on the technical specification discussions during the quotation phase, potential design change requirements could be identified early enough, and no additional change requirements are needed after the order is placed. In addition, improving the standardization of product design where possible could reduce the changes and therefore make the whole process to flow better.

5.4 Limitations and future research

This study had a few limitations that are addressed next. One limitation in this study was the chosen method, as the study was conducted as a single case study for a specific company. Because the findings are closely related to the operational context of a single company, the results may not be generalized to other companies, industries, or regions. The sample size of quantitative data can also be identified as a limitation. Even though the results provided insights into the customer perceptions, the relatively low number of answers may not represent the whole customer base of the case company. Lastly, the data was collected to measure the current perceptions and insights of the case company's operations, which means that the findings may not be valid in the future.

The study provides also several possibilities for future research within the case company as well as for academic purposes. Firstly, conducting similar research with larger sample size for quantitative data would provide valuable insights and more accurate results of customer perceptions, as the sample used in this study may not represent all customers of the case company. In addition, the research could be extended to multiple teams and departments within the organization to discover if company level changes should be made. Also, because the research showed that customer satisfaction strongly correlates with the intention to buy products in the future, the case company should regularly examine which customers are not that satisfied with the case company and therefore likely to change to another supplier.

Another alternative would be to expand the analysis to multiple companies in the similar industry, which would make the results more generalizable and provide broader insights into supplier quality and reliability in industrial supply chains. In addition, the communication practices in customer-supplier relationships could be examined in more depth, as this study showed that ease of communication had a strong correlation with customer satisfaction. Investigating that which communication practices or tools are the most effective in improving customer satisfaction would provide valuable results for academics

and other organizations who wish to improve customer satisfaction in B2B context. Lastly, conducting research over longer period of time and examining how improvements in communication and other internal processes affect customer satisfaction would benefit the existing research.

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Appendices

Appendix 1. Interview questions

	Background and role
1	Could you describe your role and responsibilities at Company X?
2	How frequently are you in contact with customers and factories?
	Before Delivery
3	How would you describe communication with customers during the early phases of projects?
4	Do customers generally have a clear understanding of the technical requirements at the order stage?
	Drawings approval process
5	How would you describe the current drawing approval process? What works well and what does not?
6	At which stage do customers typically request the most changes to the drawings?
7	How do these changes affect lead time and delivery schedules?
8	In your opinion, are all requested changes necessary, or could some be avoided?
9	How could the drawing approval process be improved to make it clearer and more effective for all parties?
10	To what extent do you think customers understand the impact of changes on lead time and delivery schedules?
	During and after delivery
11	How would you describe our delivery process from the customer's perspective? What aspects work well?
12	In your opinion, what are the most common challenges or issues in deliveries, and what typically causes delivery delays?
13	How well do you feel factory operations support your work and customer satisfaction? Are there differences between factories?
	Quality

14	What are the most common quality issues reported by customers?
15	How do you think we respond to quality issues? Is the process for handling such situations clear?
	Customer relationships and reliability
16	How reliable do you think customers perceive Company X to be as a supplier?
17	What factors influence whether customers perceive us as a reliable supplier?
18	Have you observed differences in expectations between long-term customers and new customers?
	Development suggestions
19	What do you consider to be our key strengths and the processes or practices that work well?
20	What do you see as our most important areas for improvement?

Appendix 2. Customer survey

Background information:

1. How long has your company been a customer of Company X?
 - a. Less than 1 year
 - b. 1-3 years
 - c. 4-7 years
 - d. Over 7 years
2. How frequently does your company order products from Company X?
 - a. Once a year
 - b. 2-4 times a year
 - c. 5-8 times a year
 - d. Over 8 times a year
3. What type of products do you mainly purchase from Company X?
 - a. Product type 1
 - b. Product type 2
 - c. Product type 3
 - d. Other, please specify: ____
4. How frequently does your company interact with Company X?
 - a. Daily
 - b. Weekly
 - c. Monthly
 - d. A few times per year

Communication and order phase (Scale: 1= strongly disagree, 5 = Strongly agree)

5. Communication with Company X is easy and questions are answered in a timely manner.
6. Technical details are mutually understood with Company X before the order is placed.
7. Order confirmation is clear, and it comes quickly after the order is placed.
8. Delivery schedule is usually the same as what is promised during the quotation phase.

Drawing Approval Process (Scale: 1= strongly disagree, 5 = Strongly agree):

9. The drawing approval process is clear and easy to follow (e.g. the schedule, what could be changed in the ordered product)
10. We usually request changes to drawings to ensure the product fully meets our specific needs.
11. The reasons for our requested changes are always well-justified.
12. Some of the requested changes could be avoided if the initial drawings or specifications were more detailed.
13. We would be willing to accept a slightly longer delivery time if the drawing changes are necessary for quality or safety reasons.

14. We would be willing to limit drawing changes to reduce project delays.

Product and delivery quality: (scale: 1 strongly disagree, 5 strongly agree):

15. The products received from Company X meet our quality expectations.
16. Company X's products are reliable and perform as promised.
17. Deliveries from Company X arrive on time as agreed.
18. Delivery documentation and packaging meet our requirements.
19. When issues occur, Company X handles them quickly.

Overall satisfaction (scale: 1 strongly disagree, 5 strongly agree):

20. Overall, I am satisfied with Company X as a supplier.
21. We intend to continue purchasing products or services from Company X in the future.
22. Company X is a reliable supplier.

Please rate the following items according to how important you consider them when evaluating a supplier (Scale: 1: Not important, 5 very important):

1. Product quality
2. On-time delivery
3. Cost
4. Ease of communication
5. Being able to customize products
6. Lead time
7. Documentation (e.g order acknowledgment, packing list) quality
8. Responsiveness to problems (e.g quality/delivery issues)

Open feedback:

23. What do you consider to be Company X's main strengths as a supplier?
24. What areas could be improved to enhance your satisfaction?
25. Any additional comments or suggestions?

Appendix 3. Tukey HSD post hoc analysis of supplier performance evaluation factors.

Q TEST									
group 1	group 2	mean	std err	q-stat	lower	upper	p-value	mean-crit	Cohen d
Product quality	On-time delivery	0,052632	0,104067	0,505746	-0,39661	0,50187	0,999963948	0,449239	0,082043
Product quality	Cost	0,342105	0,104067	3,287348	-0,10713	0,791344	0,283812554	0,449239	0,533278
Product quality	Communication	0,447368	0,104067	4,298839	-0,00187	0,896607	0,051887561	0,449239	0,697364
Product quality	Customization	1,078947	0,104067	10,36779	0,629709	1,528186	6,1384E-11	0,449239	1,681877
Product quality	Lead-time	0,605263	0,104067	5,816076	0,156024	1,054502	0,00130163	0,449239	0,943492
Product quality	Documentation	0,894737	0,104067	8,597678	0,445498	1,343976	1,03412E-07	0,449239	1,394728
Product quality	Responsiveness to problem	0,131579	0,104067	1,264364	-0,31766	0,580818	0,986444421	0,449239	0,205107
On-time delivery	Cost	0,394737	0,104067	3,793093	-0,0545	0,843976	0,132191095	0,449239	0,615321
On-time delivery	Communication	0,5	0,104067	4,804585	0,050761	0,949239	0,017431623	0,449239	0,779407
On-time delivery	Customization	1,131579	0,104067	10,87353	0,68234	1,580818	6,23579E-12	0,449239	1,76392
On-time delivery	Lead-time	0,657895	0,104067	6,321822	0,208656	1,107133	0,000295685	0,449239	1,025535
On-time delivery	Documentation	0,947368	0,104067	9,103424	0,49813	1,396607	1,36881E-08	0,449239	1,47677
On-time delivery	Responsiveness to problem	0,184211	0,104067	1,77011	-0,26503	0,633449	0,915446002	0,449239	0,28715
Cost	Communication	0,105263	0,104067	1,011492	-0,34398	0,554502	0,996511491	0,449239	0,164086
Cost	Customization	0,736842	0,104067	7,080441	0,287603	1,186081	2,60278E-05	0,449239	1,148599
Cost	Lead-time	0,263158	0,104067	2,528729	-0,18608	0,712397	0,628686352	0,449239	0,410214
Cost	Documentation	0,552632	0,104067	5,310331	0,103393	1,00187	0,005082681	0,449239	0,861449
Cost	Responsiveness to problem	0,210526	0,104067	2,022983	-0,23871	0,659765	0,842502902	0,449239	0,328171
Communication	Customization	0,631579	0,104067	6,068949	0,18234	1,080818	0,000629398	0,449239	0,984514
Communication	Lead-time	0,157895	0,104067	1,517237	-0,29134	0,607133	0,961954599	0,449239	0,246128
Communication	Documentation	0,447368	0,104067	4,298839	-0,00187	0,896607	0,051887561	0,449239	0,697364
Communication	Responsiveness to problem	0,315789	0,104067	3,034475	-0,13345	0,765028	0,388181628	0,449239	0,492257
Customization	Lead-time	0,473684	0,104067	4,551712	0,024446	0,922923	0,030637193	0,449239	0,738385
Customization	Documentation	0,184211	0,104067	1,77011	-0,26503	0,633449	0,915446002	0,449239	0,28715
Customization	Responsiveness to problem	0,947368	0,104067	9,103424	0,49813	1,396607	1,36881E-08	0,449239	1,47677
Lead-time	Documentation	0,289474	0,104067	2,781602	-0,15977	0,738712	0,506120689	0,449239	0,451235
Lead-time	Responsiveness to problem	0,473684	0,104067	4,551712	0,024446	0,922923	0,030637193	0,449239	0,738385
Documentation	Responsiveness to problem	0,763158	0,104067	7,333314	0,313919	1,212397	1,09938E-05	0,449239	1,189621

Appendix 4. Tukey HSD post hoc analysis of important processes of the case company

Q TEST									
group 1	group 2	mean	std err	q-stat	lower	upper	p-value	mean-crit	Cohen d
Customer service	Technical detail alignment	0,842105	0,173981	4,840215	0,110851	1,57336	0,012647498	0,731254	0,785187
Customer service	Order processing time	0,263158	0,173981	1,512567	-0,4681	0,994412	0,936426216	0,731254	0,245371
Customer service	Delivery time accuracy	0,847795	0,175153	4,840324	0,111616	1,583974	0,012644285	0,736179	0,790492
Customer service	Documentation and packaging	0,73985	0,17767	4,164178	-0,00691	1,486609	0,053993115	0,74676	0,689842
Customer service	Product quality	0,789474	0,173981	4,537701	0,058219	1,520728	0,024981366	0,731254	0,736112
Customer service	Responsiveness to problems	0,361309	0,175153	2,062823	-0,37487	1,097487	0,768932095	0,736179	0,336887
Technical detail alignment	Order processing time	1,105263	0,173981	6,352782	0,374009	1,836518	0,000214891	0,731254	1,030557
Technical detail alignment	Delivery time accuracy	1,6899	0,175153	9,648162	0,953722	2,426079	1,36955E-09	0,736179	1,575678
Technical detail alignment	Documentation and packaging	0,102256	0,17767	0,575537	-0,6445	0,849015	0,999643878	0,74676	0,095344
Technical detail alignment	Product quality	0,052632	0,173981	0,302513	-0,67862	0,783886	0,999991879	0,731254	0,049074
Technical detail alignment	Responsiveness to problems	1,203414	0,175153	6,870661	0,467235	1,939593	4,23577E-05	0,736179	1,122074
Order processing time	Delivery time accuracy	0,584637	0,175153	3,337874	-0,15154	1,320816	0,220091934	0,736179	0,545121
Order processing time	Documentation and packaging	1,003008	0,17767	5,645339	0,256248	1,749767	0,001648128	0,74676	0,935213
Order processing time	Product quality	1,052632	0,173981	6,050268	0,321377	1,783886	0,000527349	0,731254	0,981483
Order processing time	Responsiveness to problems	0,098151	0,175153	0,560373	-0,63803	0,834329	0,99969489	0,736179	0,091517
Delivery time accuracy	Documentation and packaging	1,587645	0,178817	8,878578	0,836062	2,339227	3,08479E-08	0,751582	1,480334
Delivery time accuracy	Product quality	1,637269	0,175153	9,347672	0,90109	2,373448	4,71786E-09	0,736179	1,526604
Delivery time accuracy	Responsiveness to problems	0,486486	0,176316	2,759168	-0,25458	1,227557	0,448684275	0,74107	0,453604
Documentation and packaging	Product quality	0,049624	0,17767	0,279305	-0,69714	0,796384	0,999994947	0,74676	0,04627
Documentation and packaging	Responsiveness to problems	1,101158	0,178817	6,158002	0,349576	1,852741	0,000384751	0,751582	1,02673
Product quality	Responsiveness to problems	1,150782	0,175153	6,570171	0,414604	1,886961	0,000110115	0,736179	1,073