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The impacts of supplier relationships on suppliers' performance in spare part purchasing

Case Company X

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ABSTRACT:

This thesis studies the impacts of supplier relationships on suppliers' performance in spare part purchasing. The thesis is a research work for Company X. The research questions are the following: 1. How do the suppliers of the spare part purchasing team find the co-operation and trust with Company X? 2. How do the supplier relationships affect to the suppliers' performance, such as delivery reliability and quality? The objectives of the thesis are to explore the suppliers' experiences of co-operation and trust with Company X and the spare part purchasing team, explore the purchasers' experiences to deepen the understanding of the level of the relationships, and to examine the supplier relationships and their effects on the suppliers' performance in spare part purchasing. There are several existing studies researching supply chain relationships' impacts on performance. However, they focus on the performance of the buying company, but not from the perspective of what kinds of impacts the relationships have on suppliers' performance in deliveries and quality.

The literature review explores spare part purchasing, supplier relationship management, supplier performance, and buyer-supplier relationships' impacts on supplier performance. The empirical research includes collecting and analyzing both quantitative and qualitative data. The quantitative data is collected by supplier survey, and from Company X's Power BI reports. The sample size of the supplier survey is 200 suppliers including all the suppliers the team has purchased from during a period of one year. Based on those, SPSS analysis including correlation tests and a regression analysis is made. The qualitative data is collected by open-ended questions in the supplier survey and by interviewing the team's purchasers and supplier development engineer, and the analysis is made based on those.

According to the literature review, strong supplier relationships lead to better supplier performance. The results of the supplier survey show that the suppliers find the co-operation with Company X, including trust and communication, to be at a good level. The most significant improvement suggestion appeared is related to communication concerning development ideas, innovations, and new projects. The results of the SPSS analysis support the importance of buyer-supplier relationship to gain increased supplier performance, except for the correlation test between the Power BI data and the survey data. The interviewees are satisfied with the relationships and only few development ideas appeared, and the results support the suppliers' experiences and the results of the SPSS analysis. The existing literature is supported and advanced through this research by adding empirical evidence of both buyers' and suppliers' experiences of buyer-supplier relationships and their impacts on suppliers' performance.

KEY WORDS: Purchasing, Supplier Relationship Management (SRM), Building Trust, Delivery Reliability, Supplier Performance, Buyer-Supplier Relationship

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TIIVISTELMÄ:

Tässä tutkielmassa tutkitaan toimittajasuhteiden vaikutuksia toimittajien suorituskykyyn varaosien hankinnassa. Tutkielma on tehty tutkimustyönä Yritys X:lle. Tutkimuskysymykset ovat seuraavat: 1. Miten varaosahankintatiimin toimittajat kokevat yhteistyön ja luottamuksen Yritys X:n kanssa? 2. Miten toimittajasuhteet vaikuttavat toimittajien suorituskykyyn, kuten toimitusvarmuuteen ja laatuun? Tutkielman tavoitteena on selvittää toimittajien kokemuksia yhteistyöstä ja luottamuksesta Yritys X:n ja varaosien hankintatiimin kanssa, tarkastella ostajien kokemuksia ymmärryksen syventämiseksi suhteiden tasosta, sekä tutkia toimittajasuhteita ja niiden vaikutuksia toimittajien suorituskykyyn varaosien hankinnassa. On tehty useita aiempia tutkimuksia, jotka käsittelevät toimitusketjusuhteiden vaikutuksia suorituskykyyn. Ne keskittyvät kuitenkin ostavan yrityksen suorituskykyyn, eivätkä siihen, millaisia vaikutuksia suhteilla on toimittajien toimituksiin ja laatuun liittyvään suorituskykyyn.

Kirjallisuuskatsauksessa tutkitaan varaosien ostamista, toimittajasuhteiden hallintaa, toimittajien suorituskykyä, sekä ostaja-toimittaja-suhteiden vaikutuksia toimittajien suorituskykyyn. Empiirisessä tutkimuksessa kerätään ja analysoidaan sekä kvantitatiivista että kvalitatiivista dataa. Kvantitatiivinen aineisto on kerätty toimittajakyselyllä ja Yrityksen X Power BI -raporteista. Toimittajakyselyn otoskoko on 200 toimittajaa sisältäen kaikki toimittajat, joilta ostotiimi on ostanut yhden vuoden aikana. SPSS-analyysi tehdään kerättyyn dataan perustuen, ja se sisältää korrelaatiotestejä ja regressioanalyysin. Laadullinen aineisto kerätään toimittajakyselyn avoimien kysymysten avulla sekä haastattelemalla tiimin ostajia ja toimittajakehitysinsinööriä. Laadullinen analyysi perustuu näihin aineistoihin.

Kirjallisuuskatsauksen mukaan vahvat toimittajasuhteet johtavat toimittajien parempaan suorituskykyyn. Toimittajakyselyn tulosten perusteella toimittajat kokevat yhteistyön, mukaan lukien luottamuksen ja kommunikaation, olevan hyvällä tasolla Yritys X:n kanssa. Merkittävin esiin noussut kehitysidea koskee kommunikointia, erityisesti liittyen kehitysideoihin, innovaatioihin ja uusiin projekteihin. SPSS-analyysin tulokset tukevat ostaja-toimittajasuhteiden merkitystä toimittajien suorituskyvyn parantamisessa lukuun ottamatta korrelaatiotestiä Power BI- datan ja kyselytulosten välillä. Haastateltavat ovat tyytyväisiä toimittajasuhteisiin, ja vain muutamia kehitysehdotuksia ilmeni. Tulokset tukevat toimittajien kokemuksia ja SPSS-analyysin tuloksia. Tämä tutkimus tukee ja kehittää aiempaa kirjallisuutta lisäämällä empiiristä näyttöä sekä ostajien että toimittajien kokemuksista ostaja-toimittajasuhteista ja niiden vaikutuksista suorituskykyyn.

AVAINSANAT: Hankinta, Toimittajasuhteiden hallinta, Luottamuksen rakentaminen, Toimitusvarmuus, Toimittajien suorituskyky, Ostaja-toimittaja-suhteet

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1 Introduction

Suppliers represent the most important capability and a key input for companies that produce products or services (Shahzad et al., 2016). In nowadays' competitive and global environment, where the complex and widespread supply chains are competing for economic and social benefits, understanding of relationships between buyers and suppliers is essential. Even though the supply chains have widened around the world, they are dependent on each other, and the suppliers and the buyers need to perform collaborative arrangements (Agarwal & Narayana, 2020). To response the challenges of nowadays hard competition, the buying organizations need to maintain long-time relationships with their suppliers (Shahzad et al., 2016).

The topic of this master's thesis is the impacts of supplier relationships on suppliers' performance in spare part purchasing at Company X. The thesis is completed as a research work for Company X.

Researching this topic is important, because analyzing suppliers' performance has become especially significant as the companies' dependence on their suppliers is increasing. Buying firms need to be sure that the suppliers can meet their long-term requirements, and the continuity of the supply is secured (Imeri et al., 2015). In addition, multiple studies, such as Agarwal & Narayana, (2020); Al-Abdallah et al., (2014); Hsu et al., (2008); Shahzad et al., (2018); Tarigan et al., (2020); Thatte et al., (2008) highlight the importance of information sharing in the buyer-supplier relationships. Therefore, it is important to clarify the present state of co-operation and information sharing with suppliers in Company X's spare part purchasing. To observe both the suppliers' and the purchasers' experiences, and to gain information widely enough, this thesis is completed as mixed methods research. The suppliers' experiences are investigated through a supplier survey. Because the purchasing team this research focuses on has around 200 suppliers and there is a lot of numerical data available in the Power BI reports, performing a SPSS analysis is rational. On the other hand, there are only a few purchasers

in the team, so interviews with the open-ended questions give them possibility to freely answer the questions, and to add qualitative data to supplement the research.

1.1 Background of the research

In the metal construction spare part purchasing team in Company X, the suppliers' performance, such as delivery reliability and quality, is actively followed. The suppliers' experiences of co-operation with the purchasing team are sometimes discussed in meetings, but there does not exist this kind of research, where their experiences of co-operation and trust are researched, and compared to their performance. There is a gap to find out, how the suppliers experience the co-operation with the team and the company, and how is it correlating with their performance. Also, purchasers' interviews are completed to fulfil the results and to take their perspective into account. By researching both parties, valuable information can be collected and used for the development of co-operation.

1.2 Previous studies and research gaps

According to Jääskeläinen (2021), the existing studies of performance evaluation in buyer-supplier relationship have focused on the buying company's point of view, while focusing on suppliers' insights has been limited. According to Hald & Mouritsen (2018), further research is needed to be done concerning the association of supply chain partnerships and the assessment of performance. Studies that include empirical research of both the buyers' and the suppliers' point of view were not many to be found when seeking references for this thesis. For example, Graca et al. (2015) researched the behavioural attributes and their impact on performance in buyer-supplier relationships, but the target group of the empirical research are buyers. Several existing studies that examine supply chain relationships' impacts on performance, such as studies by Al-Abdallah et al. (2014), Hsu et al. (2008), Kannan et al. (2006), and Khan et al. (2015),

focus on the performance of the buying company, but not the same point of view with this thesis, that what kinds of impacts the relationships have to suppliers' performance in deliveries and quality.

Even though this thesis is made for a spare part purchasing team, Company X is operating in the field of manufacturing, and it is the company's main business. Therefore, previous research concerning manufacturing companies are considered as relevant references. This study aims to address this gap by investigating how buyer-supplier relationships influence supplier performance specifically in spare parts purchasing. However, there are some differences between purchasing spare parts and finished goods, and they are handled in the literature review. The differences are mostly related to challenging forecasting of supply demand of spare parts, but they do not reduce the significance of supplier relationships. Vice versa, fast changes increase the need for functioning co-operation and communication. Customers have high expectations for companies delivering spare parts, but at the same time it is hard to predict the demand, and the requirements of not stocking unnecessary parts are strict (Baluch et al., 2013).

1.3 Research questions and objectives

The objectives of the research are the following:

- To explore the suppliers' experiences of co-operation and trust with the company and the purchasing team.
- To explore the purchasers' experiences to deepen understanding of the current nature of the buyer-supplier relationships.
- To examine the supplier relationships and their effects on the suppliers' performance in spare part purchasing.

The research is important, because the results can be used for improving supplier relationships and performance. The beneficiaries can be both the suppliers and

Company X. The purchasing team can gain valuable information of the level of co-operation and trust with the suppliers from their point of view, but also as compared to the purchasers' experiences.

The research questions are the following:

RQ1. How do the suppliers of the spare part purchasing team find the co-operation and trust with Company X?

RQ2. How do the supplier relationships affect to the suppliers' performance, such as delivery reliability and quality?

Research question 1 is answered based on the survey made for the suppliers. To answer comprehensively to the second research question, Power BI data is used, and purchaser interviews are performed. The literature review is a base for the survey and interviews completed.

1.4 Scope and limitations

This research focuses on the buyer-supplier relationships' effects to the suppliers' performance in spare part purchasing. Buying services and buyer-supplier relationships' effects on that side are out of scope. Concerning Company X, the scope of the research is the suppliers of the metal construction spare part purchasing team. The amount of the suppliers included is 200. The suppliers of other purchasing teams in the company are not included to focus on the metal construction spare part purchasing. The purchasers interviewed work in the same team.

1.5 Structure of the thesis

In figure 1, the structure of the thesis is presented.

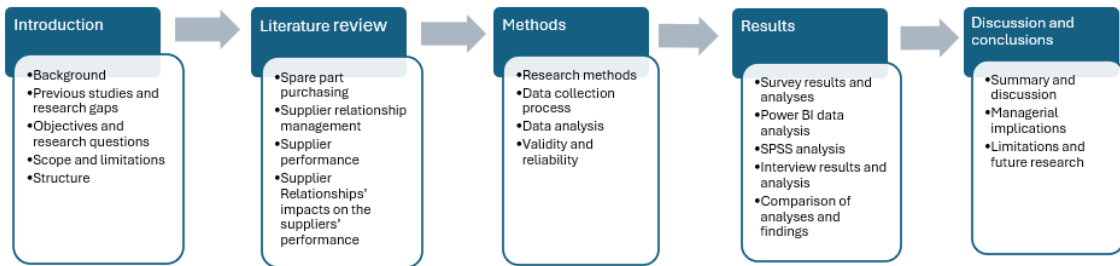


Figure 1. Structure of the thesis.

In introduction chapter the background of the study, the previous studies and research gaps, the objectives and the research questions, and the scope and limitations are presented. In the literature review, the theoretical framework is presented based on relevant literature and scientific articles. Topics such as spare part purchasing, supplier relationship management including buyer-supplier relationships, trust, commitment, and developing supplier relationships, supplier performance, and supplier relationships' impacts on the suppliers' performance are examined. After literature review, the research methods and data collection process are explained for both quantitative and qualitative data. The data analysis is presented, and validity and reliability of the data are analysed as well. Finally, in the results part, the analysis is made. First, the survey responses collected are analysed. Then, the Power BI data collected from the company's reports and the purchasers' interviews are analysed. Next, the SPSS analysis is presented based on the survey responses and numbers from the Power BI reports, and correlation and regression analysis are calculated. Finally, there is a comparison of all results and analysis including the qualitative and the quantitative data. Discussion and conclusions chapter includes a summary and discussion, managerial implications, limitations and suggestions for future research.

2 Literature review

In this chapter, the theoretical framework of the thesis is presented. The references are collected from relevant literature, scientific articles, and databases. There are seven keywords used in this thesis. The keywords and the explanations are presented in table 1.

Table 1. Keywords.

Keyword	Explanation
Purchasing	<i>"The activity of buying supplies for a company"</i> (Cambridge dictionary, n.d.).
Supplier Relationship Management (SRM)	<i>"Supplier Relationship Management (SRM) is a systematic, enterprise-wide assessment of suppliers' strengths, performance and capabilities in relation to overall business strategy, determining what activities to perform with different vendors, planning and execution of all interactions"</i> (Sangchul & Eom, 2024).
Building trust	<i>"The activity of developing trust between people so that they can work more effectively"</i> (Cambridge dictionary, n.d.).
Delivery reliability	<i>"The ability of an organization to provide on time the type and volume of product required by customer(s)"</i> (Thatte et al., 2008).
Supplier performance	Describes how well the supplier fulfils the customer's needs, including delivery time, quality, cost, responsiveness, and technical support (Tarigan et al., 2020).
Buyer-supplier relationship	<i>"Buyer-Supplier Relationship refers to the interactions and collaborations between organizations that purchase goods or services and the entities that supply them. It involves managing these relationships effectively to ensure a constant supply of resources at competitive prices"</i> (ScienceDirect, n.d.).

2.1 Spare part purchasing

Spare parts are parts that are needed to keep the existing equipment in running order (Baluch et al., 2013). They need to meet the repair and replacement requirements in cases of breakdowns, as well as in preventive maintenance (Baluch et al., 2013). In this chapter is examined spare part purchasing and how does it differ from buying finished supplies and other parts or materials. From an operational point of view, spare part purchasing and management are critical procedures (Baluch et al., 2013). Spare parts are necessary in most manufacturing firms (Hemeimat et al., 2016).

2.1.1 Specialties compared to purchasing of finished products or other parts

Spare parts effect a lot to the firms' operations as they are needed, and the number of them is often large (Hemeimat et al., 2016). According to Baluch et al. (2013), customers have high expectations of service level for the firms delivering spare parts. At the same time, demand for the parts varies, and there is a tight control in the firms, how many pieces can be stocked. The difficulty of predictability makes spare part management and purchasing challenging. Therefore, balancing between high service level and cost-effective storage needs especially accurate forecasting and part management. If the customers do not get their parts on time, it is a loss for their own capacity and business, and it may cause sanctions for the selling company (Baluch et al., 2013).

Spare parts differ from production parts, as the demand for production parts is directly driven by the level of ongoing manufacturing (Baluch et al., 2013). In production side the incoming changes in demand are easier to predict. Spare part management is extremely important to optimize the inventory and to meet the requirements (Baluch et al., 2013).

2.2 Supplier Relationship Management

Supplier Relationship Management (SRM) is vital for manufacturing firms in today's competitive and changing environment (Al-Abdallah et al., 2014). Companies need to be able to provide high-quality products with low costs and deliveries precise on time (Thatte et al., 2008). The selection of suppliers is a significant process, and efficient suppliers that match with the company's strategy can help the company to gain considerable cost savings (Imeri et al., 2015).

SRM helps the firms to secure reliable and regular deliveries. According to the literature review by Al-Abdallah et al., (2014), Supplier Relationship Management can be measured by observing improvement in five main functions that are delivery time, quality, collaboration in cases where a new product is needed, loyal relationships, and supplier development. Significant suppliers are in key role when looking at the buying firm's own delivery dependability and product quality (Thatte et al., 2008). Supplier Relationship Management leads to better competitive performance of the buying firm (Al-Abdallah et al., 2014). Strategically managing supplier relationships is the key factor in sustainable competitive advantage (Shahzad, 2018).

Where customer satisfaction has gained a lot of attention and been researched for decades, supplier satisfaction has engaged interest in academic research recently (Schiele et al., 2015). Nowadays suppliers have more responsibility due to changes in supply chains, but also the buying firms has challenges with the lack of suppliers. If there exist scarcity of the suppliers, and the suppliers have limited resources, they have the power to choose the customers for who they want to share the most of their resources. If they are not satisfied in the relationship with the buying firm, they probably will not put that many resources on them. Therefore, the partnerships with suppliers are extremely important (Schiele et al., 2015).

2.2.1 Buyer-supplier relationships

Long-term supplier relationships are essential for success of any business organization (Ganguly, 2019). Buyer-supplier relationship refers to both parties' acknowledgement that instead of competing, collaboration can provide mutual advantages (Kannan & Tan, 2006). Relationships in supply chains do not only include economic factors mentioned in agreements but also factors of social exchange (Agarwal & Narayana, 2020). Buyer-supplier relationship refers to partnership between a buying company and a supplier. These relationships include elements such as planning, information sharing, and tactical development (Tarigan et al., 2020). According to Yue (2022, p. 142), good buyer-supplier relationship should be appreciated as much as reasonable price. The origins of supplier relationships have been traced to car industry in Japan, where they have spread to western companies in the 1990s (Al-Abdallah et al., 2014). According to Thatte et al., (2008), the change from traditional purchasing and manufacturing to just in time (JIT) - model requires speed, flexibility, and trustworthiness. Information sharing should be seamless, and the relationship between buyer and supplier should be strategic (Thatte et al., 2008). Co-operation and information sharing are the key basis for a buyer-supplier relationship (Al-Abdallah et al., 2014).

According to (Tarigan et al., 2020), there are some key factors that firms should consider when building buyer-supplier relationships. The companies should have some shared goal, but they should also be open towards both parties' objectives. Decision making in the partnership requires consideration and agreements. Possible conflict situations and solving them should be noted. Also, both parties should aim towards continuous improvement. To build long-term and efficient buyer-supplier relationships, both the buyer and the supplier need to benefit from them (Al-Abdallah et al., 2014). There are several matters affecting to the efficiency of the relationship, such as the level of communication and knowledge sharing. Also, similarities in technology and the field of industry help, as well as the supplier's participation in the buyer's operation of a business (Al-Abdallah et al., 2014). Mutual respect and understanding of different cultures are needed between organizations (Tarigan et al., 2020).

According to Agarwal & Narayana (2020), buyer-supplier relationships can be shared to trust or commitment-based or transaction-based, or they can be combinations of both. Trust or commitment-based relationships are based on co-operation and strong trust. Typically, in these kinds of relationships, the firms put more resources into relationship quality, team working, productivity, and satisfaction (Agarwal & Narayana, 2020). In transaction-based relationships, lower level of commitment between the firms is typical, as well as acting opportunistically. Tight security measures, formal agreements, and other management structures are usual in these kinds of relationships. The risk is that the model can prevent firms' common objectives happen, such as long-term investments (Agarwal & Narayana, 2020).

According to Agarwal & Narayana (2020), satisfaction in a supply chain relationship can be defined as an overall positive experience of working in a relationship with another company. It can be reached as both partners' expectations of the co-operations are achieved. Satisfaction is important in buyer-supplier relationships, because it leads to long-term and successful relationships. Satisfaction is even more significant in buyer-supplier relationships than operational factors, such as financial savings. It is because partners content with the relationship do not probably end it, and therefore social and financial savings are caused (Agarwal & Narayana, 2020).

Buyer-supplier relationships bring a lot of positive consequences for the companies and the supply chain (Khan et al., 2015). The companies can provide more high-quality products, flexibility increases, companies do not need to maintain as high stock levels as previous, and total costs reduce. Overall, buyer-supplier relationships are essential for supply chain improvement (Khan et al., 2015).

2.2.2 Communication and co-operation

Communication is a necessity for business performance (Agarwal & Narayana, 2020). According to Yue (2022, p. 144), open communication is the most significant element in building trust between business partners. Between a buying company and a supplier, it is also a significant condition for the supplier development (Sillanpää et al., 2015). Hsu et al. (2008) found positive connection between information sharing input and buyer-supplier relationships.

Social Exchange theory can be used in supply chain management research, thus most commonly it is used in research of relationships between an employee and a firm (Agarwal & Narayana, 2020). Social exchange can be defined as an exchange operation between at least two persons, that can be material or non-material, and profitable or costly. The theory focuses to explore the interaction of business associates, and how much they put effort to adapting their own processes and developing trust with the exchange partners (Agarwal & Narayana, 2020). Social exchange diverges from economical exchange as measuring the level of social exchange is complex, and the duties of the exchange partners are difficult to define. The theory suggests that social capital, such as friendship, commitment, and trust, can further both material and non-material benefits in a buyer-supplier relationship. According to the theory, rational self-interest lead people, and in this context selling and buying firms, toward interrelation, aiming their own benefits. Working relationship requires efforts from both partners (Agarwal & Narayana, 2020).

Information and data are valuable currency in a supply chain (Agarwal & Narayana, 2020). Therefore, information sharing is vital between supply chain members. Information sharing can be defined as the degree to which essential and proprietary information is effectively communicated in a supply chain. For example, information can concern manufacturing schedule, forecasts, capacity information, or order situation (Agarwal & Narayana, 2020). According to Hsu et al. (2008), shared information can be divided into two area units that are tactical and strategic. For example, tactical information can

concern elements such as logistics, purchasing, and scheduling. Strategic information can be related to long-time targets, marketing, or information concerning customers (Hsu et al., 2008). Availability of updated and qualitative information in every part of the supply chain reduces costs and improves competitive advantage, and consequently it is needed in supply chain relationships. If the information is accurate, on time and periodic, it improves flexibility and response time, and reduces production, freightage, and stocking costs (Agarwal & Narayana, 2020). Communication and information sharing are important factors concerning buyer satisfaction. The partners need to share their efforts and goals and that bring them closer to each other (Agarwal & Narayana, 2020). Information sharing reduces issues in supply chains and therefore it has straight effect on buyer-supplier relationships (Hsu et al., 2008). Also, companies can benefit from the better knowledge of the supply chain situation by adjusting current operations or making plans for development in the future (Hsu et al., 2008). Even though communication and information sharing are essential in buyer-supplier relationships, it has been found that there is surprising disinclination in sharing information between companies (Agarwal & Narayana, 2020).

Agarwal & Narayana (2020) found that relational communication, identified as information sharing, frequency, and quality, positively affected to satisfaction in buyer-supplier relationship. In addition to information sharing, they found that trust has the positive effect as well. If the buyer felt higher commitment with the supplier, the positive effect of the relational communication to satisfaction increased (Agarwal & Narayana, 2020). Buyer-supplier relationships that are based on social capital, lead to loyal, committed, and long-term co-operation between organizations. Communication between organizations can reduce opportunism that appears in transaction-based relationships (Agarwal & Narayana, 2020).

2.2.3 Trust in buyer-supplier relationships

For a long time, trust has been identified as a key factor in efficient business relationships (Chen & Lewis, 2023). Trust has a positive effect to buyer-supplier relationships and innovations (Tarigan et al., 2020). According to Tarigan et al., (2020), trust has been found to be more effective factor in buyer-supplier relationship than engagement. The findings by Jiang et al. (2012) support the statement. They found that in the construction industry in the UK, the quality of relationships is mostly influenced by the trust between buyers and suppliers. Organizational dependence structures lead to more conflict-driven relationships, and their influence on relationship output is significantly weaker compared to the impact of trust (Jiang et al., 2012).

In context of operations and supply chain management, trust leads to better supply chain performance, improving for example logistics effectiveness and supply chain innovations (Chen & Lewis, 2023). Between firms, trust can be defined as prioritizing common achievements over individual ones and avoiding opportunistic and unforeseen behaviour (Mudra & Yadav, 2019). Developing loyal relationships is a long process. Both the buyer and the supplier need to put effort in trust building and accept possible vulnerability. Sharing information might lead to some significant decision, but both parties need to accept the possible positive or negative consequences. It has been found to lead to strong and trustable buyer-supplier relationship (Agarwal & Narayana, 2020).

Trust-based buyer-supplier relationships have many benefits. They lead to improved collaboration, better information sharing, improved satisfaction, and long-term relationships (Al-Abdallah et al., 2014). Companies' operational performance and market performance is higher when the relationships are based on trust. Trust has been found to facilitating the development of psychological contracts (Agarwal & Narayana, 2020). In addition, conflict situations reduce (Al-Abdallah et al., 2014). Trust building should not only be a response of the buying companies. It is necessary and beneficial for suppliers as well hence they should put effort to build and maintain it (Al-Abdallah et al., 2014).

According to Al-Abdallah et al., (2014), in context of buyer-supplier relationships, trust can be divided into three main categories: Competence trust, contractual trust, and goodwill trust. Competence trust refers to belief that the buying company will perform as it has promised. Contractual trust means that the supplier believes that the buying company will continue their contracts. Goodwill trust refers to the supplier's belief that the buying firm will always work for both parties benefit and does not angle for unfair advantage. According to Agarwal & Narayana (2020), trust is implemented in two ways in organizational literature. Integrity refers to the belief that the co-operating company is loyal, accountable, and keep their promises. Benevolence means believing that the partner company acts thinking the other company's benefit and do not make harmful choices. It has been thought that benevolence fluctuates more than integrity in relationship, but the theory does not recognize the differences in consequences of the trust types. As in all social exchange relationships, the norm of reciprocity is valid. It means that both parties trust that the partner has fair aims, and the efforts given will be recovered (Agarwal & Narayana, 2020).

In every relationship where is trust exists a risk that the partner behaviours untrustworthy. Therefore, in relationships between organizations, the partners need to try to find ways to minimize the risk (Bachmann & Inkpen, 2011, p. 17-18). Bachmann and Inkpen (2011, p. 18-25), mention four ways to forward the trust building: Legal regulation, companies' reputation, certifications, and community norms, frameworks, and processes. As a concrete course of actions, trust between the buying firm and the supplier can be advanced by organizing on-site supplier visits, by clear and common communication practices, and by being conscious about the supplier's worries (Agarwal & Narayana, 2020). In supply chain relationships, information sharing has been found to be key in building trust (Agarwal & Narayana, 2020). In supply chains, efficient information sharing lead to improved transparency, empathy towards others, and significant mutual skill development. Nevertheless, the shared information needs to be qualitative (Agarwal & Narayana, 2020). If information sharing is not working, it can lead

to misunderstandings and reduced trust (Agarwal & Narayana, 2020). Even though trust building is difficult, and it takes time and efforts, it is essential for long-term and strong buyer-supplier relationships (Al-Abdallah et al., 2014). Employees working in leadership positions should focus on building trust between trade partners (Tarigan et al., 2020).

2.2.4 Supplier relationship development

Organizations tend to be too focused on cost minimization when implementing projects with suppliers instead of focusing the development of relationships (Shahzad et al., 2016). Supplier relationship development requires efforts and co-operation both from the supplier's and the buying firm's side. For example, an effective supplier development process would include enhancing activities and processes, collaboration, and long-term partnerships. The objective is that both parties would gain financial benefit from the efforts (Al-Abdallah et al., 2014).

Engagement and satisfaction are essential characteristics for an efficient relationship (Agarwal & Narayana, 2020). In addition, working information sharing of qualitative information is a key to supplier development and efficient relationships. Sharing of qualitative information leads to improvements in satisfaction, product quality, lead time and especially with new products and prices. Shortages in information quality have effects on decision making and weakens the efficiency of the supply chain (Agarwal & Narayana, 2020). As the information shared is qualitative and on time, the buying firm does not need to look for alternative suppliers. The consequences are trustworthy relationship, satisfaction, and often willingness to buy from the same suppliers again (Agarwal & Narayana, 2020).

A long-term relationship requires satisfaction from both partners (Ganguly, 2021). According to Ganguly (2021), supplier's satisfaction appears as they can experience fairness between their own input and the rewards from the buying company's side. Supplier's satisfaction can also be defined as the buyer-supplier relationship meet the

supplier's expectations of the gained value (Ganguly, 2021). The quality of the buyer-supplier relationship directly affects to the level of the supplier's satisfaction. Becoming as a preferred customer in the supplier's point of view is a challenge for the buying firm. Supplier's satisfaction is required if the buyer wants the position of a preferred customer. Supplier's satisfaction and the preferred customer status affect to both innovative and physical resources the buying company gets from the supplier. From suppliers' perspective, high operational performance of the buyer is a sign of potential customer (Ganguly, 2021). Ganguly (2021) found that the element that increases the satisfaction of supplier the most is the commitment of suppliers through effective collaboration. Also, trust, appreciation towards their innovations, empathy, confidence about the continuously of the partnership, and including them to the buying company's development increased satisfaction. Strategies based on preferred customers can upgrade the competitive advantage of a whole supply chain. However, there are not many studies examining the suppliers' satisfaction with the buying firm (Ganguly, 2021).

Face-to-face meetings regularly has been found to improving performance of buying companies and advancing behavioural expectations. Regularly shared information boosts confidence towards the relationship, improves trust and collaboration, and reduces conflicts (Agarwal & Narayana, 2020). Even though technological communication has hugely increased in recent years, face-to-face meetings are still much valued (Yue, 2022, p. 145). Factors such as communication, competence, handling conflict situations, and commitment improve supplier relationships (Gupta & Choudhary, 2016). Communication across different functions, involvement of top management, and diversified teams are important for succeed supplier development strategies (Sillanpää et al., 2015).

2.2.5 Commitment and dependence on buyer-supplier relationships

Commitment makes both the buyer and the supplier to stay in the relationship. In the other words, it refers to the need to maintain it and keep it stable (Agarwal & Narayana,

2020; Shahzad et al., 2018, p. 4). Manufacturing firms' production is highly dependent of the performance of their suppliers (Khosrow & Anjali, 2015). In literature related to supply chain management, commitment is divided to two views. The first one, affective commitment, sees it as a feeling towards the partner. The second one, calculative commitment, considers commitment based on actions, not as a feeling. It is based on evaluation of the benefits of the relationship (Agarwal & Narayana, 2020). According to Shahzad (2018), companies' dependence towards suppliers is increasing due to their focus on essential abilities, outsourcing, and optimizing. Schmelzle and Mukandwal (2023) found that the suppliers who have fewer connections with their customers' competitors tend to manage inventory better and use their resources more efficiently. Therefore, suppliers can benefit and increase their operational performance by building closer and more trusting relationships with fewer buyers, rather than having many weaker relationships (Schmelzle and Mukandwal, 2023).

The dependence between a supplier and a buyer varies according to how difficult and expensive changing to another alternative would be (Chen & Lewis, 2023). The level of the dependence between the buyer and the supplier can be defined by Cox's typology of power relationships (Chen & Lewis, 2023). It divides the relationships to four categories: Independent, supplier dominance, buyer dominance, and interdependent. Understanding power relationships is important in exploring the buyer-supplier relationships and performance (Chen & Lewis, 2023). Independent relationship refers to a low dependence. There exists low level of trust in the relationship, and there are not many weaknesses that the partner could exploit. In a buyer dominance relationship, the buying company is not that dependent on the supplier than the supplier is on the buying company. Therefore, the supplier is in weaker position and more vulnerable for exploitation. Supplier dominance means reversed situation, where the supplier is less dependent on the relationship. In this case, the power benefit is on the supplier's side in a conflict situation. Interdependence in a relationship means that the dependence is high on both parties. In this situation, both are probably willing to develop trust and co-

operation. In addition, both are on equal positions, which reduces exploitation in the relationship (Chen & Lewis, 2023).

Shahzad et al. (2018, p. 3) have researched the impact of governance mechanisms on transaction costs and relationship commitment in buyer-supplier relationships. According to Shahzad et al. (2018, p. 4), reducing transaction costs and enhancing relationship commitment have become a key research topic in the relationships between companies. Trust and communication are examples of social governance mechanisms (Shahzad et al., 2018, p. 8), whereas mutual dependence and contract completeness are examples of economic governance mechanisms (Shahzad et al., 2018, p. 8). Transaction costs refer to costs caused in economic exchange, such as costs of negotiation, monitoring, and enforcing agreements between parties (Shahzad et al., 2018, p. 4). There exist challenges in the buyer-supplier relationships, that depends on if the partner acts opportunistically. For example, lack of trust, weak level of information sharing, uncomplete agreements, and different goals might lead to negative impact on relationship commitment, and therefore cause transaction costs (Shahzad et al., 2018, p. 4). There reasons make governance crucial in the development of buyer-supplier relationships, including behavioural and economic methods (Shahzad et al., 2018, p. 4). As structured governing of buyer-supplier relationships is needed to build stabile relationships with profitable output, the central question is that how to create a system where both parties can fully focus on their common targets (Shahzad et al., 2018, p. 7). Shahzad et al. (2018, p. 31-32) found that both economic and social methods have an equally crucial role in controlling transaction costs and commitment improvement. Nevertheless, economic mechanisms have bigger impact on minimizing afterward transaction costs, but social mechanisms affect more on relationship commitment development. The findings show the importance of the varying roles of relationship governance mechanisms in effectively managing relationship exchanges (Shahzad et al., 2018, p. 31-32).

Satisfaction is a consequence of commitment in a relationship (Mungra & Yadav, 2019, p. 9). Mungra and Yadav (2019, p. 2), researched the impact of trust and commitment on satisfaction, and the outcomes of satisfaction in a manufacturer-supplier relationship. They found positive connection between satisfaction and commitment, and satisfaction and trust. Their findings show that higher satisfaction leads to reduced governance costs. In addition, the findings show a positive correlation between satisfaction and performance in a manufacturer-supplier relationships (Mungra & Yadav, 2019, p. 2). However, according to their findings, during the five first years of the relationship, the performance increases and governance costs decreases. After five years of the partnership, the performance starts to decrease, and the governance costs increase. In this stage, the relationship has negative impact on satisfaction, and the impact of commitment and trust to satisfaction reduces (Mungra & Yadav, 2019, p. 2). As a conclusion, commitment is an important mediator between trust and satisfaction, as performance and governance costs fluctuate during a manufacturer-supplier relationship (Mungra & Yadav, 2019, p. 9). Also, Admed et al. (2020) researched supplier satisfaction, and they found clear and positive associations between the quality of communication and supplier satisfaction, and supplier satisfaction and trust, commitment, supplier attraction, and efficient time management. The results highlight the importance of communication as a key element to supplier satisfaction. Effective time management allows suppliers to perform more tasks in a shorter time, and it reduces their stress and increases performance. Therefore, their satisfaction increases as well (Ahmed et al., 2020).

2.3 Supplier Performance

Performance can be defined as a capability to reach the objectives and as a level of efficiency that effects to the members of a supply chain (Bak et al., 2020). Due to the today's varying markets, many companies are looking for ways to improve their performance indicators, and they use strict control over their operations (Yue, 2022, p. 142). Supplier Performance refers to how well the supplier can meet the customer's

requirements, such as delivery time, quality, costs, ability to react, and technical support (Tarigan et al., 2020). The most trustable way to determine performance is to use different measures (Bak et al., 2020). Good supplier performance is necessary for meeting customer requirements (Tarigan et al., 2020). According to Tarigan et al. (2020), performance can be divided into three categories. First of them, financial performance, can be assessed for example by profit from capital, return on investment, and by market share. Non-financial performance is based on customer satisfaction. Operational performance refers to the capability of deliveries, quality, and flexibility, and abilities to improve them. Continuously improvement is expected from the suppliers (Tarigan et al., 2020). In this thesis is concentrated on the operational performance of the suppliers, because it is directly affecting to the purchasing teams' work.

To meet the customers' requirements on markets, a functioning supplier evaluating process is important for a company (Xia et al., 2008). The purchasing costs are a large part of a company's operating costs, which strengthens the significance of the suppliers' performance. In most firms in the USA, raw materials compose 40-60 % of the costs of a manufactured product. Hence suppliers have a long-time effect on competitiveness of a supply chain. Therefore, evaluating and following suppliers' performance is vital (Xia et al., 2008).

According to Xia et al. (2008), already in the 1960s, performance, delivery, and quality were ranked as the most important factors in selecting suppliers. Other important factors found were price, capacity, production conditions, and claim handling and warranties (Xia et al., 2008). Later in the 1990s, factors such as reactivity, adaptability, technical abilities, and location were considered (Xia et al., 2008). Nowadays, safety and environmental responsibility are kept as important factors as well (Xia et al., 2008). Buyers who prefer single sourcing prioritize dependability and reliability more, while those who prefer multiple sourcing focus more on price (Xia et al., 2008).

On manufacturing firms, supplier performance has an outstanding effect to the success of the firm (Ravindran & Vivek, 2009). The firms should focus on the performance of their suppliers to meet their final customers' requirements (Khosrow & Anjali, 2015). According to Sillanpää et al. (2015), measuring supplier performance improvement is the most significant way to measure if supplier development has paid off. The competitive requirements are changing, so developing existing suppliers' performance is needed to fill the requirements. According to Sillanpää et al. (2015), supplier performance can be monitored by observing factors such as deliveries, quality, lead time, inventory, and the rate of new product implementation.

According to Bak et al. (2020), suppliers differ from others with the needs of follow their performance. Some suppliers act well without different measurements, but others need regular following due to lacks in performance. The lacks can be influenced by regular measurements and management approaches. Only one supplier can affect to the whole supply chain with poor actions. Differences between suppliers makes feedback sharing on both sides especially important. Through the feedback sharing, issues in supply chains can be noticed, foreseen, and eliminated more effectively (Bak et al., 2020).

In measuring supplier performance is important to find the gaps between the present situation and the hoped situation in the future (Bak et al., 2020). It has been found that regular evaluations can help the situation with late deliveries, and reduce costs caused by damages and wastage (Bak et al., 2020). However, the measurement actions can be complex and costly. Therefore, buying companies need to find suitable ways to follow their suppliers' performance in their supply chains, considering the company's vision and mission. There are many ways to assess the suppliers' performance. For instance, the suppliers' ability to respond the customers' requirements over different time periods, net profits, deliveries and lead times, flexibility, responsiveness, quality, product availability, forecasting, communication, and capacity using can be analysed (Bak et al., 2020).

2.3.1 Delivery performance and reliability

In 1988, it was reported that suppliers are responsible of around 80 % of problems related lead time (Al-Abdallah et al., 2014). Nowadays, as lean production and just in time purchasing are general ways to work, complete synchronization would be necessary between the buyer and the supplier. Buying firms require exact deliveries in small batch sizes (Al-Abdallah et al., 2014). Nowadays, delivery reliability is seen as an order qualifier in addition to price and quality (Thatte et al., 2008). Suppliers' delivery performance is an important gauge because it significantly affects to the performance of the buying firm or manufacturer compared to the others in the same field (Bak et al., 2020).

There are many definitions for delivery reliability. In the article by Thatte et al. (2008), delivery reliability is defined as a summary of multiple definitions as *"the ability of an organization to provide on time the type and volume of product required by customer(s)"*. It involves delivery on time, order fulfilment rate, speed, and frequency of the delivery (Thatte et al., 2008). Delivery performance can be analysed by using cost-based measures, that evaluate deliveries and include penalties caused by late deliveries. Possible improvements need to be taken account when evaluating a supplier's delivery performance (Bak et al., 2020).

If a supplier continuously misses delivery dates, their potential from a customer's perspective decreases (Thatte et al., 2008). It might risk the whole business of the supplier. Delivery reliability is equally important with the quantity delivered. As a result of international research including firms from Australia and Singapore appeared that most of them considered delivery reliability as the most important measurement of a company's delivery performance (Thatte et al., 2008). Delivery reliability has a clear effect to a firm's performance (Thatte et al., 2008).

2.3.2 Quality

Quality is a key expectation of a customer in all business areas. It directly effects to buyer-supplier relationships, because better quality improves competitive advantage (Hoque & Maalouf, 2022). Supplier quality is essential because poor quality of supplied products cause costs (Khosrow & Anjali, 2015). The quality of the suppliers' products directly affects to the quality of the buying firm's products (Yue, 2022).

According to Khosrow & Anjali (2015), supplier quality development refers to strategic measures to improve the quality, reliability and effectiveness of suppliers. Quality development of suppliers is a fundamental and necessary element of supplier development (Khosrow & Anjali, 2015). If the supplied products are poor-quality, the supplier development actions such as common product development will be more challenging (Khosrow & Anjali, 2015). Supplier quality evaluation can be carried out by analysing the supplier's quality system compared to the received quality notifications, product requirements and safety procedures. Customer satisfaction and the supplier's performance are included as well (Khosrow & Anjali, 2015). Firms can use qualifications and certifications in evaluating suppliers' quality. They help the buying companies to ensure that the suppliers are following agreed quality and safety standards. The buyers can also follow the certification history and improvement. Therefore, certificates are one way to follow the suppliers' performance (Khosrow & Anjali, 2015).

Supplier quality performance measurement (SQPM) is in vital role in supplier quality development because it provides a foundation for supplier improvement. It involves assessing supplier performance including quality, cost, delivery, health and safety, and environmental factors (Khosrow & Anjali, 2015). A qualitative supplier delivers qualitative products on time, is easy to work with, and provides the requested documents and certificates. Good SQPM program supports suppliers and help them to grow. The program can include supplier's system analysing, problem identification, and improvement suggestions (Khosrow & Anjali, 2015). Performance objectives can be set for the suppliers to motivate them towards improved quality performance. Also, supplier

visits, risk analysis, scorecards, and assessment of the supplier's comparative performance are possible SQPM methods in supplier quality development actions (Khosrow & Anjali, 2015).

According to Khosrow & Anjali (2015), many companies do not track the costs that are caused by bad suppliers. They are called the cost of poor supplier quality, and the effects can be immediate or secondary. Immediate costs can be controlled, and they are related to preventing or evaluating quality issues. Secondary costs are related to quality problems that cause discontent and costs for the customers (Khosrow & Anjali, 2015). However, buying firms are increasingly putting resources to the supplier quality improvement. Some often-used actions are lean manufacturing, six sigma, JIT deliveries, rewarding, continuous improvement, and guidance on quality tools and other technical devices. Also, developing relationships and supplier development, and actions they typically include, such as communication, common planning and knowledge sharing, are mentioned (Khosrow & Anjali, 2015). Process enhancement and new product development are important factors of the operational performance of suppliers. They improve the uniform quality of the products as process deviations and mistakes decline (Tarigan et al., 2020).

According to Khosrow & Anjali (2015), some reasons that led to problems in supplier quality management were caused by unclear quality requirements, technological issues between companies, shortage of cost definitions caused by lack of quality, issues in communication and knowledge sharing, unclear targets, and unmotivated suppliers. Also, missing of top management and un motivating incentives affected. On the suppliers' side, conflicts between quality and supply chain management, unwillingness to follow quality scorecards, ineffective reporting, top management's unwillingness to attend, and lack of risk analysis caused weak quality management (Khosrow & Anjali, 2015).

2.3.3 Supplier development

Recently, improving supplier development has been seen as the most important investment that companies can make to have strong supplier relationships and gain competitive advantage (Shahzad et al., 2016). Organizations need to develop suppliers is increasing due to trend of outsourcing and their focusing on essential abilities (Shahzad, 2018). Firms are looking for suppliers that can offer leading products. Therefore, the suppliers need to be able to answer the changing market requirements (Tarigan et al., 2020). Continuing supplier development helps suppliers to first meet the buying company's requirements, but through frequent reviewing the suppliers can improve their performance (Tarigan et al., 2020).

Suppliers and buyers need to co-operate to achieve supplier development (Shahzad, 2018). It involves improving suppliers' ability and competence to solve problems related to supply chains. The success of supplier development depends on the lucidity of the firm's long-term goals. For that reason, companies are completing different supplier development programs to achieve improved operational performance and long-term relationships (Shahzad, 2018). There are some important activities for supplier development, such as training, setting targets for suppliers, performance evaluation, and supplier assessment (Shahzad, 2018). Frequent reviewing of suppliers' performance motivates them to provide their best possible performance in both short and long-term operations (Tarigan et al., 2020). According to Khosrow & Anjali (2015), lean manufacturing and just-in-time deliveries were the most efficient way to develop suppliers in Canadian firms. Also, suppliers' environment and health and safety have impacts on performance (Khosrow & Anjali, 2015).

Yulasmı et al. (2023) researched how the supplier's role affects to the performance and quality of a product development team. The results show that there exists significant positive connection between the main supplier and the quality of the team in an innovative process. Corporate culture was considered in the research as well, and the results show that it strengthens the impact of supplier's role on the quality of the team.

In addition, the team quality has a significant impact on the product development team's performance (Yulasmı et al., 2023). As a conclusion, suppliers have significant impact on companies' performance in new product development.

According to Shahzad et al. (2016), five factors affecting supplier development are the supplier's leadership capabilities, participation of the supplier's senior management to the development process, collaborative development team, successful implementation of a pilot line, and data-driven decision making. Including senior management in development process enables sharing important knowledge for the partner. It helps in developing operational performance (Shahzad et al., 2016). Also, supplier development should include positivity towards long-term partnerships, communication, information sharing, and mutual promises (Shahzad, 2018). Management should take part in the process (Shahzad et al., 2016). In addition to supplier development, those actions lead to better performance, and to strategically improving supplier relationships. Both suppliers and buyers can improve their competencies and operational performance through supplier development (Shahzad et al., 2016). Supplier development has led to better quality of supplies, improved delivery time, reduced costs, and better productivity (Shahzad et al., 2016).

Because of the vital importance of suppliers, companies are adopting different supplier development programs and strategies (Shahzad et al., 2016). There exist different supplier development strategies based on the previous research, and Shahzad (2018) presents four most exhaustive ones of them in his doctoral thesis. The first of them is supplier assessment, which lead firms towards high expectations of suppliers' performance based on the assessment and certification system. The second one is competitive pressure, which appears when the buying firm have many alternative suppliers, and it pressurize the suppliers towards better performance and quality to gain competitive advantage. The third one, supplier incentives, means awarding them for their accomplishments. Supplier incentives encourage the suppliers towards improved utilization of their capabilities and to continue hard working. The last one, direct

involvement, means that the buying firms have a predictive method for improving suppliers' performance. It includes direct involvements, such as targeted investments (Shahzad, 2018). Shahzad et al. (2016) found that supplier development strategies are functional tools for developing relationships between the buyers and the suppliers, and to improve the suppliers' performance. Especially, their research shows that direct involvement and supplier incentives are notable strategies in creating strong buyer-supplier relationships (Shahzad et al., 2016).

2.4 Supplier Relationships' impacts on the suppliers' performance

Great supplier relationships enable better supplier performance (Tarigan et al., 2020). As the relationship is confidential, the buying firm can trust that the supplier will deliver as promised (Tarigan et al., 2020). Suppliers can provide value to the buyer through innovations, and working buyer-supplier relationship enhances innovations (Tarigan et al., 2020). According to Al-Abdallah et al. (2014), collaborative relationships with supplier lead to better suppliers' performance and competitive advantage, assuming that the relationships are trust-based and long-term, the suppliers are supported to develop their processes, communication is working, and the suppliers are allowed to take part in new products development. Also, it has been found that shared goals and values between buying firms and suppliers, and buyers' participation in suppliers' development project positively effects on the buyers' competitive ability (Al-Abdallah et al., 2014).

Supplier development strategies are significant in developing supplier relationships, and they increase suppliers' performance (Shahzad, 2018). Supplier development is essential to development of operational performance. Developments in operational performance can improve quality and lead time and help to reduce costs. Also, supplier development improves buyer's performance in collaborative planning and integrating product development and information systems (Sillanpää et al., 2015). In supplier development, one target is to transfer know-how from the buyer to the supplier. Therefore, the basic information and skills of the suppliers develop, and it should be visible in their

performance as continuously improvement. Also, it should help the suppliers with the new needs and innovations (Sillanpää et al., 2015). There are also other critical elements in supplier development effecting supplier performance. One of them is the buyer engagement of building perception of a business partnership (Sillanpää et al., 2015).

Graca et al. (2015) found high dependence between contentment on performance and buyer-supplier relationship capital, including trust and engagement, and exchange climate including collaboration, communication, and acting in conflict situations. Also, Hsu et al. (2008) found positive relationship between buyer-supplier relationships and performance. Their findings highlight the relationships between the buying and supplying firms mediate the effect of information sharing on firm's performance. By implication, the firms' ability to react improves, and they can focus on the sources of value (Hsu et al., 2008). Also, the findings by Khan et al. (2015) highlight the significance of buyer-supplier relationships and information sharing on performance and supply chain efficiency.

The findings by Hsu et al. (2008) point out to understand the multidimensionality of the buyer-supplier relationships. According to them, even though term "supply chain management" is commonly used, in truth the firms are most likely to manage individual relationships and supply processes. As the distance from the central company increases, the management of the processes and relationships becomes more difficult. It means that there are not only differences between the levels of the buyer-supplier relationships and the levels of information sharing but also differences in how different aspects of buyer-supplier relationships influence the firm performance (Hsu et al., 2008). Also, Kannan & Tan (2006) point out that it is important to understand the difference between the output of the successful relationship from the other improvements of the company. Measurements such as delivery reliability and quality can be improved by improved buyer-supplier relationships, but there are also many other factors affecting them. Therefore, it is difficult to separate the impact of only the relationship level (Kannan & Tan, 2006).

From suppliers' point of view, qualitative relationships with customers are vital for maintaining competitive (Mohan et al., 2021). Qualitative relationship refers to deep and powerful relationship between a customer and a supplier. These kinds of relationships lead to improved performance and competitive advantage (Mohan et al., 2021). The companies in a supply chain should notice the importance of relationships while aiming organizational goals and success (Shahzad, 2018). Buyer-supplier relationships that are based on social capital, including strong relational communication, knowledge sharing, and quality, provide improved efficiency and competitive edge (Agarwal & Narayana, 2020). Competitive advantage can be achieved also when the co-operation is working, and the buying firm can manage its inventory levels and delivery times together with its suppliers (Tarigan et al., 2020). According to Yue (2022), it is important to treat the suppliers honest and respectful. When they are treated well, they will provide as good service as they can, and act more efficiently in urgent or sudden situations. In addition, they will share their experiences of co-operation with other suppliers (Yue, 2022).

2.4.1 Impacts on delivery reliability

According to Bak et al. (2020), prompt and accurate co-operation and communication between the buyer and the suppliers decreases the need for queries and lead to better lead times. Shorter lead times are a competitive advantage, and they make the supplier to be seen as an effective partner. Also, if a supplier can manage of unexpected orders and inquiries, it is a way to show strong productivity (Bak et al., 2020). Companies which appreciate their suppliers and work with them together to respond the changes on the markets can provide higher service level for their own customers and achieve higher performance (Hsu et al., 2008).

Great buyer-supplier relationships reduce negative impacting exceptions in supply chains. Consequently, the buying firms can make more accurate forecasts and improve delivery performance (Hsu et al., 2008). In a successful buyer-supplier relationship the buyers can trust that the suppliers will deliver as promised (Tarigan et al., 2020). The

quality of shared information between the buying and supplying firm effects to the delivery time performance, as well as how close the relationship is. Also, technical assistance for suppliers improves delivery reliability (Al-Abdallah et al., 2014). According to Kannan & Tan (2006), one of the most focal benefits of good relationships with important suppliers is improved delivery performance.

2.4.2 Impacts on quality

Buyer-supplier relationship is the first stage for supplier quality development (Khosrow & Anjali, 2015). According to Khosrow & Anjali (2015), the relationship contains operations that enables the quality development, such as sharing quality and product knowledge, common product development, involving suppliers in quality systems, and organizing on-site meetings. Collaborative planning in quality management is important. Sharing common objectives and long-time relationships are ways to improve quality, as well as fewer suppliers with close relationships and regular visits (Khosrow & Anjali, 2015).

The research by Ahmed et al. (2020) highlights the importance of communication in a buyer-supplier relationships relative to supplier satisfaction. In addition to supplier satisfaction, effective communication reduces the risk of mistakes in a supply chain, such as errors in purchase orders or product lists (Ahmed et al., 2020). Therefore, effective communication improves quality. In addition, it is important that the suppliers are satisfied with their own products and service quality. Then they are satisfied with their own work (Ahmed et al., 2020).

Improving supplier quality can enable removing inspections of incoming materials (Al-Abdallah et al., 2014). Supplier quality can be improved by operations such as offering technical guidance and certifying suppliers based on quality (Al-Abdallah et al., 2014). The results of improved supplier quality can be seen as improved quality and design of the supplies, better productivity, and reduced costs. Long-term buyer-supplier

relationships and contracts encourage suppliers towards improved quality (Al-Abdallah et al., 2014). Rewarding is one way to encourage suppliers pay more attention to quality. One example of a supplier award is sharing the advantages gained by the improvements with the suppliers that they have completed (Khosrow & Anjali, 2015). However, the most popular ways to improve supplier quality are training and implementation activities. Purchasers can implement them by offering tools for quality control through statistics, methods for quality development, or means for problem solving (Khosrow & Anjali, 2015). Supplier's ability to reduce lead time is necessary for a responsible supply chain. It also helps the supplier to be lean and reduce uncertainty. Holding safety stocks includes a quality risk, and consequently reducing lead time can improve quality (Al-Abdallah et al., 2014).

To achieve improved quality, consideration is needed in the relationships. Terpend & Ashenbaum (2012) found that using coercive power in the relationships, that means making threats as the instrument of power, resulted in lower quality, but referent power, which is based on respect, increased it. If the relationship is based on coercion, the suppliers might not put their best efforts to the buyers that are offensive to work with. This is one reason for the poorer quality (Terpend & Ashenbaum, 2012).

2.4.3 Other impacts

According to Al-Abdallah et al. (2014), in buyer-supplier relationship both parties can gain valuable benefits. The overall performance of both parties can improve, as well as their communication and decision-making processes. When buying firm gives technical assistance for their suppliers, in addition to delivery reliability and quality improvements, the companies' productivity, designs, and flexibility improve, and costs decrease. Good supplier relationships lead to risk sharing and better problem solving (Al-Abdallah et al., 2014). Effective co-operation and information sharing are the key factors to achieve mutual advantage. These factors also increase customer responsiveness (Thatte et al., 2008).

Terpend & Ashenbaum (2012) researched the impacts of the supplier base size, trust, and power to the supplier performance in five sectors. In addition to deliveries and quality, prices, innovations, and flexibility were included. They found that if the supplier trusted in the buyer, there existed positive effect in all the sectors. There are different types of power, but Terpend & Ashenbaum (2012) found only referent power to have a positive impact on all five sectors. Besides, coercive power resulted in lower quality and fewer innovations. Terpend & Ashenbaum (2012) mentions that if the relationship is based on coercion, the suppliers might want to avoid the buyers' attention and are not interested in collaborating for new innovations. They also found that the supplier base size has not as big effect as has been thought alone, but it might have contextual effect to the interaction between trust, power, and the network size (Terpend & Ashenbaum, 2012).

Innovation refers to administration of actions where idea generation, technological advancement, and the development of products and processes are needed (Tarigan et al., 2020). It can also be defined as capability to provide new products that has not existed earlier, or improving product design or qualities (Tarigan et al., 2020). Due to today's competitive markets, product development that adapts environmental changes is a competitive advantage for manufacturing companies (Tarigan et al., 2020). New innovations boost suppliers' performance because they increase their own competitive advantage. According to Tarigan et al. (2020), relationships including factors as trust, engagement, information sharing, stable demand, and information system, creates a suitable environment for innovations. Long-term relationships have a significant effect to innovations as well (Tarigan et al., 2020).

2.5 Summary of the literature review

In this chapter, the key points of the literature review are summarized. The reliability of the literature used is analyzed as well. More research concerning supply chain

relationships' impacts on performance evaluation is needed (Hald & Mouritsen, 2018), and especially from suppliers' point of view (Jääskeläinen, 2021). Several studies have examined the buyer-supplier relationships' impacts on supplier performance (Jääskeläinen, 2021; Maestrini et al., 2018; Qian et al., 2023; Schmelzle and Mukandwal, 2023), but the context of spare part purchasing and focusing on both buyers' and suppliers' experiences create a research gap. This literature review answers the second research question: "How do the supplier relationships affect to the suppliers' performance, such as delivery reliability and quality?" based on the existing literature. The response based on empirical research is presented in the next chapters. In addition, the literature review completes the objective to explore the supplier relationships and their effects on the suppliers' performance in spare part purchasing based on relevant literature. Also, the literature review provides background information about buyer-supplier relationships, and trust and co-operation in buyer-supplier relationships for the first research question.

All the references used in the literature review, except dictionaries, are research and scientific articles searched by using different databases, such as Scopus, Emerald Insight, and Google Scholar. Most of them are from past ten years, and many of them from past five years. Therefore, the data can be expected to be quite up to date. The scientific articles can be considered as trustable references. However, an even larger quantity of new research as references would improve reliability.

Firstly, spare part purchasing and its specialties were explained. Spare parts purchasing is a critical operation where the parts are often speedily needed in cases such as breakdowns. It makes the prediction of demand challenging but at the same time there are strict limitations, how much parts can be stocked (Baluch et al., 2013). Customers have high expectations for the companies delivering spare parts (Baluch et al., 2013). To manage today's highly competitive markets, companies must focus on supplier relationships and developing them (Al-Abdallah et al., 2014). Supplier relationship management help companies to answer the requirements and to secure on-time

deliveries (Al-Abdallah et al., 2014), that are vital in spare part purchasing.

Supply chains are not based on only the exchanging of economic factors, but social exchange is an important element as well (Agarwal & Narayana, 2020). Buyer-supplier relationships should be based on co-operation and communication (Al-Abdallah et al., 2014), and the buyers and the suppliers should have common objectives (Tarigan et al., 2020). Both parties need to benefit from the relationship to make it long-term (Al-Abdallah et al., 2014). Trust is a key factor in building strong and durable buyer-supplier relationships (Al-Abdallah et al., 2014). The problem is that companies tend to be too focused on cost minimization instead of relationship development (Shahzad et al., 2016).

Supplier performance refers to the supplier's ability to answer the customer's requirements. For example, it can be measured in terms of delivery time, costs, quality, and ability to react (Tarigan et al., 2020). Measuring supplier performance is the most efficient way to estimate if the supplier development process has worked (Sillanpää, et al., 2015). The needs of following different suppliers' performance varies, and therefore sharing feedback on both sides is especially important (Bak et al., 2020). Measuring supplier performance is the way to find gaps between current situation and hoped situation in the future (Bak et al., 2020). Delivery reliability is seen as an order qualifier in addition to quality and price (Thatte et al., 2008), and buying companies have high requirements for accurate deliveries in small batch sizes (Al-Abdallah et al., 2014). Quality is a vital measurement of performance because poor quality supplies cause costs (Khosrow & Anjali, 2015). A qualitative supplier is producing qualitative products on time, providing the needed documents, and is an easy-going business partner (Khosrow & Anjali, 2015). Supplier development is the most significant investment to improve supplier relationships and competitive advantage (Shahzad et al., 2016).

Good buyer-supplier relationships, where the purchaser can trust that the supplier will deliver as agreed, are a way toward better supplier performance (Tarigan et al., 2020). To achieve improved performance and competitive advantage, collaboration and

communication need to be fluent, suppliers need to get support in their process development, and suppliers should be allowed to take part in product development (Al-Abdallah et al., 2014). Accurate co-operation and collaboration are also the way to improved lead times (Bak et al., 2020), as well as the quality of shared information and the depth of the relationship (Al-Abdallah et al., 2014). In quality side, buyer-supplier relationship is the first step of development (Khosrow & Anjali, 2015). Elements needed in relationships, such as information sharing, are needed to achieve development. In a buyer-supplier relationship, both sides should gain benefits. It is possible to improve both parties' overall performance, but also communication and decision-making processes (Al-Abdallah et al., 2014). Long-term supplier relationships are significant factors for new innovations that are continuously needed on today's markets (Tarigan, et al., 2020). Based on the literature review, the following hypotheses were made for the correlation test made between the survey responses in the SPSS analysis:

H1: There is a positive correlation between communication with Company X and the supplier's perceived improvement in delivery reliability.

H2: There is a positive correlation between communication with Company X and the supplier's perceived improvement in quality.

H3: There is a positive correlation between trust in Company X and the supplier's perceived improvement in delivery reliability.

H4: There is a positive correlation between trust in Company X and the supplier's perceived improvement in quality.

H5: There is a positive correlation between collaboration with Company X and the supplier's perceived improvement in delivery reliability.

H6: There is a positive correlation between collaboration with Company X and the supplier's perceived improvement in quality.

3 Method

In this chapter, the research method and the data collection process are explained. The objective is to find answers to the research questions by using these methods. Also, the objectives of the research are fulfilled by using these methods.

3.1 Research methods

This thesis is mixed methods research, where both qualitative and quantitative data are collected and analyzed. The purpose of using mixed methods is to use qualitative and quantitative methods in parallel so that the outcome of the research is more comprehensive than by using only another method (Creswell, 2009). Stronger evidence and deepen answers to research questions can be gained as multiple ways to explore the topic are used (Shorten & Smith, 2017). In this thesis, mixed methods are used because both qualitative and quantitative data are available, and by using both methods more viewpoints can be considered. In this research, sequential explanatory strategy is used, which means first collecting and analyzing quantitative data, and then collecting and analyzing qualitative data to support and extend the quantitative results (Creswell, 2009). The emphasis is on the quantitative methods (Creswell, 2009). In this thesis, quantitative methods are used in collecting quantitative data by supplier survey and from the Power BI reports and then combining them in SPSS analysis. Qualitative methods are used to support quantitative methods by adding open-ended questions to the supplier survey and conducting interviews for strategic purchasers and supplier development engineer from Company X. These methods offer both suppliers and purchasers possibility to describe their experiences in their own words, which brings more viewpoints to this research. Both methods are utilized in answering both research questions.

The first research question is answered based on a survey conducted among the suppliers. A structured survey is completed by using the Likert scale 1-5 to gain quantitative data to be analyzed from the suppliers' experiences of co-operation,

communication, trust, continuous improvement, and performance with Company X. In addition, there are two open-ended questions to gain qualitative data that are voluntary to answer. In these questions, the suppliers can freely tell what is currently working well and what could be improved in co-operation with Company X. The questions of the survey are based on literature review. Survey is a suitable research method when a human element is taken into consideration (Helo et al., 2019). In this research, relationships and trust are in a significant role. A challenge with survey as a research method can appear is that the respondents might answer as they think they are expected to do (Helo et al., 2019). To avoid this issue, the survey is performed anonymously. Therefore, at the beginning of the survey, the suppliers are asked to answer three questions for grouping purposes. In these questions, the suppliers' category of supplies, the duration of the partnership, and the frequency of the deliveries with Company X are investigated.

To answer the second research question from an empirical research point of view, the SPSS analysis is made. To take both the buyers and the suppliers' viewpoints into account, purchaser interviews are completed to fulfil the results and to gain qualitative data. The data collected from Power BI reports concerning the suppliers' performance in the areas of lead times, delivery reliability, and quality, was grouped based on the product categories, as well as the survey responses. To perform the comparing, the Power BI data was moved to SPSS as well as the quantitative data collected by the surveys. SPSS is used to create a summary table of the survey answers, and to calculate Pearson correlations and regression analysis. The Pearson correlation coefficient is calculated first between the suppliers' own experiences of relationship with Company X, and if they think that the co-operation has helped them to improve deliveries and quality. After that, the correlation test is made between the realized data of the suppliers' performance and survey responses. Finally, regression analysis is calculated between the suppliers' own experiences to see if the good buyer-supplier relationships prevent experience of improved delivery reliability and quality.

To gain wider understanding, the purchaser interviews are included in the research. To widen the viewpoint, an interview of a supplier development engineer is included as well. All the interviewees work in the metal construction spare part purchasing team. Thus, they are actively in contact with the suppliers that are included in this research and have experience of cooperating with them. The supplier development engineer and purchaser interviews include seven open-ended questions concerning their opinions and experiences of significance of the buyer-supplier relationships, and their impacts on supplier performance.

3.2 Data collection process

The survey was executed in 2025 as an online questionnaire and sent to the suppliers via email. They were given 13 days to answer. One reminder was sent to maximize the number of the responses two days before the survey link was closed. The number of suppliers contacted is 200, and the survey was sent to one email address per supplier. The number of suppliers contacted includes all the suppliers the metal construction spare part purchasing team has purchased within a calendar year from beginning of March 2024 to the end of February 2025. Therefore, the data is comparable with the data of the Power BI analysis. The number of responses received is 95, which means response rate of 47,5 %. The survey includes 15 mandatory multiple-choice questions and two voluntary open-ended questions. The questions are grouped related to the themes of the questions, that are background information, communication, trust, cooperation and continuous improvement, and performance. The tool used for performing the survey is Webropol which enables taking the data collected straight to SPSS for the analyses.

The Power BI data used was collected from Company X's reports that the purchasers use for following the suppliers' performance in their daily tasks. The pictures used in this thesis are screenshots from the reports. In the results chapter 4.2, there is firstly presented the delivery reliability, lead times, and quality notification situations of the

whole supply team in the one-year period from the beginning of March 2024 to the end of February 2025. The period has been chosen as the timeframe of the research to gain information of the current state of the buyer-supplier relationships. The survey was open to the respondents from the end of March to 10th of April in 2025. Then, the data is as recent as possible. To explore the current development of the figures, there is also presented the same data from a three-year period from the beginning of March 2022 to the end of February 2025. After that, the one-year period data of delivery reliability and quality of the different product categories are presented. The Power BI analysis is made based on this data.

Three purchasers of the team and one supplier development engineer were interviewed to fill the third research objective to gain insights of the purchasers' experiences as well. The supplier development engineer interview fulfils the research by adding his viewpoint of the supplier relationships and their impacts. The interviewees and their roles are presented in table 2.

Table 2. Interviewed purchasers

Interviewee	Position	Responsibilities
Purchaser 1	Strategic purchaser of Category Y30	Negotiating and concluding agreements with suppliers for the purchase of products in category Y30. Taking care of fluent co-operation with the category's suppliers.

Interviewee	Position	Responsibilities
Purchaser 2	Strategic purchaser of Categories Y03 and Y06	Negotiating and concluding agreements with suppliers for the purchase of products in categories Y03 and Y06
Purchaser 3	Strategic purchaser of Category Y15	Negotiating and concluding agreements with suppliers for the purchase of products in category Y15. Taking care of fluent co-operation with the category's suppliers.
Supplier development engineer	Supplier development engineer of Category Y30	Working to improve the quality and delivery reliability of category Y30 suppliers' products. Taking care of fluent co-operation with the category's suppliers.

The interviews were performed in written format via Teams. By using written format, the precise responses of the interviewees are on record, which increases reliability of the results. There were seven open-ended questions in the interview form concerning their experiences of co-operation and trust with the suppliers, and how do the buyer-supplier relationships in their point of view affect to the supplier performance. One development engineer interview was performed as well by using the same method.

3.3 Data analysis

As this is mixed methods research, both qualitative and quantitative data are analysed. In this chapter is presented the stages of the data analysis in detail of both quantitative and qualitative data

3.3.1 Quantitative data

The quantitative data was collected by the survey sent to the suppliers. As the survey is completed by using the Likert scale 1-5, the first step of the data analysis is to go through the answers question by question. Webropol shows the percentage distributions, average scores, and median of the answers to each question. Therefore, the analysis is made based on the data the program gives. The questions are divided into categories that are background information, communication, trust, co-operation and continuous improvement, and performance. The categorization allows comparing the responses with each other within the category. Each question and the response distribution are presented in tables in the result chapter. Written analysis is made based on those. Two graphs are presented as well to visualize the distribution of the answers to a question. The purpose of this analysis is to figure out which parts of the buyer-supplier relationship the suppliers are most satisfied with, and in which parts there is most room for improvement. Also, the analysis shows how much the suppliers think the relationship has improved their delivery reliability and quality.

The next step of the quantitative analysis is the Power BI analysis. In this part, there are multiple figures presented of the Power BI reports regarding to delivery reliability, lead times and quality. The figures are grouped according to the product categories. In the analysis, the data of the figures is presented in written format. The analysis presents differences between the categories in the stages of delivery reliability and quality. The figures present the variation of the level of delivery reliability and quality as a bar chart in a period, which are one year and three years in this research. Also, the average levels

of measures, including amount of the orders in a period, are presented in screenshots from the reports. This analysis gives an overview of the situation regarding to delivery reliability and quality among the product categories, but also data for the SPSS analysis.

SPSS analysis is the last step of the quantitative analysis. The data collected by the survey is categorized for the SPSS analysis. Based on the literature review, the basis of effective buyer–supplier relationships are co-operation and open communication (Al-Abdallah et al., 2014). In addition, trust plays a crucial role in establishing strong and long-term partnerships between buyers and suppliers (Al-Abdallah et al., 2014). Therefore, the categories are communication, trust, and collaboration. To ensure that the categories are reliably measuring the same construct, the Cronbach’s Alpha was calculated. The results are presented in table 3.

Table 3. Cronbach’s Alpha

Category	Cronbach's Alpha	N of questions
Communication	0,861	3
Trust	0,882	3
Co-operation	0,803	4

If the coefficient of Cronbach’s Alpha is between 0,80-0,89, it can be considered good, while more than 0,90 would be excellent and below 0,59 not acceptable (Mohd Arof et al., 2018). Therefore, the analysis indicates that all categories demonstrate good internal consistency.

Firstly, a summary table of the average scores by categories from the supplier survey is made. The table helps to perceive the differences in the data between the categories. After that, the data is tested with Kolmogorov-Smirnova test to see if it is normal divided and Pearson correlation coefficient can be used. Then, the Pearson correlation coefficient is calculated first between the suppliers’ own experiences of relationship with Company X, and their experiences if the co-operation has helped them to improve

deliveries and quality. After that, the correlation test is made between the realized data of the suppliers' performance and survey responses. Based on the test, the strength of the correlations can be analyzed. One bar chart and two point graphs are presented to visualize the results. Lastly, regression analysis is calculated between the suppliers' own experiences to see if the good buyer-supplier relationships prevent experience of improved delivery reliability and quality. As a part of the regression analysis, ANOVA is used to assess if the overall regression model significantly improves prediction compared to a baseline model without predictors. To check the robustness of the regression model, multicollinearity, residual normality, and homoscedasticity are tested and the results are presented.

3.3.2 Qualitative data

The first part of the qualitative analysis are the answers to the two open-ended questions in the supplier survey, in which are requested feedback from the suppliers regarding things that are working well in the buyer-supplier relationships, and areas that would need improvement. Based on the answers, a written analysis can be made of the well-functioning aspects and areas for improvement in the buyer-supplier relationships in suppliers' point of view. The open-ended questions give the suppliers a chance to freely give feedback wider than quantitative questions would enable them to.

The wider part of the qualitative data analysis is the interview responses from the three strategic purchasers and the supplier development engineer. The interviews were performed in written format through Teams. Therefore, exact responses from the interviewees are usable for the written analysis. Interviews of the strategic purchasers include seven open-ended questions. The same questions are asked of all the strategic purchasers. The supplier development engineer's interview includes seven open-ended questions that differ from those asked of the strategic purchasers to bring forward different viewpoints from his role. All the interview responses are reviewed in chapter 4.4. The interview questions include the same themes as the supplier survey questions,

such as regarding aspects that are currently working well and not working well in the buyer-supplier relationships, and how the relationships have impacted on the supplier performance in terms of quality and delivery reliability. Especially, the questions related to things that are working well and the areas needing improvement in the buyer-supplier relationships match with the open-ended questions asked from the suppliers, and the results can be compared. By the interviews, one of the research objectives is reached by exploring the purchasers' experiences of the relationship stages. The supplier development engineer interview includes questions such as most important features of a successful buyer-supplier relationship from his point of view, what kinds of impacts he sees between the relationships and supplier performance, and how do Company X acts when some issues regarding supplier performance arise. The interview responses are compared to the data from quantitative analysis, including supplier survey and SPSS analysis, in discussion and conclusions chapter to support the research results.

3.4 Validity and reliability

Validity and reliability are important factors when evaluating the quality of research (Andersson et al., 2024). According to Andersson et al. (2024), validity measures how well the research is measuring what it is supposed to, including functional results. Reliability refers to reliable and reproducible research results (Andersson et al., 2024).

Firstly, the data used in the literature review is from scientific articles and research searched from databases, such as Scopus, Google Scholar and Emerald Insight. Therefore, it can be considered reliable. Overall, what comes to reliability, the research is reproducible for another sample. The steps of the empirical research are presented in the methods chapter so that another researcher could make their own test, upon condition that there is a group of suppliers and data of their performance available. The survey form could be used in the future. Regarding validity, both research questions are responded based on several references, both literature and empirical research made.

Validity and reliability of the data collected by empirical research are considered in next chapters in detail, divided into qualitative and quantitative data.

3.4.1 Quantitative data

The first part of the quantitative data is collected by the supplier survey. To gain honest feedback, the survey was performed anonymously. The survey was sent to suppliers that are in continuous contact with Company X or at least have been in one year since the questionnaire was performed. The suppliers can be considered a reliable source of data from their perspective, which was the purpose of the research stage. When thinking about validity, 47,5 % of 200 respondents give a good overview of the suppliers' experiences, and the results fulfil the objective of this research phase.

The data used in the Power BI analysis can be considered highly trustable. It comes to Power BI straightly from SAP where the up-to-date data of purchases is stored. The purpose of this stage is to collect data of delivery reliability and quality for the duration of the research period. For this purpose, the validity is on a high level. The purchasers use the same data in their everyday work.

As the amount of the respondents to the survey was great, the data gained can be considered valid. However, the results of the correlation test measuring the connection between suppliers' experiences and realized performance is not statistically significant, which for one's part decreases the validity of the response to the second research question. Therefore, this result needs to be considered carefully and as approximate. However, there are other reliable references and test results answering to this research question as well.

3.4.2 Qualitative data

First part of the qualitative data was collected by the open-ended questions in the supplier survey. As the survey was performed anonymously, the suppliers have a freedom to give honest feedback in their own words. The open-ended questions were voluntary to answer to gain as much responses as possible. However, 19 respondents answered to the first of them and 18 respondents answered to the second one. Validity is on a good level as well, as feedback was gained from many respondents to gain different viewpoints.

Interviews are presented in this research anonymously as well. The interviewees are working in the purchasing team. Therefore, they have real time information of the level of the buyer-supplier relationships. Their answers can be considered reliable, and they are supporting the purpose of the research to notice the purchasers' viewpoint as well.

4 Results

In this chapter, the results of the empirical research are presented. First, in chapters 4.1, 4.2, and 4.3, the survey results and analysis, the interview results analysis, and the Power BI data analysis are presented. Then, in chapter 4.4, the SPSS analysis is made, and the results are presented by correlation and regression analysis. Lastly, in chapter 4.5, comparison and overview of all empirical results is presented.

4.1 Survey results and analysis

In this chapter is answered to the first research question: “How do the suppliers of the spare part purchasing team find the co-operation and trust with the company X?” based on the survey responses. The survey was sent to 200 suppliers, of which 95 responded. Therefore, the response rate is 47,5 %. According to Wu et al. (2022), an average response rate of online questionnaires in educational research is 44,1 %. Therefore, the response rate gained is close to the average score but slightly higher.

4.1.1 Background information

There were three background information questions in the survey. The purpose of these questions was mainly grouping for further analysis, but also to see if there are differences between the answers due to the length of the buyer-supplier relationship or the frequency of supplying parts for Company X. The background information questions and response distribution are presented in table 4.

Table 4. Survey background information.

Which product category do you primary supply for Company X?	n	Percent
Turned & Machined Parts & Pipes	40	42,1 %
Carbon Steel Weldments	15	15,8 %

Which product category do you primary supply for Company X?	n	Percent
Insulation and Vibration	19	20,0 %
MRO	17	17,9 %
Other	36	37,9 %
How often do you supply parts for company X?	n	Percent
Regularly (weekly or more often)	54	56,8 %
Fairly regularly (about once a month)	19	20,0 %
Occasionally (less than once a month)	22	23,2 %
How long have you been supplying parts for company X?	n	Percent
Less than one year		,0 %
1-5 years	1	1,1 %
More than 5 years	94	98,9 %

The first question monitors the number of suppliers providing different product categories. There are four product categories and an alternative “other”, as the purchasing teams is buying also some materials that are not part of any of the categories. Most of the respondents, 42,1 %, chose category turned and machined parts and pipes. It is the biggest category of the supply team, so the result was predictable. However, the next most chosen category is “other”, and 36 respondents have chosen it. The result is not in line with the real number of suppliers supplying products that do not belong to any of the categories. The explanatory reason for the result might be that as there are 95 respondents and 127 answers to this question. Therefore, many of the respondents have chosen more than one of the options. Some suppliers are providing parts that belong to more than one category, and some respondents were possibly not sure which category they should choose. However, this issue was tried to avoid by adding the descriptions of the categories to the survey. Third most, 20 % of the respondents, announced belonging to category insulation and vibration. 17,9 % of respondents are delivering parts belonging to category MRO, and 15,8 % carbon steel weldments.

Most of the respondents, 58 %, are supplying parts for Company X weekly of more often. 20 % deliver about once a month, and 23 % less than once a month. Almost all the respondents have been supplying parts for the company more than 5 years. Only one

supplier replied that they have been supplying one to five years, and no one less than one year. Therefore, the results of the survey can be considered to being from long-time suppliers of Company X.

4.1.2 Communication

There were three questions in the communication section. The questions and the distribution of responses are visible in table 5 below.

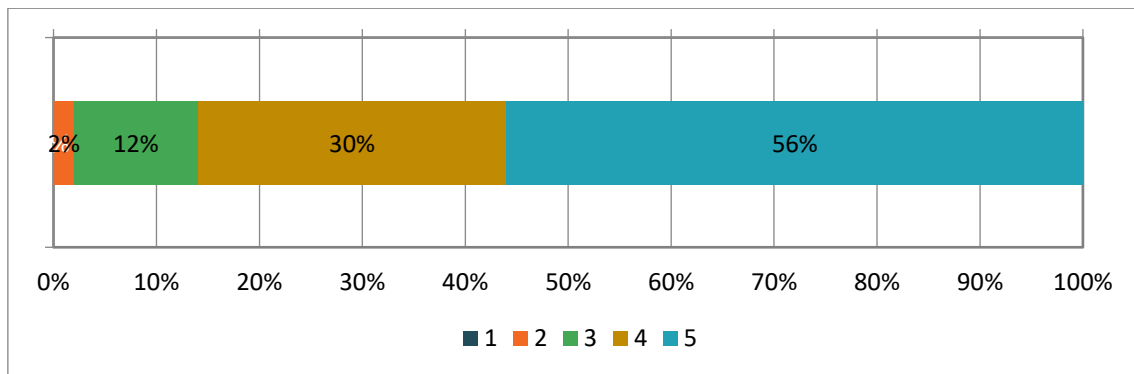
Table 5. Distribution of responses to communication-related questions.

Statement	1	2	3	4	5	Avg.	Mdn.
Communication with the company's purchasing team is fluent.	,0 %	2,1 %	15,8 %	47,4 %	34,7 %	4,1	4,0
Company X's purchasing team responds promptly to inquiries and issues.	,0 %	5,3 %	10,5 %	50,5 %	33,7 %	4,1	4,0
Changes in orders or schedules are communicated in a timely manner.	1,0 %	5,3 %	13,7 %	45,3 %	34,7 %	4,1	4,0

Based on the results, communication between Company X and the suppliers is on a good level. In all communication related questions, concerning fluency, promptly, and communication of changes in a timely manner, the average of the responses is 4,1 and median is 4 on Likert-scale 1-5. After 4, the most chosen rank was 5 in all questions. Only one supplier had selected value 1 in the question concerning information sharing of changes on time. In other questions, no one had chosen alternative one.

4.1.3 Trust

Regarding trust, there are three statements in the survey. The first of the questions is if the supplier can trust Company X as a partner. The distribution of the responses is presented in picture 1. The company received a high score of this question, as the median of the answers is 5 and the average score is 4,4. Only two percent points of the respondents chose rate 2 out of five.



Picture 1. "We can trust in Company X as a partner".

The second trust-related question concerns sharing relevant information transparently with suppliers. The average score of the answers is 4,1, and median 4,0. The last statement in this section is related to if the suppliers feel that they can openly discuss with the purchasers of the concerns or issues without a fear of unpleasant followings. Concerning the statement, the median is 4,0, and the average of the responses is 4,3. No score of 1 point was given in the trust section. As a summary, trust towards Company X and the purchasing team is on a very good level in the suppliers' point of view. The distribution of the all responses by categories related to trust-related questions is visible in table 6.

Table 6. Distribution of responses to trust-related questions.

Statement	1	2	3	4	5	Avg.	Mdn.
We can trust in Company X as a partner.	,0 %	2,1 %	11,6 %	30,5 %	55,8 %	4,4	5,0

Statement	1	2	3	4	5	Avg.	Mdn.
Company X shares relevant information transparently with us.	,0 %	3,2 %	20,0 %	40,0 %	36,8 %	4,1	4,0
We can openly discuss problems or concerns with the company's purchasers without fear of negative consequences.	,0 %	3,1 %	11,6 %	40,0 %	45,3 %	4,3	4,0

4.1.4 Co-operation and continuous improvement

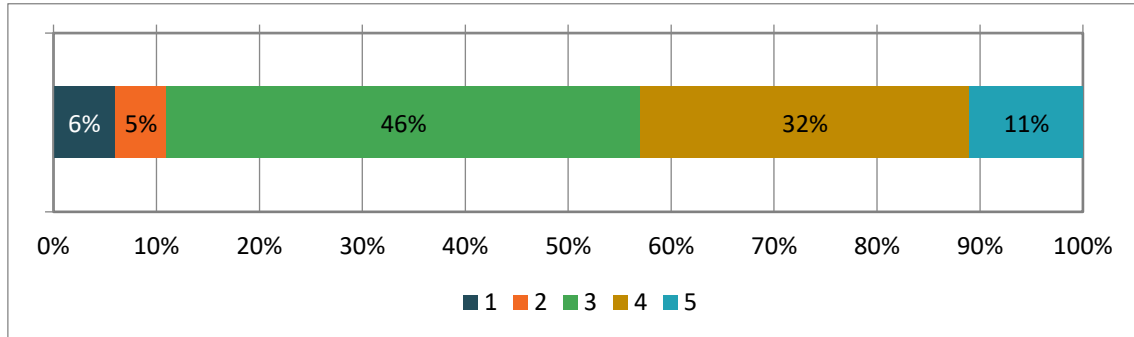
Concerning co-operation and continuous improvement there are four statements in the survey. The statements and the response distribution are presented in table 7.

Table 7. The distribution of survey responses concerning co-operation and continuous improvement.

Statement	1	2	3	4	5	Avg.	Mdn.
Company X involves us in discussions and shares information about innovations and future improvements.	6,3 %	5,3 %	46,3 %	31,6 %	10,5 %	3,3	3,0
Our feedback is taken seriously and acted upon.	1,1 %	2,1 %	24,2 %	48,4 %	24,2 %	3,9	4,0
We consider Company X as a long-time strategic partner rather than just a customer.	2,1 %	3,2 %	6,3 %	27,4 %	61,0 %	4,4	5,0
We are satisfied with the collaboration with Company X.	1,0 %	3,2 %	10,5 %	35,8 %	49,5 %	4,3	4,0

Concerning continuous improvement, the first statement of this section is related to how well the company shares information about innovations and future improvements and include suppliers in discussions about them. The distribution of the responses to the questions is presented in picture 2. This question gained the lowest score of the survey.

The average of responses is 3,3 and median 3. Also, 6,3 % of the respondents has chosen option 1. The results clearly show that there is a room for improvement in this matter.



Picture 2. “Company X involves us in discussions and shares information about innovations and future improvements”.

The next statement concerning taking suppliers’ feedback seriously and making actions based on it gained quite good score with the average of 3,9 points and median 4. However, this might need improvement as well. Clearly most of the suppliers see Company X rather a long-time partner than just a customer. The median of the answers is 5, and 89 % of the respondents have chosen 4 or 5. Most of the suppliers are also satisfied with the collaboration with Company X.

4.1.5 Performance

Concerning performance, there are two statements in the survey. The statements and the response rate are showed in table 8. The first one; “Collaboration with the company helps us improve our delivery reliability”, got an average score of 4,1, and median 4. However, most of the respondents, 37 %, chose grade 5. None of the suppliers chose grade 1. Based on this result can be concluded that the suppliers feel that buyer-supplier relationship with Company X has helped to increase their delivery reliability.

Table 8. Survey responses to questions related to improved delivery reliability and quality.

Statement	1	2	3	4	5	Avg.	Mdn.
Collaboration with Company X helps us improve our delivery reliability.	,0 %	4,2 %	23,2 %	35,8 %	36,8 %	4,1	4,0
Collaboration with Company X supports our ability to deliver high-quality products.	,0 %	5,2 %	13,7 %	35,8 %	45,3 %	4,2	4,0

The other performance-related question is similar but related to quality. The results are close to the results of the delivery reliability -question, but this question got slightly better score. The average score is 4,2, and 45 % of respondents chose grade 5. Based on this result, collaboration with Company X has helped the suppliers to improve the quality of their products.

4.1.6 Open-ended questions

In the end of the survey, there are two open-ended questions, of which answering was voluntary. The first of these questions is “What are the strengths in collaboration with Company X?”. Of 95 respondents, 19 answered to this question. Especially, communication and long-term partnership were mentioned in many responses. Communication was described to be open and fast. This is a good result, because as stated in the literature review, buyer-supplier relationships should be based on communication and co-operation, and the quality of shared information is one way towards developed lead times (Al-Abdallah et al., 2014). One of the suppliers described the strengthen relationship during the years, during which has been learnt the best solutions in different situations and for different problems, they have gained experience and expertise, and how to handle the urgent situations. Deep relationships are a way to improved lead times as well (Al-Abdallah et al., 2014). Reliability and flexibility were highlighted in some comments. As an example, flexibility was mentioned concerning delivery times that both parties can adapt if possible. Few of the respondents mentioned

of being proud of being a supplier of Company X. One of the respondents had mentioned Company X's real caring of the employees' safety. Company X is putting a lot of effort into the safety theme and seems that it has been visible for the suppliers as well.

One response stands out with its length and accuracy. The supplier is describing how they are helping Company X to improve their performance: *"As a tower internals supplier with a long-term and stable cooperation with Company X, our advantages in working with them include: 1. **Proven Reliability**: Our consistent delivery of high-quality tower internals has ensured reliable operations for the company's systems. 2. **Customized Solutions**: We offer tailored tower internals that meet the company's specific requirements, enhancing the efficiency and performance of their processes. 3. **Technical Expertise**: Our team's in-depth knowledge and experience in tower internals contribute to innovative and effective solutions for the company. 4. **Timely Support**: We provide prompt technical support and after-sales service, ensuring any issues are addressed quickly to minimize downtime. 5. **Cost-Effective**: Our efficient production and supply chain management help deliver cost-effective solutions without compromising on quality. 6. **Continuous Improvement**: We are committed to continuous improvement, working closely with the company to enhance our products and services based on their feedback and evolving needs. Good quality, competitive price".*

The second open-ended question was "What areas of co-operation could be improved?". For this question, 18 responses were received. Among the responses, the repeating theme was concerning innovations, projects, and new products, and suppliers' involving in them. Many suppliers also hoped to get possibilities to discuss and supply more for Company X. In a couple of responses, speed and communication in a timely manner had been mentioned as a need for improvement. One supplier hoped more feedback from Company X's side about their products, and information of the incoming innovations in the industry.

“There is no real way for smaller suppliers to give suggestions of improvement. Purchasers are not interested and there is no connection to designers”. This comment reflects a smaller suppliers’ feeling that they have not possibilities of suggesting improvements, and it correlates with results of future improvements and innovation related multiple choice question. The question got the lowest grade from the suppliers in the survey. In the literature review turned out that one way to increase satisfaction of the suppliers is to show appreciation towards their innovations (Ganguly, 2021), and new innovations increase the suppliers’ performance as they can improve their competitive advantage (Tarigan et al., 2020). Therefore, open discussion about innovations and future improvements and involving suppliers in it is needed. Suppliers should feel that their suggestions are listened and respected.

“Suppliers are required to spend a lot of time preparing all kinds of reports (e.g. PQAP, cleanliness of components etc.) and participating in continuous Teams meetings. At least compared to other large industrial customers. As a small subcontractor, these take up a disproportionate amount of time. For example, Teams meetings could be held a little less frequently, unless there is a special reason to organize them”. One supplier raised up the unnecessary frequency of meetings that they are expected to take part, if there is nothing special ongoing. Also, the supplier feels that preparing the requested reports takes a lot of time.

“Visibility (advance order issuance, forecast improvement,...) for a better handling and balancing if high up/down trend of order volume occurred - optimization of minimum / typical batch But regarding these points, improvement actions have been already taken and we are feeling already the results”. Even though many respondents had given positive feedback about the openness and fairness, some suppliers feel that visibility could still be improved. In this case, the supplier feels that some improvements have already been done, and the results are visible.

4.2 Power BI data analysis

In this chapter is presented the Power BI data analysis based on the data that the purchasers use in their daily tasks to follow the suppliers' performance. The data showed in the next chapters is firstly showed concerning the situation of the whole supply team and then divided into groups according to the supply product categories. The data collected is from a calendar year between the beginning of March in 2024 to the end of February 2025 to make it comparable with the suppliers' survey answers and to make observations of the recent situation. To make observations of the development during the one-year period, the same data is presented also from a three-year period in the whole supply team level.

4.2.1 Delivery reliability and lead time

In figure 2 is showed the delivery reliability of the suppliers of the whole supply team in one year period between the beginning of March 2024 and the end of February 2025. The X axis shows the situation month by month, and in Y axis is visible the delivery reliability percentage. Also, the number of deliveries by monthly is presented in the bar chart. As visible from the bar chart, the delivery reliability has stayed between 80 percent and 92 percent whole year, but the trend has been slightly decreasing. The number of deliveries seems to be slightly increasing if compared to the last summer. In March 2024 there were 1796 deliveries, and in February 2025 the number of deliveries was 2025. The February's number was the highest during the one-year period.

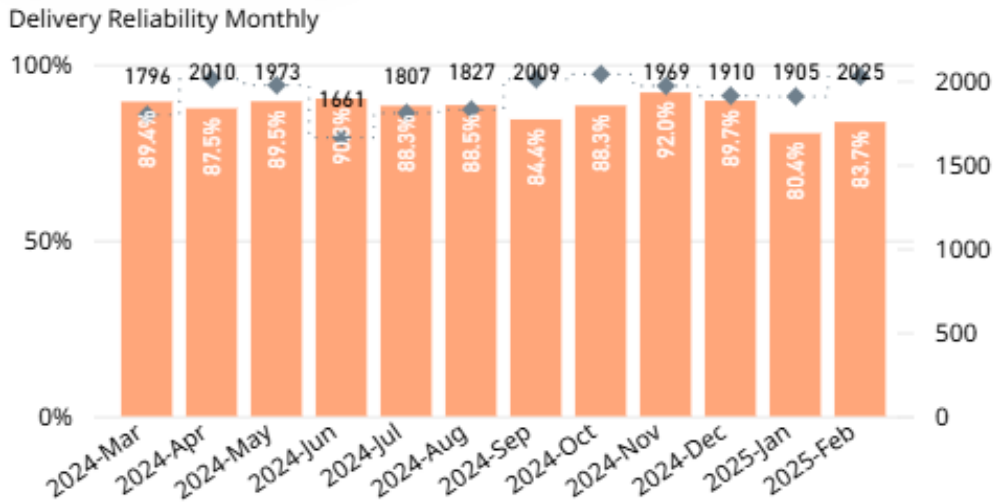


Figure 2. Delivery reliability in one year.

In picture 4 the average delivery reliability of all the supply categories is presented. The total number of deliveries during the year was 22 930, of which 2842 were late. Therefore, the average percentage of delivery reliability is 87,61 %.

Category	Delivery Reliability	Deliveries	Deliveries Late	Confirmation Coverage
Y03 - Turn&MachPa &Pi...	86.27%	9328	1281	99.94%
Y15 - Insul & Eng.Coolrs	92.25%	5637	437	99.89%
Y30 - MRO Production	85.19%	4995	740	99.48%
Y06 - Carbon steel weldm	87.30%	2173	276	100.00%
Y05 - Pistons& Cyl Liner	99.01%	202	2	100.00%
Y07 - Small & Med Cast	82.35%	136	24	100.00%
Total	87.61%	22930	2842	99.78%

Picture 3. Total delivery reliability in one year.

To compare the current situation to the situation of a longer period, in figure 3 is presented the delivery reliability month by month from a three-year period since the beginning of March 2022. As visible from the bar chart, there have not been big changes. The delivery reliability percentage has mostly remained slightly above 80 percent over the years. The lowest delivery reliability measured during the period was in August 2022,

that is 69,6 %. In the chart can be seen that in both years 2022 and 2023 the delivery reliability was as its lowest in August. In year 2024, the pattern did not repeat completely, but the delivery reliability was at lowest in September. Significant reason for the phenomenon is the suppliers' summer breaks.

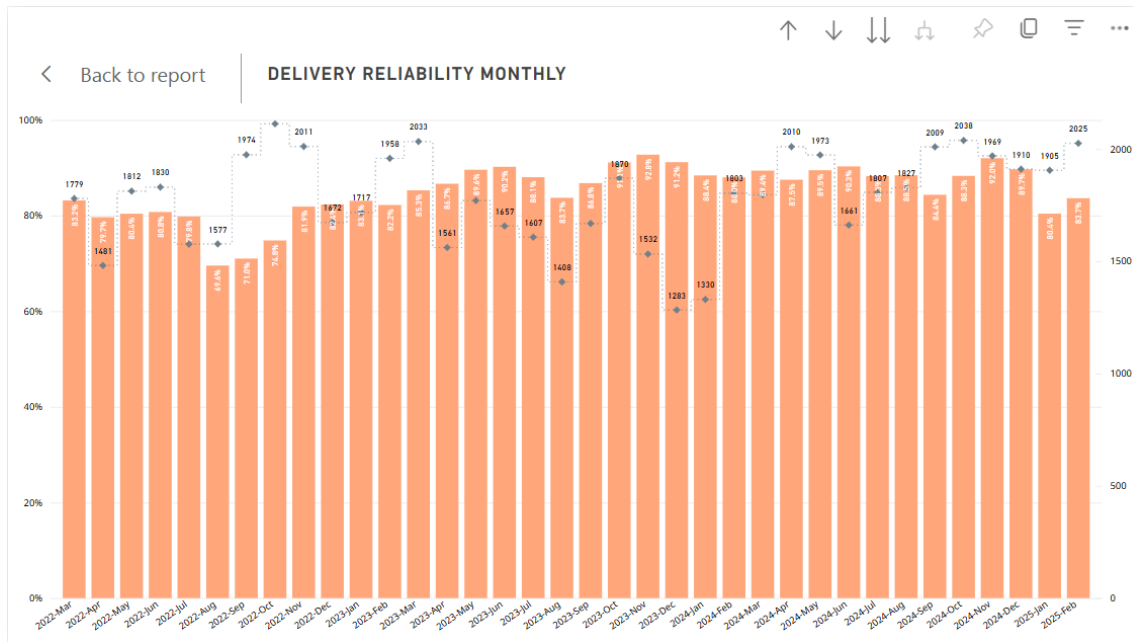


Figure 3. Delivery reliability in three years.

In picture 4 the overall number of deliveries from the past three years is presented, that is 63 951. In addition, the average delivery reliability percentage was 84,99%. Compared to this number, the average delivery reliability percentage is almost three percentage points higher during the past year than over a period of three years. As a conclusion can be seen that there has been improvement in delivery reliability.

Category	Delivery Reliability	Deliveries	Deliveries Late	Confirmation Coverage
Y03 - Turn&MachPa &Pi...	84.06%	24769	3949	99.90%
Y15 - Insul & Eng.Coolrs	88.50%	16691	1920	99.88%
Y30 - MRO Production	83.23%	13980	2344	99.40%
Y06 - Carbon steel weldm	85.20%	6054	896	99.97%
Y05 - Pistons& Cyl Liner	92.44%	569	43	100.00%
Y85 - OuantiParts	68.47%	444	140	98.42%
Total	84.99%	63951	9602	99.73%

Picture 4. Total delivery reliability in three years.

In figure 4 is presented the averages of lead times of the whole supply team by monthly. In the bar chart, light grey presents agreed lead times of the materials, orange presents requested lead times on the purchase orders, dark grey presents the lead times confirmed by suppliers, and dark blue shows the realized lead times on deliveries. First, lead times agreed are significantly shorter than the requested, confirmed, and delivered. As a positive aspect, the lead times requested is the highest number in most of the months. However, in some months, the confirmed lead times has been slightly longer than the requested ones. Also, in every month, the realized lead times are shorter than the confirmed lead times, which refers to suppliers' ability to deliver as they have promised or faster. Overall, the lead times have been stayed mostly between 40 and 60 days. There is some varying between the months, but the lead times promised and realized correlate with the requested lead times. Especially, in May and in August the lead times have been longer. During the year, the average lead times are: Agreed 36 days, requested 54 days, confirmed 52 days, and delivered 50 days.

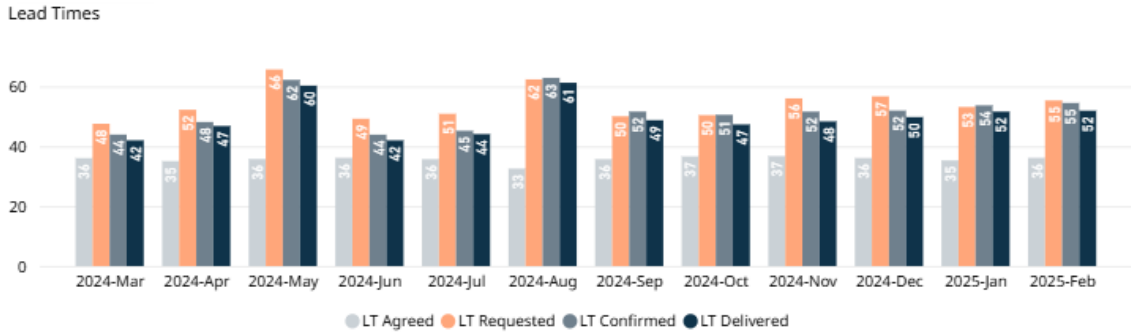


Figure 4. Lead times in one year.

4.2.2 Quality

In figure 5 is visible the quantity of quality notifications of all product categories month by month in one year. The total number of notifications in year is 157, which is 0,68 % of all deliveries. The number of notifications per month has varied during the year.

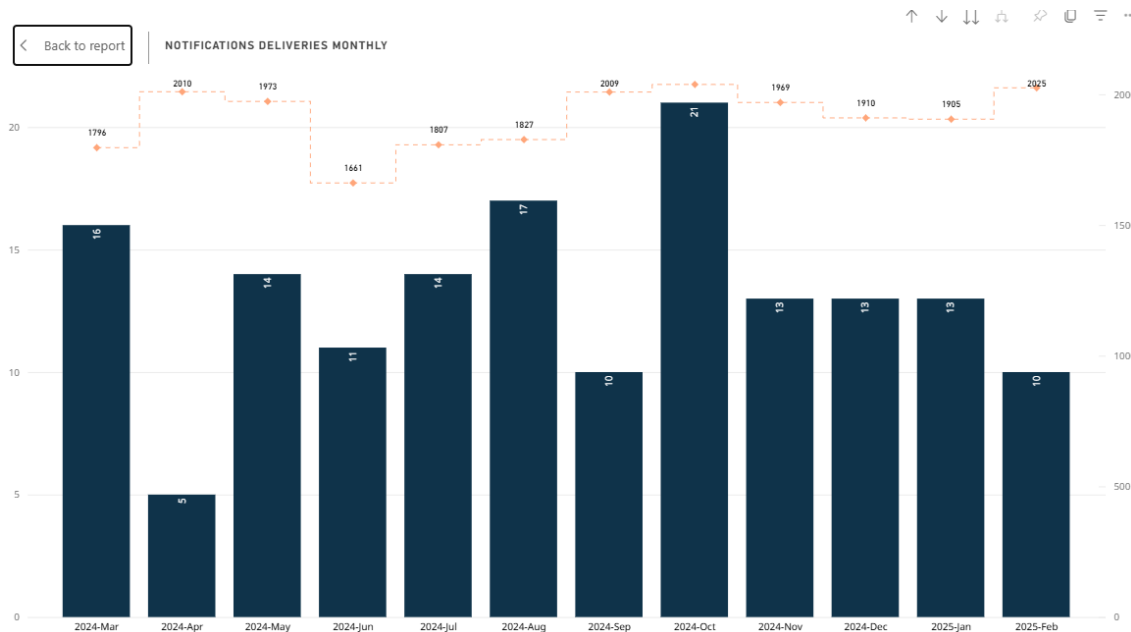


Figure 5. Notifications by monthly.

Compared to the data from the past three years, the number of notifications has stayed very stable. In three years, there have been 429 notifications, which means a defect ratio

of 0,67 % of all orders. The difference compared to the percentage of latest year is only 0,01 percent, even though in the bar chart there is visible significant varying between months. The number of quality notifications month by month is presented in figure 6 below.

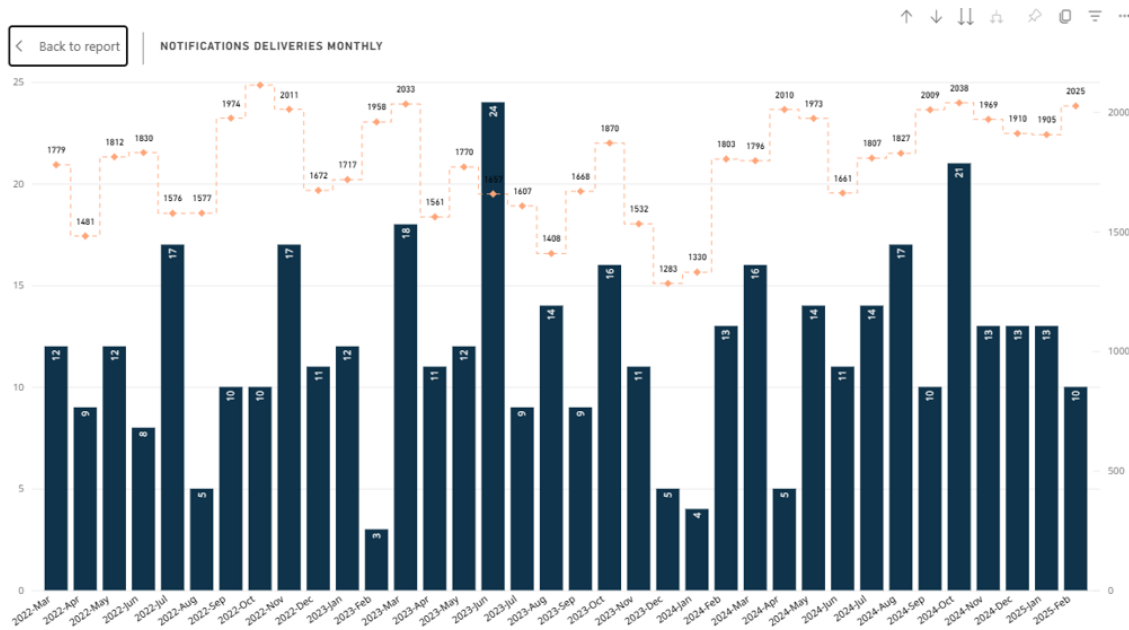


Figure 6. Quality notifications in three years.

4.2.3 Comparison between supply categories

In this chapter, the situation of each supply product category is presented. By this comparison, it is possible to find if there are differences between the delivery and quality performance in supplying of different product types. In addition, the data handled in this chapter is later compared to the survey results.

4.2.3.1 Category Y03

In category Y03, turned and machined parts and pipes, the average delivery reliability percentage for one year has been 86,27 %. It is very close the delivery reliability of all

categories as the difference is only slightly over one percent. It has stayed stable during the year. The total amount of deliveries was 9328, of which 1281 were late. In quality side, there were overall 69 claims in year. It means defect ratio of 0,74 %, which is slightly more than the defect ratio of all categories, but still close to it.

4.2.3.2 Category Y06

In category Y06, carbon steel weldments, the total number of deliveries was 2173, of which 276 were late. It means delivery reliability of 87,30 %. In this category, the delivery reliability is slightly better than the overall delivery reliability, but the varying between months has been greater. Especially, in August, it has dropped to 66,4 %. It is probably due to the suppliers' summer holidays and breaks in production, but which is interesting the phenomenon is not visible in other product categories. The bar chart is presented in figure 7.

Delivery Reliability Monthly

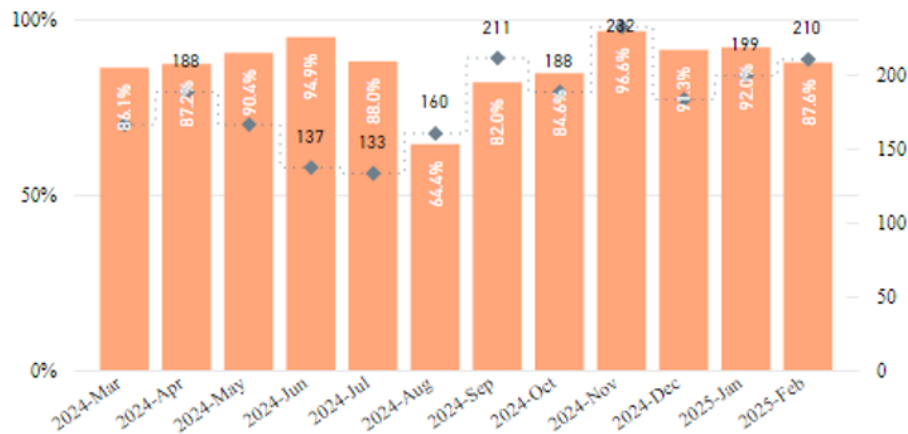


Figure 7. Delivery reliability category Y06.

Regarding quality, there were 10 claims in one year. It is 0,46 % of all purchase orders, which is significantly less than in all categories altogether.

4.2.3.3 Category Y15

In category Y15, insulation and vibration, the average delivery reliability of the year was 92,25 %. It is significantly higher than the average of all product categories. As can be seen from the figure 8 below, it has stayed stable the whole year. The lowest value was measured in April 2024 which was still close to 90 %.

Delivery Reliability Monthly

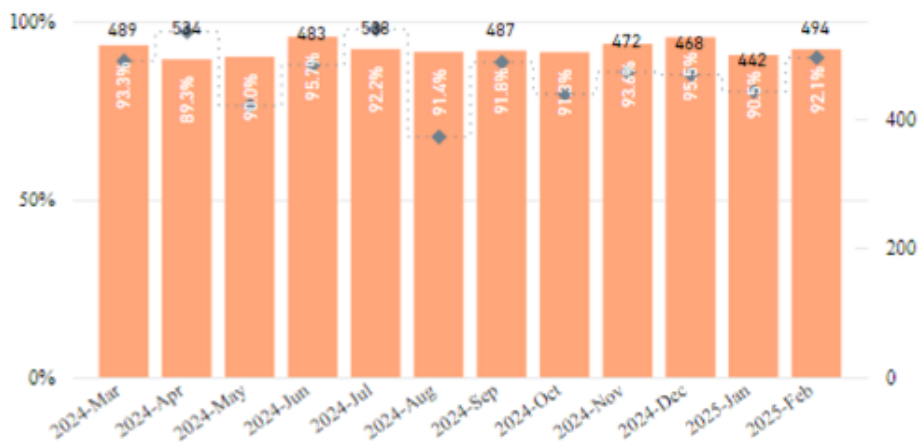


Figure 8. Delivery reliability category Y15.

On the quality side, there were 24 claims in one year. It is 0,43 % of all orders, which is also less than all categories' amount. However, it is close to the category Y06's situation.

4.2.3.4 Category Y30

Delivery reliability in category Y30, MRO, was 85,19 % on average. It is a couple of percentage points lower than the average of all categories. However, there were notable differences between months as visible in figure 9. It varied between 69,4 % and 91,7 %, and the trend seems to be decreasing during the period of measurement. The lowest delivery reliability was measured in January 2025, and in February it seems to be increasing again.

Delivery Reliability Monthly

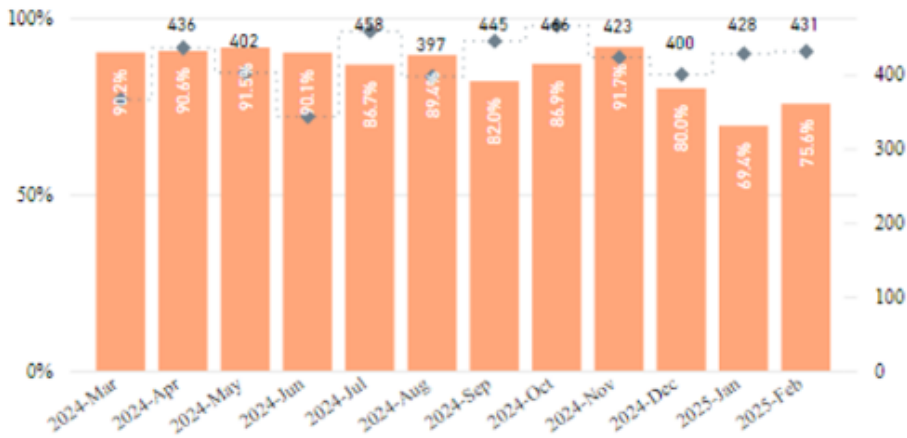


Figure 9. Delivery reliability category Y30.

In category Y30, the defect ratio of claims was 0,92 %, which is significantly more than the average of the whole supply team. However, there were variation between months as visible in figure 10. For example, in November 2024 there was only one notification, as in October the number was 10.

Notifications Deliveries Monthly

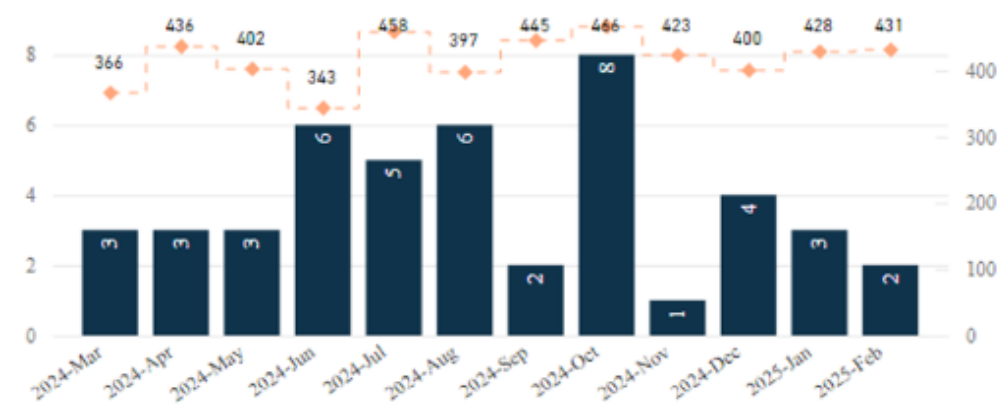


Figure 10. Notifications category Y30.

4.2.3.5 Other categories

In this chapter is presented the supply team's statistics without the suppliers belonging to categories in the previous chapters. Delivery reliability was 86,45 % on average in a year, which is slightly lower than all categories' delivery reliability. There was varying during the year between 80,4 % and 95,2 %, as can be seen in figure 11. Which needs to be considered concerning the other categories explored in this chapter is the small number of deliveries compared to the other categories.

Delivery Reliability Monthly

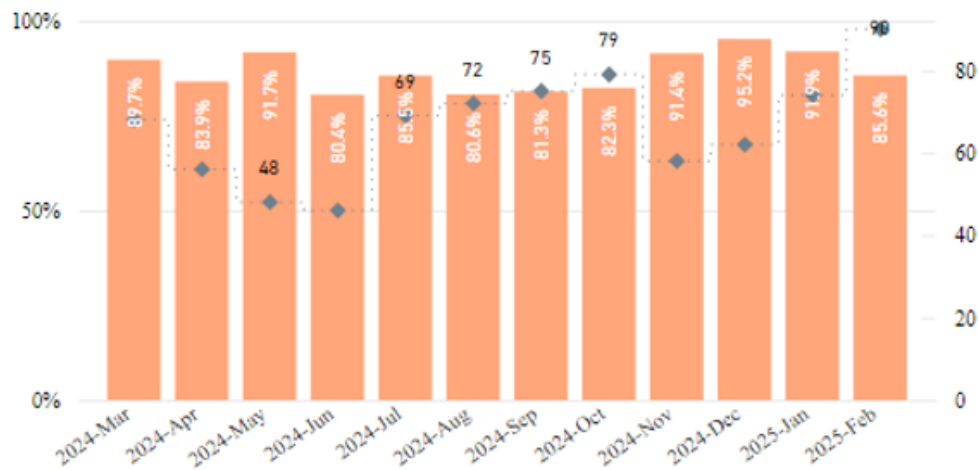


Figure 11. Delivery reliability in other categories.

On the quality side, there were not many claims during the year. The number of them was six, which means defect ratio of 0,74 %. It is close to the average of all categories.

4.3 SPSS analysis

In this chapter, the SPSS analysis is made based on the survey results. The results are also compared to the Power BI data of delivery reliability and quality to explore if there is correlation to be found between the level of co-operation, communication, and trust,

and the level of delivery reliability and quality. The challenge with the analysis is that the survey was completed anonymously to maximize the number of responses and to gain honest feedback. Therefore, the survey results cannot be compared to the Power BI data at the individual supplier level, but they need to be grouped. The grouping lowers the statistical significance of the results, as there are only five product category groups. Some respondents have chosen more than one of the product categories in the survey, which makes grouping even challenging, as the suppliers' grouping in the company's system might differ from their selection. However, from the results can be seen indicative observations. In addition, correlations are calculated between the suppliers' own answers to collect statistically significant data, and to examine what kind of connections there are between the suppliers' own perceptions of the level of the relationship dimensions and their feelings if the buyer-supplier relationship with Company X has helped them to increase their performance.

To perform the analyses, the data from the survey was grouped according to the themes of the survey sections. In table 9 is presented the number of survey responses by categories, the average scores of the survey responses related to communication, trust, and collaboration, and the delivery reliability and the quality notification percentages in one year by categories. The average scores by categories are calculated in SPSS. On the bottom line, the average scores of all categories are presented.

Table 9. Survey responses by categories.

Category	N (respondents)	Avg Communication	Avg Trust	Avg Collaboration	Avg Delivery Reliability (%)	Avg Notifications defect ratio (%)
Y03	40	4,22	4,23	3,99	86,27 %	0,74 %
Y06	15	3,91	4,16	3,89	87,30 %	0,46 %
Y15	19	3,91	4,16	3,89	92,25 %	0,43 %
Y30	17	3,96	4,20	3,90	85,19 %	0,92 %
OTHERS	36	4,11	4,34	4,14	86,45 %	0,74 %
ALL	95	4,02	4,22	3,96	86,49 %	0,66 %

As visible from the table, there are no big differences in given scores between the categories. However, category Y03 has gained the highest score from communication related questions, and category “others” from trust and collaboration categories. Categories Y06 and Y15 have gained the lowest scores in all sections.

To perform the analyses, the data was tested by Kolmogorov-Smirnov test to see if it is normal divided. The results of the test are presented in table 10.

Table 10. Kolmogorov-Smirnova test.

	Kolmogorov-Smirnov ^a		
	Statistic	df	Sig.
Avg Communication	0,276	5	,200
Avg Trust	0,253	5	,200
Avg Collaboration	0,334	5	0,07
Delivery Reliability (%)	0,328	5	0,085
Notifications defect ratio (%)	0,253	5	,200

$P > 0,05$ means that the data is normal divided, and it is implemented with all variables. Therefore, the data can be considered as normal divided.

4.3.1 Correlation

In this chapter, the correlation analyses are presented. Firstly, Pearson correlation coefficient was calculated to see if there is correlation between the communication, trust, and collaboration variables defined in the previous chapter, and the suppliers' experiences if they feel that collaboration with Company X has helped them to increase their delivery or quality performance. Based on the literature review, the following hypotheses were made:

H1: There is a positive correlation between communication with Company X and the supplier's perceived improvement in delivery reliability.

H2: There is a positive correlation between communication with Company X and the supplier's perceived improvement in quality.

H3: There is a positive correlation between trust in Company X and the supplier's perceived improvement in delivery reliability.

H4: There is a positive correlation between trust in Company X and the supplier's perceived improvement in quality.

H5: There is a positive correlation between collaboration with Company X and the supplier's perceived improvement in delivery reliability.

H6: There is a positive correlation between collaboration with Company X and the supplier's perceived improvement in quality.

The results calculated in SPSS are presented below in table 11.

Table 11. Pearson correlation coefficient: Survey responses and suppliers' experiences.

		Collaboration with company X helps us improve our delivery reliability.	Collaboration with company X supports our ability to deliver high-quality products.
Communication_avg	Pearson Correlation	,547**	,572**
	Sig. (2-tailed)	<,001	<,001
	N	95	95
Trust_avg	Pearson Correlation	,549**	,617**
	Sig. (2-tailed)	<,001	<,001
	N	95	95
Collaboration_avg	Pearson Correlation	,652**	,700**
	Sig. (2-tailed)	<,001	<,001
	N	95	95

** . Correlation is significant at the 0,01 level (2-tailed).

The results are statistically significant as $p < 0,001$. Therefore, all the hypotheses are supported. Related to communication, the results indicate moderate correlation with

the increased delivery reliability and quality. Between trust and delivery reliability exist moderate correlation as well, and between trust and quality the level of correlation is strong. Between collaboration and delivery reliability, and between collaboration and quality there is strong correlation. The results highlight the importance of collaboration to improve supplier's delivery reliability and quality, but all the other dimensions have a correlation with the suppliers' feeling of increased delivery reliability and increased quality as well.

Next, correlation analysis is presented between the grouped survey responses and Power BI data. In this analysis, the hypotheses compared to the realized supplier performance. The hypotheses are the following:

H7: Higher communication is associated with better delivery reliability.

H8: Higher communication is associated with fewer number of notifications.

H9: Higher trust is associated with better delivery reliability.

H10: Higher trust is associated with fewer number of notifications.

H11: Higher collaboration is associated with better delivery reliability.

H12: Higher collaboration is associated with fewer number of notifications.

To test these hypotheses, Pearson correlation coefficients were calculated using average scores of survey responses related to communication, trust, and collaboration, and the delivery reliability and quality notification percentages in one year by categories. The results are presented in table 12.

Table 12. Pearson correlation coefficient: Survey responses and realized delivery reliability and quality.

		Delivery Reliability (%)	Notifications defect ratio (%)
Avg Communication	Pearson Correlation	-0,46	0,478
	Sig. (2-tailed)	0,435	0,416
	N	5	5

		Delivery Reliability (%)	Notifications defect ratio (%)
Avg Trust	Pearson Correlation	-0,43	0,483
	Sig. (2-tailed)	0,47	0,41
	N	5	5
Avg Collaboration	Pearson Correlation	-0,323	0,324
	Sig. (2-tailed)	0,596	0,595
	N	5	5
	N	5	5

** . Correlation is significant at the 0,01 level (2-tailed).

According to the analysis, the correlations between the relationship variables and hypotheses H7, H9, and H11 concerning delivery reliability are all negative, which means that they are not supported. However, the results are not statistically significant as $p > 0,05$, and the results might be accidental. The correlations between the relationship variables and notification defect ratio are all positive: 0,478 for communication, 0,483 for trust, and 0,324 for collaboration. These results do not support the hypotheses as well. As with the previous results, the correlations are not statistically significant when $p > 0,05$. As an outcome, all six hypotheses can be rejected. However, it is important to note that the small number of categories limits the reliability of the findings. Also, the small differences between the survey responses between categories are notable and might explain the result. The comparison was made with the Power BI data, which explains the difference to the results of the other analysis made between the suppliers' experiences. In the supplier survey, many suppliers selected more than one category, and the grouping probably does not completely match with the grouping of company's Power BI data. To visualize the distributions, the following graphs are presented. The first chart in figure 12 demonstrates the averages of the response scores to questions regarding communication, trust, and collaboration by categories. The average scores are close to each other and around four. The graph shows that in all categories the questions

related to trust have gained highest scores. Depending on the category, there is small variation, is the score of communication or collaboration higher.

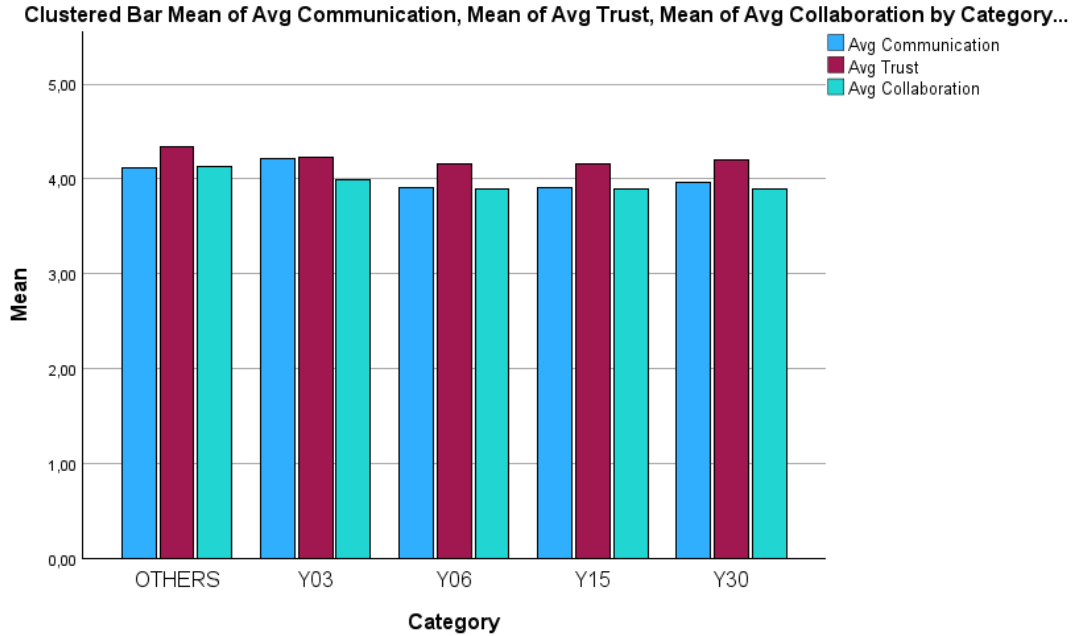


Figure 12. Mean of communication, trust, and collaboration by categories.

Because the results of the correlation test are surprising and statistically not significant, the charts below are presented to visualize the distribution of the observations. In figure 13, the average scores of trust, collaboration and communication related questions are compared to the realized delivery reliability. The categories are marked to the chart to visualize the distribution.



Figure 13. The average scores of trust, collaboration and communication related questions compared to the realized delivery reliability.

The chart supports the results of the correlation test. For example, category Y30 has the lowest delivery reliability percentage of the categories and category Y15 has the highest. However, the categories are placed close to each other in the chart when looking at the levels of communication, collaboration, and trust. Category “others” have placed on very high level in terms of trust, but in terms of delivery reliability it is placed in the middle of the categories. Y06 and Y15 have the lowest scores of the supplier survey responses, but these categories have the two best delivery reliabilities.

In next chart in figure 14, the average scores of trust, collaboration, and communication are compared to realized defect ratio of notifications. Categories are marked to the chart to visualize the difference between them. The results of the previous analysis are visible from the chart.

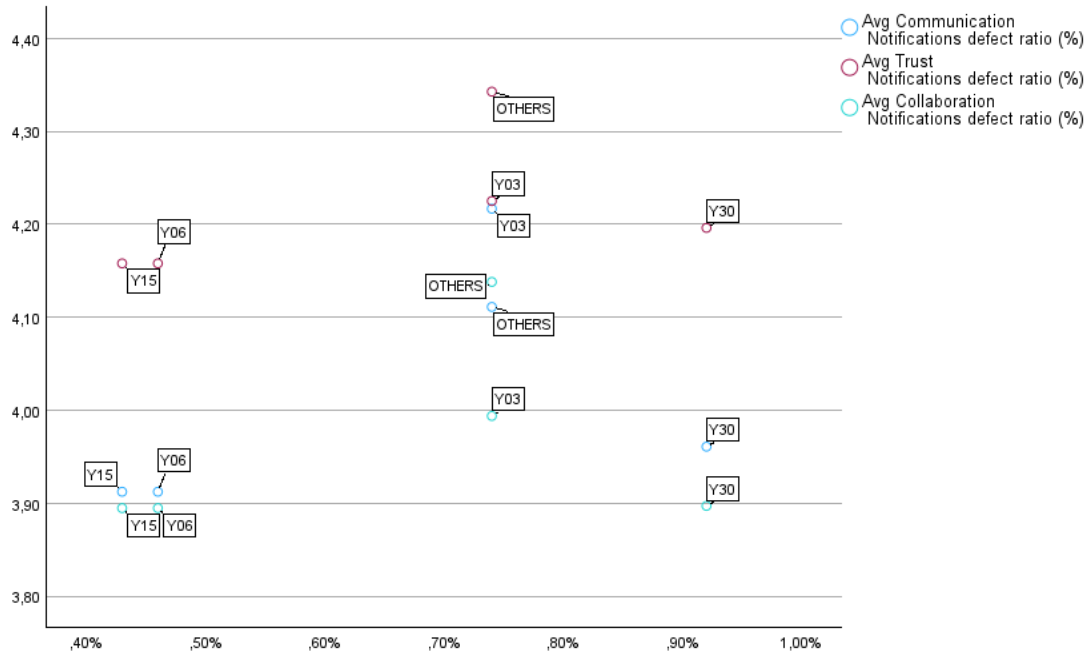


Figure 14. The average scores of trust, collaboration and communication related questions compared to the realized quality.

In this chart, Y15 has gained lowest scores in the supplier survey, but it has least notifications. Y06 is very close to Y15 in both measures. Categories Y03 and others are placed in the middle in the terms of notification defect ratio, and they have gained highest scores from the survey. Y30 has most notifications, and in the survey responses it has placed in the middle of the categories.

4.3.2 Regression analysis

In this chapter, the regression analyses are presented. First, the analysis is calculated between delivery reliability and co-operation, communication and trust. Based on the literature review can be assumed that better communication, trust, and collaboration have a positive impact on delivery reliability (Tarigan et al., 2020; Al-Abdallah et al., 2014). Therefore, the hypotheses are the following:

H1: Better communication with Company X is positively related to suppliers' perceived improvement in delivery reliability.

H2: Better trust in the relationship with Company X is positively related to suppliers' perceived improvement in delivery reliability.

H3: Stronger collaboration with Company X is positively related to suppliers' perceived improvement in delivery reliability.

Firstly, the robustness of the regression model is checked by testing multicollinearity, homoscedasticity, and normal distribution of residuals. As the collinearity test is calculated only between the explaining variables, the results are also valid for the other regression analysis concerning quality. The results of the multicollinearity test are presented in table 13.

Table 13. Collinearity Statistics

Category	Tolerance	VIF
Communication	0,505	1,981
Trust	0,324	3,085
Collaboration	0,327	3,058

Multicollinearity occurs when explanatory variables in a multiple regression model are strongly linearly correlated with each other, which can cause faulty results in regression analysis (Kim, 2019). In this model, the Variance Inflation Factor (VIF) values are between 1,981-3,085 and the tolerance values between 0,327-0,505. If the VIF value is over five to ten and tolerance lower than 0,1-0,2, multicollinearity exists (Kim, 2019). Therefore, there is no multicollinearity observed among these variables.

Next, residual normality is analyzed by using a Normal P-P Plot. The scatterplot is presented in figure 15. According to the figure, the points are placed close to the diagonal line with only small random deviations, indicating that the residuals are approximately normally distributed and the regression model's normality assumption is met.

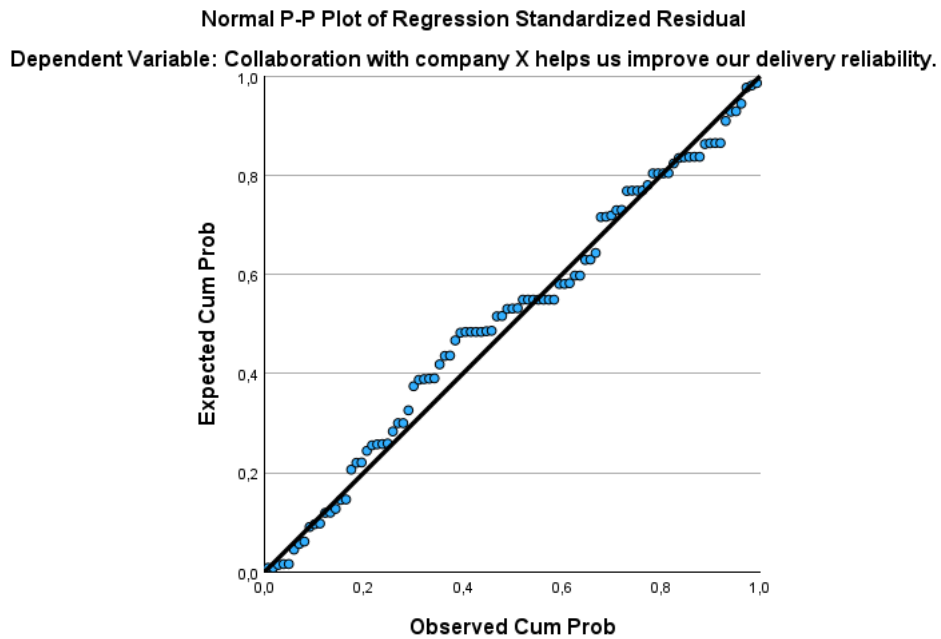


Figure 15. Normal P-P Plot of Regression Standardized Residual Delivery Reliability

Lastly, homoscedasticity is examined by using a scatterplot of standardized residuals against predicted values. Homoscedasticity is a key assumption in regression analysis. It means that the error variance is the same for all observations (Hayes & Cai, 2007). If the assumption of homoscedasticity is not filled, it is called heteroscedasticity. It can cause the variance estimates to be inaccurate, which makes significance tests and confidence intervals unreliable, even though the regression coefficients remain correct (Hayes & Cai, 2007). The scatterplot analysing homoscedasticity is presented in figure 18.

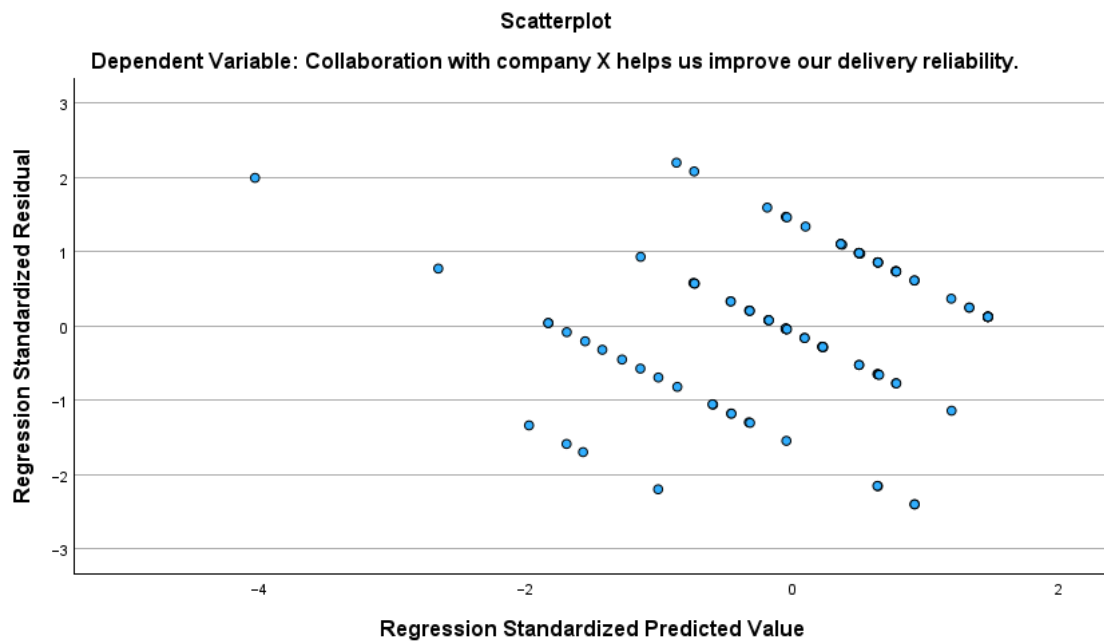


Figure 16. Homoscedasticity Scatterplot Delivery Reliability

The figure indicates some signs of heteroscedasticity, as there is some patterning visible. Since heteroscedasticity mainly affects the reliability of standard errors and significance tests rather than the regression coefficients themselves, the results should be interpreted with some caution. However, the deviations are not substantial and are unlikely to change the overall conclusions. The results of the regression analysis are presented in table 14.

Table 14. Regression analysis delivery reliability.

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0,461	0,445		1,036	0,303
	Communication_avg	0,247	0,133	0,203	1,854	0,067
	Trust_avg	-0,004	0,167	-0,003	-0,024	0,981
	Collaboration_avg	0,649	0,17	0,52	3,816	<,001

Coefficients ^a						
Model Summary						
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate		
1	,670 ^a	0,448	0,43	0,664		
a. Predictors: (Constant), Collaboration_avg, Communication_avg, Trust_avg						
ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	32,61	3	10,87	24,65	<,001 ^b
	Residual	40,127	91	0,441		
	Total	72,737	94			
a. Dependent Variable: Collaboration with company X helps us improve our delivery reliability.						
b. Predictors: (Constant), Collaboration_avg, Communication_avg, Trust_avg						

The regression model is statistically highly significant as $p < 0,001$ and $F(3, 91) = 24,65$, which means that communication, trust, and collaboration together significantly predict how suppliers perceive the impact of the relationship with Company X on their own delivery reliability. The model explains 44,8% of the variance in perceived improvement in delivery reliability. According to the analysis, collaboration is the strongest and only statistically significant predictor. This supports hypothesis H3. Communication has positive but only marginally significant association with perceived improvement in delivery reliability, which means weak support for H1. In the analysis, trust has no significant effect. Therefore, H2 is not supported in this model. These findings suggest that especially suppliers who think collaboration is on a good level between them and Company X have also experienced that the buyer-supplier relationship has helped them to improve their delivery reliability. Weak support for H1 and no support for H2 are surprising results, but in this analysis are only compared the suppliers' subjective experiences.

Next, the regression analysis is presented between suppliers' experience of improved quality during the buyer-supplier relationship and co-operation, communication and trust. Based on the literature review, the assumption is that trust (Chen & Lewis, 2023), communication (Ahmed et al., 2020), and co-operation (Khosrow & Anjali, 2015) have positive impact on quality. Therefore, the following hypotheses are proposed:

H4: Better communication with Company X is positively related to suppliers' perceived improvement in quality.

H5: Better trust in the relationship with Company X is positively related to suppliers' perceived improvement in quality.

H6: Stronger collaboration with Company X is positively related to suppliers' perceived improvement in quality.

For this model, residual normality is analyzed using a Normal P-P Plot as well. As visible in figure 17, the residuals are placed close to the diagonal. There are only small deviations in the mid-range. This indicates that the residuals approximate a normal distribution, and therefore the normality assumption of the regression model can be considered fulfilled.

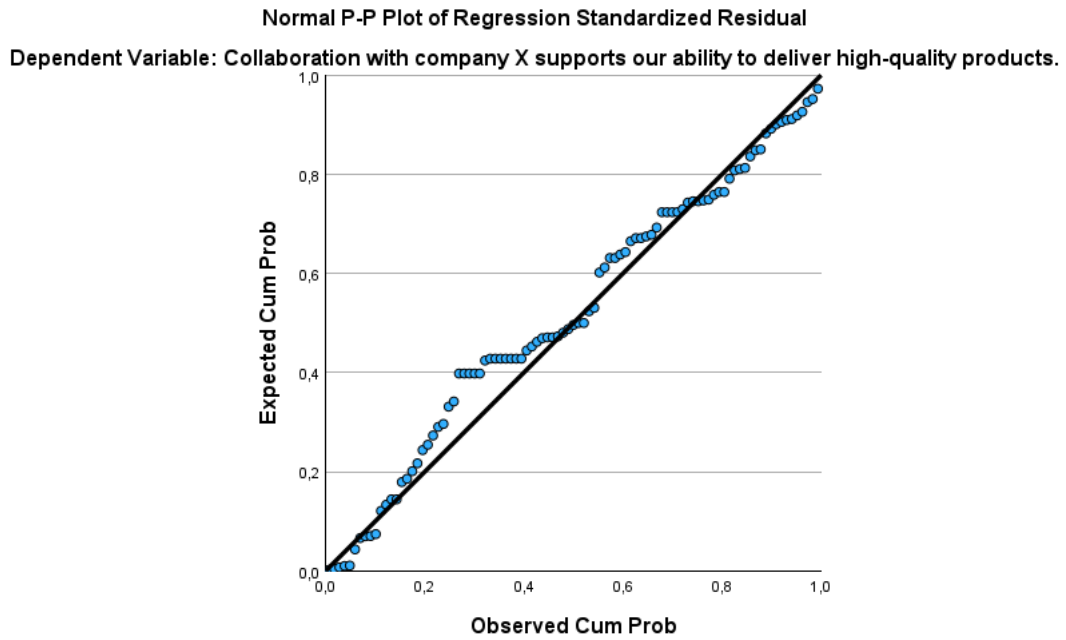


Figure 17. Normal P-P Plot of Regression Standardized Residual Quality

Homoscedasticity is analysed in scatterplot in figure 18. As visible in the figure, the residual scatterplot suggests some signs of heteroscedasticity. The results should be viewed cautiously, though the deviations are minor and unlikely to affect the overall conclusions.

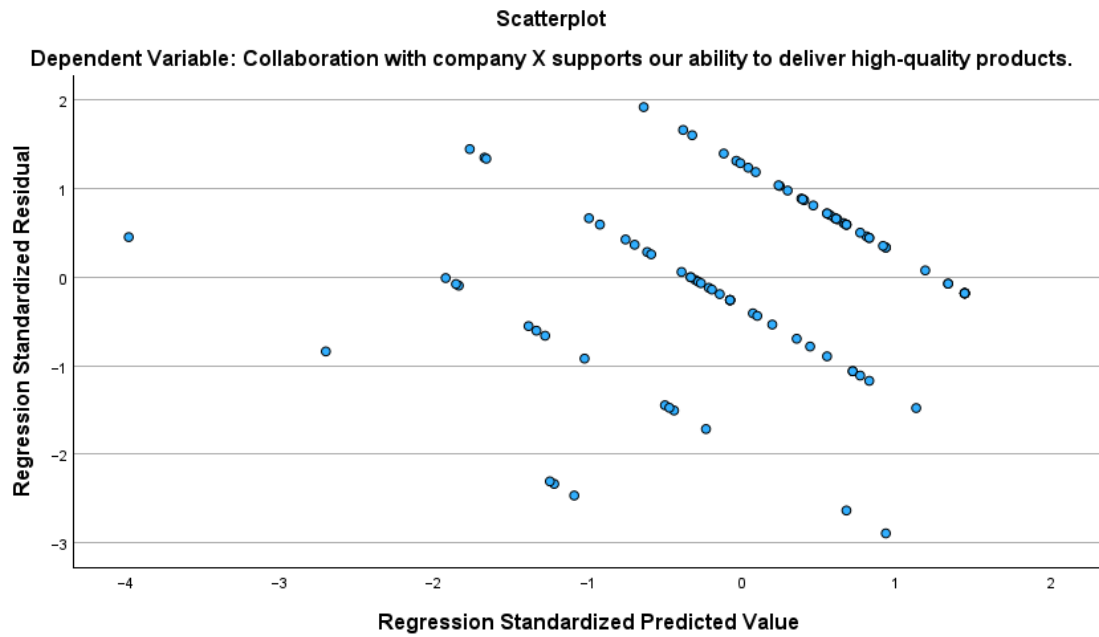


Figure 18. Homoscedasticity Scatterplot Quality

The results of the regression analysis are presented below in table 15.

Table 15. Regression analysis quality.

Coefficients ^a							
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
		B	Std. Error	Beta			
1	(Constant)	0,351	0,415		0,845	0,401	
	Communication_avg	0,202	0,124	0,167	1,625	0,108	
	Trust_avg	0,111	0,156	0,091	0,709	0,48	
	Collaboration_avg	0,64	0,159	0,516	4,036	<,001	
a. Dependent Variable: Collaboration with company X supports our ability to deliver high-quality products.							
Model Summary							
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate			
1	,716 ^a	0,513	0,497	0,62			
a. Predictors: (Constant), Collaboration_avg, Communication_avg, Trust_avg							

Coefficients ^a						
ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	36,851	3	12,284	31,993	<,001 ^b
	Residual	34,939	91	0,384		
	Total	71,789	94			
a. Dependent Variable: Collaboration with company X supports our ability to deliver high-quality products.						
b. Predictors: (Constant), Collaboration_avg, Communication_avg, Trust_avg						

The overall regression model is statistically highly significant as $p < 0,001$ and $F(3,91) = 31,99$. The result indicate that communication, trust, and collaboration together significantly explain variance in suppliers perceived quality improvement. The model explained 51,3 % of the variation in suppliers' responses, which shows it is a strong predictor of how suppliers perceive quality improvements. According to the model, collaboration is the strongest and statistically significant predictor which supports H6. Communication shows a positive but non-significant connection which means weak support for H4. In this model, trust has a small and non-significant effect, which means that H5 is not supported. The results are surprising from parts of trust and communication. However, collaboration showed strong and statistically significant relationship also with the suppliers' experience of improved delivery reliability, so these results are in line with the regression analysis concerning delivery reliability.

To conclude the results of the regression analysis, the results of each hypothesis are presented in table 16.

Table 16. Regression analysis hypotheses summary

Hypothesis number	Statement	Supported/Rejected
1.	Better communication with Company X is positively related to suppliers' perceived improvement in delivery reliability.	Weakly supported
2.	Better trust in the relationship with Company X is positively related to suppliers' perceived improvement in delivery reliability.	Rejected
3.	Stronger collaboration with Company X is positively related to suppliers' perceived improvement in delivery reliability.	Supported
4.	Better communication with Company X is positively related to suppliers' perceived improvement in quality.	Weakly supported
5.	Better trust in the relationship with Company X is positively related to suppliers' perceived improvement in quality.	Rejected
6.	Stronger collaboration with Company X is positively related to suppliers' perceived improvement in quality.	Supported

4.4 Interview results

To wider the understanding of the buyer-supplier relationships, and to consider the purchasers point of view, the team's strategic purchasers were interviewed. The same questions were asked from all of them, and the responses are presented in the next chapters. In addition, one development engineer of the team was interviewed. His

interview brings a perspective from a person who is especially focused on improving the supplier performance.

4.4.1 Strategic purchaser 1

The first purchaser interviewed mentions that co-operation, communication, and trust are currently on a good level with most of the suppliers of his category. However, he mentions that closer collaboration in some projects and communication in some ways could still be improved, and more face-to-face meetings could be arranged. In addition, he mentions that “sometimes change of attitude would be necessary to try and find a way to strengthen co-operation”. As a challenge in buyer-supplier relationships he raises misunderstandings in communication, and sometimes they are related to language barriers. He thinks that trust, collaboration and communication are the most important elements in a buyer-supplier relationship. Without them, the suppliers are not motivated to perform well.

Concerning supplier relationships’ impacts on supplier performance, he thinks that a close relationship makes the suppliers to care about their performance. Then they will do the needed actions to keep it on a good level. When asking about the impacts of a good or bad buyer-supplier relationship, he explains one example of a weak relationship, where a language barrier led to misunderstandings and to poor delivery reliability. As another example, he tells the following: “One great example of strong relationship was also from about 8-9 years ago when we had one Italian supplier performing very weak, communication was very much lacking or not at all. Our Strategic Purchaser at that time took it personally to create better relationship with the supplier. F2F meetings were arranged to explain to the supplier what we are expecting and how they would be able to improve their performance. After the relationship was built almost from scratch, this supplier has been one of the best performing one's ever since.” The interviewee highlights the importance of a good relationship. A good relationship helps the suppliers to understand the common objectives and motivates them to perform well.

4.4.2 Strategic purchaser 2

“With most of the suppliers I think we have a joint effort to make things happening and also improving the everyday working. With some we are more in contact due to changes in supply chain (for ex pipes) and also a lot of product development, how the products are made, is needed. Making things happen requires good communication within correct people and openness”, tells strategic purchaser 2. She highlights the importance of face-to-face meetings, and if they are not possible, calls and virtual meetings with cameras on are better than only emails. As a challenge she identifies getting responses to emails. Also, in the company and in the team, there might be several people contacting the same supplier concerning the same issue, but they are not aware of the double work. In other words, internal communication is sometimes a challenge in co-operation with suppliers. When something is needed from the suppliers’ side, she thinks that it is important to be efficient, clear and open oneself as well.

Concerning the supplier relationships’ impacts on supplier performance, she thinks that the suppliers need to be aware of what performance measurements the purchasers are following. Then the suppliers can focus on the correct things. Also, the purchasing team needs to support the suppliers in terms of quality concerning drawings and instructions. When asking about relationships’ impacts on performance, she mentions that “If information for ex on machine breakdowns or something else that disturbs the manufacturing process is not share actively it might be visible later in performance. Same goes if changes in personnel, sub-suppliers or way of working are not shared that can easily have an effect on performance. And vice versa, when more information is shared probably also performance is better/stable”. She highlights the importance of information sharing to achieve better performance. In her opinion, it takes time to get to know the suppliers, and being active, asking, and even challenging if needed is important.

4.4.3 Strategic purchaser 3

“We have a clear understanding on what we can expect from each other. Suppliers are very well aware of the KPI’s which are important to Company X, and we keep on reminding them about these. Suppliers do trust our data which supports the discussions. An important element is that we need to trust each other and that we are working based on mutual respect. Not that you always need to agree on things, but respect and treating suppliers fair is important. I believe that this is working well in our category”, tells strategic purchaser 3. As an improvement idea to achieve better relationships, he thinks that different business lines should have common ways of working with suppliers. For example, there are differences in KPI measuring. As a challenge in buyer-supplier relationships he names some smaller suppliers, that are too small to visit, and sometimes there might be a language barrier with some of them. As the most important elements in a good supplier relationship, he lists honesty, fairness, being clear with expectations, keeping promises, being nice when it is possible, and being hard when it is needed.

Regarding the relationships’ impacts on performance, he says that the suppliers who are not satisfied or do not see Company X as a trusted partner are not willing to put any extra effort. Then, if the delivery reliability drops on a low level, they are not interested in improving it. In these cases, the relationship matters. As an example of the relationships’ impacts, he tells the following: “Recovery at one of our biggest bellow suppliers during this Covid times when raw material was a real issue. They really made the extra mile to get the raw material from all over the globe. We had daily calls to cooperate on the order book. Recovery was done without jeopardizing the deliveries to the factory. This, I believe, is one of the results that suppliers need to have trust in what you say. I we state that deliveries are under pressure, and we are facing issues because of delays, they need to act on this. If they do not trust you, the less they are prepared to act.” The purchaser highlights the importance of trust. In his opinion, relationships are the most important thing in doing business. He mentions that building relationships takes time, but it is worth it. He thinks that Company X is investing a lot in relations, and the company is not looking only for suppliers but long-time partners.

4.4.4 Supplier development engineer

The questions presented to the supplier development engineer differ from the questions presented to the strategic purchasers so that he could respond to them based on his role and responsibilities. Concerning the supplier relationships' impacts on supplier performance, he mentions the following: "In my opinion, when you keep in regular contact with suppliers, they feel that they are cared about. This, in turn, makes them more likely to ensure that goods are dispatched on time and with good quality. It also lowers the threshold for them to reach out in case of problems or unclear situations". As possible challenges in relationships he points out personal chemistry and different personal characteristics. However, in cases where there are problems with quality or delivery, he thinks that Company X responds by trying to ensure the availability of the material as fast as possible and seeks financial compensation. He notes that the root cause is requested from the supplier, but the follow-up actions to correct and prevent the issue are sometimes left incomplete.

When asking if he thinks that Company X encourages suppliers towards innovations and development, he responds that suppliers do have improvement suggestions for producing methods and materials. However, he thinks that there might appear unwillingness to make changes from Company X's side, if financial savings are not reached. As an improvement suggestion concerning buyer-supplier co-operation, he mentions that suppliers could be invited to visit production premises and warehouses to show them where their supplying parts are going. Also, he sees visits to suppliers' premises important. "I find visits to suppliers very effective. Once you have met someone in person, later discussions via Teams become significantly more efficient and positive".

4.5 Comparison of the analyses and findings

In this chapter, the comparison of all analyses and findings is made, and the overall results of the empirical research are presented. Based on the results, the responses to

the research questions are presented. Before that, the results of the empirical research are summarized.

4.5.1 Summary of the results

The survey results show that the suppliers are satisfied with co-operation, communication, and trust with Company X. In open-ended questions, communication was mentioned most frequently in positive feedback. In the multiple-choice questions, the average score of all communication-related questions is 4,1. However, some areas of development emerged as well. Communication in a timely manner from both sides was mentioned as an improvement suggestion by one respondent. In addition, some suppliers hoped more possibilities to discuss with the purchasers. Trust-related questions reached the average points of 4,22. The open-ended questions received only positive feedback regarding trust. Therefore, the level of trust seems to be great in the suppliers' point of view. Many suppliers are satisfied with the long-term relationships, and most of the respondents consider Company X as a long-time partner rather than just a customer. The most to be developed is in the areas of visibility and including suppliers in the future innovations, projects, and product development. Listening of all sizes of suppliers could be on a better level based on the results.

From the Power BI analysis can be seen the overall situation of the delivery reliability, lead times, and quality notifications in one year. The delivery reliability and quality notifications situations are also compared to the data from three years to see the direction of development. As a conclusion of the delivery reliability, when all product categories are considered, it has stayed quite stable for a year of which statistics are being reviewed. Instead, over a period of three years, the delivery reliability has improved around three percentage points. Of the product categories, Y15 has significantly the best delivery reliability. In the review period, the weakest delivery reliability is category Y30's, however, it is still close to the average of all categories.

Regarding quality, Y15 had least notifications, and category Y30 had most of them. Both differ significantly from the average of all categories, while category Y03 was close to it.

SPSS analysis' results are partly surprising. The challenge with the analysis is the anonymously collected survey responses, that can only be grouped by the supply categories or by themes based on the literature review. When the suppliers' own experiences of improved delivery reliability and quality were compared to their experiences of trust, communication, and collaboration in the correlation test, all the hypotheses were supported, and the results are statistically significant. The result refers to a positive correlation between these variables. When the survey responses were compared to the realized delivery reliability and quality, the results show opposite results for the hypotheses. However, the results are statistically not significant, which might cause unexpected results. The results of regression analysis highlight the importance of collaboration to gain improved delivery reliability and quality.

There are many common features in the strategic purchasers' and the development engineer's interview responses. All respondents highlight the importance of open communication and information sharing. They also emphasize the importance of making suppliers feel they are cared about. Then they are willingness to do their best in terms of quality and deliveries, which increases their performance. Based on the interviews, possible targets for development could be arranging more face-to-face meetings. Sometimes there might be room for improvement in attitudes towards developing relationships. Closer communication in some projects might be needed. Also, some misunderstanding may occur, especially if there is a language barrier with a supplier. Internally, the purchasing team might sometimes to double work when more than one person is communicating about the same thing with the supplier. If the suppliers are not satisfied with the co-operation, they will not put effort to perform as good as possible. According to the development engineer, in cases of notifications, a financial replacement and the delivery of new product might go ahead of stricter exploring of the root cause. Overall, the strategic purchasers and the development engineer seem to be satisfied in

co-operation with their category's suppliers, and only few development ideas were presented.

4.5.2 Comparison and analysis

In this chapter, the results of the empirical research are analysed and compared to each other to see which kinds of similarities and differences there appear. The research questions are answered based on the empirical data. The first research question is "How do the suppliers of the spare part purchasing team find the co-operation and trust with Company X"? This research question can be answered based on the data collected by the supplier survey. Company X gained high average scores of all the multiple-choice question, which means that the suppliers that responded to the survey are satisfied with the relationship with the spare part purchasing team of Company X. Concerning questions related to co-operation and trust, the average scores of the responses were close to four, for trust 4,22 and for collaboration 3,96, which means response "agree" to the statements. Also, because communication is in very significant role in buyer-supplier relationships, it was explored, and it gained average score of 4,02. As a response to the research question, the suppliers of the spare part purchasing team see trust and co-operation to be in a good level with Company X.

The second research question is: "How do the supplier relationships affect to the suppliers' performance, such as delivery reliability and quality"? In this chapter, this research question is answered from empirical research point of view based on the SPSS analysis and the interviews. In the literature review, this question was answered based on the literature collected, and in conclusion chapter both approaches are considered. The results of the SPSS analysis were partly surprising as all of them did not meet the expectations. When the suppliers' own experiences of the relationship's level of trust, communication, and collaboration were compared to their experiences of improved level of quality and delivery reliability, the results support the hypotheses and show positive correlation. Based on the result, from the suppliers' point of view, better level

of trust, communication, and collaboration leads to increased delivery reliability and quality. In summary, this result support that better level of a buyer-supplier relationship relates to better delivery reliability and supplying high-quality products. However, when the suppliers' experiences of relationship statuses were compared to the realized delivery reliability and quality by category, the results did not support the hypotheses. Unexpectedly, the results show even negative correlation between the level of relationship features and the realized delivery reliability and quality. This result cannot be considered as a significant from the research question point of view, as it is not statistically significant, but it presents the current situation in this purchasing team. Also, regression analysis was calculated between the suppliers' own experiences. The results show that communication, trust, and collaboration together significantly predict how suppliers perceive the impact of the relationship with Company X on their own delivery reliability and quality. Therefore, the result suggests that the buyer-supplier relationship's features have an impact on the supplier's performance.

To gain an overview of the empirical results, the features of the different stages of the research are compared. In the supplier survey, the results show that the suppliers are overall satisfied with the relationship with Company X. In this stage, trust related questions gained the highest average score of the relationship features. Also, co-operation and communication gained good scores. Communication gained positive feedback, but communication in a timely manner, including suppliers more in development discussions, and noticing all sizes of suppliers were mentioned as improvement suggestions. If these results are compared to the other parts of the empirical research, similarities can be found when compared to the results of interviews. The strategic purchasers and the development engineer all highlighted the importance of fluent communication. From the interviewees point of view communication with suppliers is overall on a good level. However, some communication issues with smaller suppliers were reported from the purchasers' side as well, especially if there is a language barrier, and this issue match with the suppliers' experience. Also, some supplier felt that there are no ways to communicate about development ideas with

Company X enough. The experience might be in connection with the development engineer's feeling that in cases of quality issue, the problem is solved as soon as possible, but sometimes the root cause analysis and actions to prevent similar problems in the future are not always enough. The results suggest that there could be space to increase communication between Company X and suppliers in cases of development ideas, but also when a notification has been made.

The interviewees pointed out that if the suppliers feel that they are cared about they will do their best what comes to their performance. This result match up with the correlation and regressions analyses where the suppliers' own experiences of the buyer-supplier relationship were compared to their experience of the increased performance. The results suggest that the level of the buyer-supplier relationship is in connection with the level of supplier performance. Trust gained great points and no improvement suggestions in the supplier survey, and the interviewees neither mentioned their need for improvement. This result relates to good level of common trust. The Power BI analysis presents the status of supplier performance for one year, and to explore its direction of development, the graph from three past years was presented as well. The situation during past years looks good and quite stable, and the suppliers and interviewees did not mention any big issues there through supplier relations.

5 Discussion and conclusions

The purpose of this thesis is to explore the impacts of supplier relationships on supplier performance in spare part purchasing. In this chapter, the research and the results are concluded, and discussion between the empirical research and existing literature is presented. In addition, limitations and future research and managerial implication suggestions are presented.

The objectives of this research are to explore the suppliers' experiences of co-operation and trust with Company X and the purchasing team, to explore the purchasers' experiences to deepen understanding of the current nature of the buyer-supplier relationships, and to examine the supplier relationships and their effects on the suppliers' performance in spare part purchasing in Company X. The research questions are the following: "How do the suppliers of the spare part purchasing team find the co-operation and trust with the company X"? and "How do the supplier relationships affect to the suppliers' performance, such as delivery reliability and quality"? To answer the research questions and to achieve the objectives, the literature review, supplier survey, Power BI analysis, SPSS analysis, and the interviews were made. In the literature review, the concepts of spare part purchasing, supplier relationship management, supplier performance, and buyer-supplier relationships' impact on supplier performance were explored.

The first research question is answered based on the supplier survey responses. Based on them, the suppliers find the co-operation with Company X, including trust and communication, to be on a good level. Especially trust gained a great score, but communication and co-operation got positive feedback as well. Especially long duration of the relationship, fluent communication, and reliability were mentioned most often in open comments as strengths. Based on the literature review, buyer-supplier relationships should be based on co-operation and communication (Al-Abdallah et al., 2014). Also, trust is a key factor in strong and long-time buyer-supplier relationships (Al-Abdallah et al., 2014). Therefore, the basis for strong buyer-supplier relationships seems

to be existing between the Company X's purchasing team and its suppliers. The most significant improvement suggestion appeared is related to communication concerning development ideas, innovations, and new projects. As stated in the literature review, showing appreciation towards suppliers' innovations increases their satisfaction (Ganguly, 2021), and new innovations enhance suppliers' performance by strengthening their competitive advantage (Tarigan et al., 2020). Statement "Company X involves us in discussions and shares information about innovations and future improvements" gained average score of 3,3 in the supplier survey, which is the lowest score of the questions. It is closest to the answer 3 meaning "not agree or disagree", whereas the response distribution scores of all the other questions round to grade 4. Concerning these subjects, some suppliers hope more changes to discuss.

The second research question was answered based on the literature review, the SPSS analysis, and the interviews. From the literature review point of view, buyer-supplier relationships, where the purchasing company can trust that the supplier will perform as expected, are needed for improved supplier performance (Tarigan et al., 2020). Continuously development of operational performance is expected from suppliers (Tarigan et al., 2020). According to Tarigan et al. (2020), strong supplier relationships lead to better performance. In buyer-supplier relationships, fluent communication is vital (Abdallah et al., 2014) and accurate collaboration is needed to gain better lead times (Bak et al., 2020). Regarding quality, the importance of information sharing is highlighted to gain development (Al-Abdallah et al., 2014). Supplier satisfaction and motivation are important, because unmotivated suppliers caused problems in quality management (Khosrow & Anjali, 2015).

The results of the empirical research support the importance of relationships to gain increased supplier performance, except for the correlation test between Power BI data and survey data. In the supplier survey, statement "Collaboration with Company X helps us improve our delivery reliability" gained average score of 4,1 points out and statement "Collaboration with Company X supports our ability to deliver high-quality products"

gained score 4,2. The results are closest to the grade 4 which means “agree”. Therefore, it can be considered that the suppliers of Company X’s spare part purchasing team feel that they have benefited from the collaboration with Company X in terms of delivery reliability and delivering high quality products.

In SPSS analysis, the correlation test made between the suppliers’ own responses indicated that communication, trust, and co-operation together have a significant role in predicting how the suppliers see their performance has developed during the relationship with Company X. The test shows the strongest correlation between co-operation and performance, but correlation also existed between trust and performance and communication and performance. The test measuring correlation between realized performance and survey responses did not show correlation. However, the results of this test should be considered as approximate and only concerning this purchasing team and its suppliers. Categorization lowers the reliability of this result, as the survey responses are categorized based on the suppliers’ own estimates, and they might differ from the categorization in the company’s Power BI data. The results of the regression analysis indicate that communication, trust, and co-operation together have a significant role in predicting how the suppliers see their performance has improved during the relationship with Company X. The results support especially the importance of the level of co-operation as a predictor. Therefore, they are in with the results of correlation tests between suppliers’ own experiences.

The interview results support the suppliers’ experiences and the results of the SPSS analysis, as they highlight the importance of communication, trust, and co-operation. The interviewees agree that if the suppliers are satisfied and feel cared about, they are motivated to do the needed actions to keep their performance at better level. Common themes in the interviewees’ responses also included considering face-to-face meetings important and valuing the fair treatment of suppliers. Overall, the buyer-supplier relationships are at a good level based on the interviewees’ experiences. Based on the supplier survey, the suppliers’ overall experiences are consistent with this finding. On

the other hand, one interviewee pointed out that if problems occur with quality or delivery reliability, the solution focuses on replacing the material as soon as possible and seeking financial compensation. Replacing the material quickly is vital in spare part purchasing, as spare parts are needed to keep the equipment functional (Baluch et al., 2013), but incomplete root cause analysis and follow-up actions might cause issues in the future. Another interviewee mentioned that “sometimes change of attitude would be necessary to try and find a way to strengthen co-operation”. According to Shahzad et al. (2016), companies are often too focused on cost minimization instead of relationship development. It could be one explanatory factor for the finding.

Overall, the results of the research support and advance existing literature. The results support the literature by confirming the most significant elements, and their importance in buyer-supplier relationships and affects to performance. The previous research has focused on the buying company’s perspective, and exploring the suppliers’ experiences has been limited (Jääskeläinen, 2021). The literature is advanced through this research by adding empirical evidence based on both buyers’ and suppliers’ experiences of the relationships and their impacts on performance.

5.1 Managerial implications

From Company X point of view, seems that there was a need for this kind of research. The response rate to the supplier survey was very good, which tells about the suppliers’ interest to response a survey related to the topic. Also, many of them gave open feedback, which was not mandatory in the questionnaire. Overall, the suppliers and the purchasers seem to be satisfied with the co-operation, which is great news for the managers. Especially, trust and communication gained positive feedback from suppliers’ side. Also, long-time partnership, flexibility, and Company X’s caring about safety were mentioned. Therefore, the managers of Company X are recommended to continue good work regarding those themes. However, some possible improvement points emerged that managers in Company X could consider. From the purchasers’ point of view, some

double work in communicating with suppliers were mentioned. It takes time from the purchasers and might confuse the suppliers. Also, one strategic purchaser mentioned that different business lines have different ways to handle orders and use the KPIs, and the purchasers would need to be more consistent with communication. Therefore, improving communication within the team and considering common ways to communicate with the suppliers over the lines of business lines could help. From suppliers' side, a need for more possibilities to discuss with purchasers and especially concerning development ideas and involving to new projects appeared. When the purchasers have meetings with suppliers, this topic could be asked and discussed more often at the initiative of Company X. In the interview, the supplier development engineer mentioned that the suppliers do have suggestions concerning materials and producing methods, but there appears unwillingness from Company X side to proceed with them if financial savings are not reached. Also, one supplier hoped more feedback from the Company X side, one felt preparing of different reports and continuous meetings loading if there are no specific issues to go through, and one hoped better visibility concerning forecasts. These subjects could be reviewed case by case, as the suppliers' needs to follow their performance varies (Bak et al., 2020). Some of them perform well without separate following, and others benefit from regular following and measurements (Bak et al., 2020). As the survey was performed anonymously, there is no information available which suppliers have given these comments. However, in these kinds of cases, asking the suppliers opinion for need of discussions or meetings could improve their feeling of being heard. Also, regular analysing and decreasing the frequency of meetings with some suppliers might work, if the performance is on a good level. Then the workload would decrease on both sides. One possible target of development appeared from the supplier development engineer's interview, which is slightly related to discussing with the suppliers about the improvement ideas. In the interview, he mentioned that if quality or delivery issues appear, the availability of material and financial compensation are searched as soon as possible. Fast availability of material is vital in spare part business, but he mentions that the follow-up actions to avoid the issues in the future are sometimes incomplete. Also, one common improvement target

for both sides appeared from the interviews, that how to find positive attitude towards improving the buyer-supplier relationships and though that performance.

This thesis is a research work for Company X, and therefore the managerial implications are focused on their side. However, from the suppliers' side, the managers could consider few main points as well. Even the performance of the suppliers has stayed quite stable and slightly increased during the last years, there is still room for improvement. The suppliers could think case by case, which elements of the buyer-supplier relationship and performance would be possible to improve, and openly discuss about the observations with the purchasers of Company X. For example, if a supplier feels that the frequency of meetings is too much, it is good to discuss about it with the representative of Company X. The positive attitude towards development co-operation is needed from suppliers' side as well. The strategic purchasers highlighted the importance of face-to-face meetings. Therefore, the suppliers could invite the purchasers visit and to familiarize their facilities. Having cameras on in Teams meetings and calling instead of sending emails were mentioned as well. After meeting the purchasers in person, it is probably easier to discuss about the development ideas in the future. Good news for the managers of the suppliers is that the purchasers seem to be overall satisfied with the co-operation as well, and no bigger issues were mentioned in the purchasers' and supplier development engineer' interviews.

5.2 Limitations and future research

In this chapter, the limitations of this research and possibilities for future research are presented. Concerning limitations, performing the supplier survey anonymously outlines the opportunity to compare the survey data to performance supplier by supplier. For this reason, categorization was needed among the responses and Power BI data. However, categorization caused some confusion among the suppliers as some of them might deliver more than one category or did not know which category to choose. The problem was tried to be avoided by adding the descriptions of each category to the questionnaire,

but it did not eliminate it. This issue limits the reliability of the results. This research examines the suppliers' experiences at one point in time, but it does not follow the possible changes in relationships. Also, there are multiple internal and external factors that might affect the performance of the suppliers and the level of a relationship this research does not observe, such as changing market conditions, changes in prices of raw materials, global disruptions, and financial situation and resources of both companies. This research is based on one purchasing team's supplier base in one company. The team is purchasing spare parts, and the number of the supplier is large. Therefore, the results cannot be directly generalized to other organizations.

This research lays the groundwork for research of buyer-supplier relationships on supplier performance, where both the buyers' and the suppliers' experiences are surveyed, and the companies are working in spare part business. The questionnaire created for this research could be utilized in the future. Other recommendations for future research would be asking more questions related to performance from the suppliers to gain wider data for the second research question concerning the relationship's impacts on performance. In future research, one way to improve validity would be to perform the survey non anonymous so that the results could be compared to the performance data at the individual supplier level. However, in this kind of research the risk would be that the response percentage would remain lower, or the responses would not be that honest. This kind of research could also be repeated after a specific period to see the changes in the relationships and performance. The topic of this research could also be further researched by including several buying companies and suppliers and comparing if the results are similar in the bigger picture. Similar kind of research could be performed for a team that has small number of suppliers and therefore probably closer relationships with them. The supplier survey and other analyses focus on some areas of buyer-supplier relationships, especially communication, trust, and collaboration. For example, the impacts of market fluctuations, global supply chain disruptions, or company's internal processes and resources could be examined in the future.

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Appendices

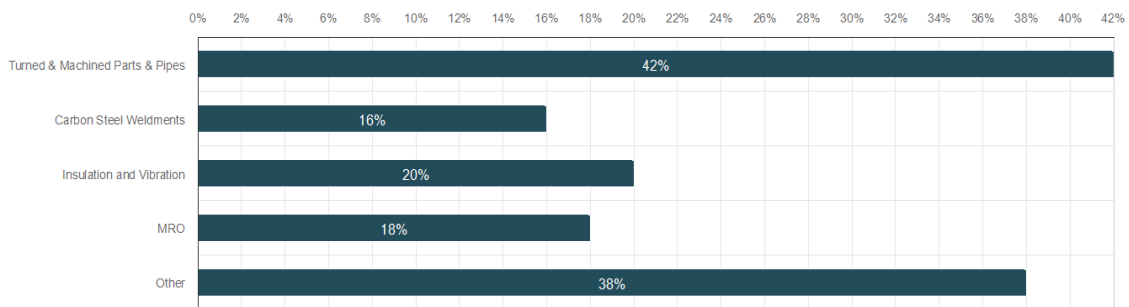
Appendix 1. Survey questions and responses

Supplier Feedback Survey on collaboration

Total number of respondents: 95

Which product category do you primarily supply for Company X? Please see the category details below if needed.

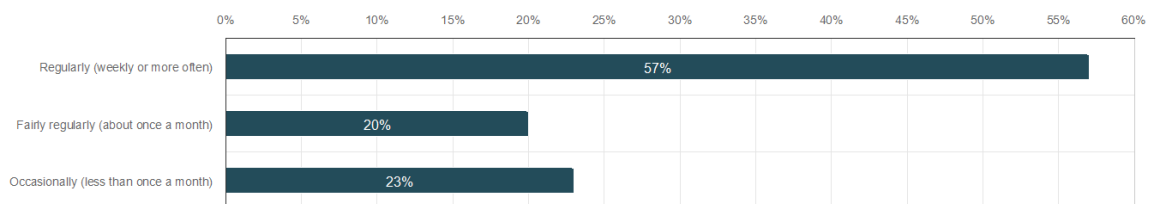
Number of respondents: 95, selected answers: 127



	n	Percent
Turned & Machined Parts & Pipes	40	42,1%
Carbon Steel Weldments	15	15,8%
Insulation and Vibration	19	20,0%
MRO	17	17,9%
Other	36	37,9%

How often do you supply parts for Company X?

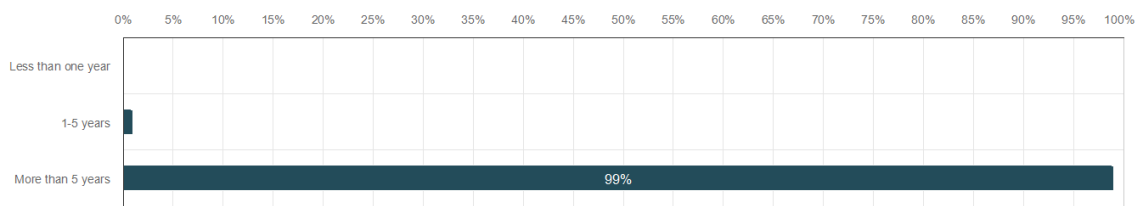
Number of respondents: 95, selected answers: 95



	n	Percent
Regularly (weekly or more often)	54	56,8%
Fairly regularly (about once a month)	19	20,0%
Occasionally (less than once a month)	22	23,2%

How long have you been supplying parts for Company X?

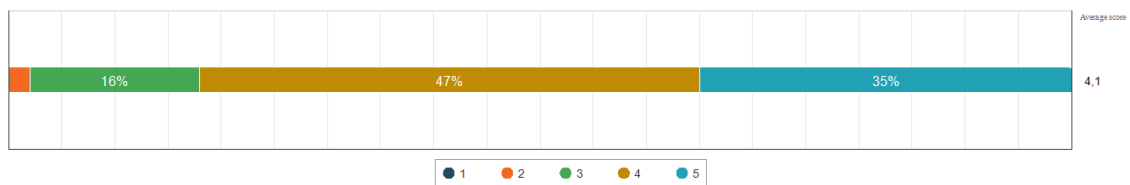
Number of respondents: 95, selected answers: 95



	n	Percent
Less than one year	0	0,0%
1-5 years	1	1,1%
More than 5 years	94	98,9%

Communication with the Company X purchasing team is fluent.

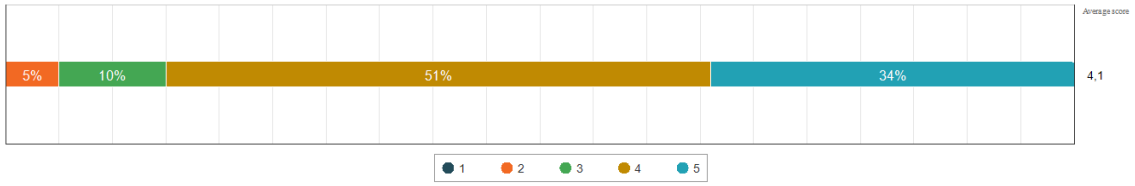
Number of respondents: 95



	1	2	3	4	5	Average	Median
	0,0%	2,1%	15,8%	47,4%	34,7%	4,1	4,0

Company X purchasing team responds promptly to inquiries and issues.

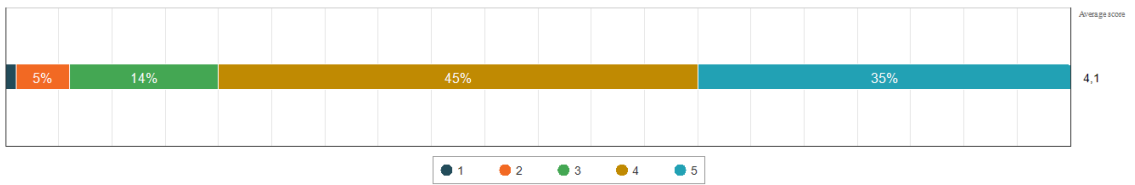
Number of respondents: 95



	1	2	3	4	5	Average	Median
	0,0%	5,3%	10,5%	50,5%	33,7%	4,1	4,0

Changes in orders or schedules are communicated in a timely manner.

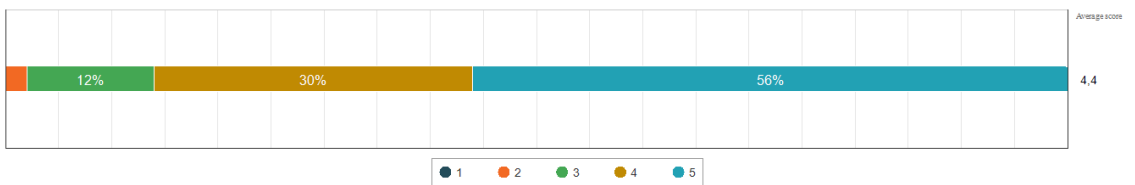
Number of respondents: 95



	1	2	3	4	5	Average	Median
	1,0%	5,3%	13,7%	45,3%	34,7%	4,1	4,0

We can trust in Company X as a partner.

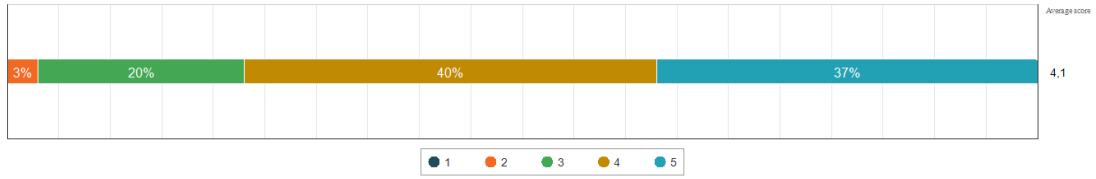
Number of respondents: 95



	1	2	3	4	5	Average	Median
	0,0%	2,1%	11,6%	30,5%	55,8%	4,4	5,0

Company X shares relevant information transparently with us.

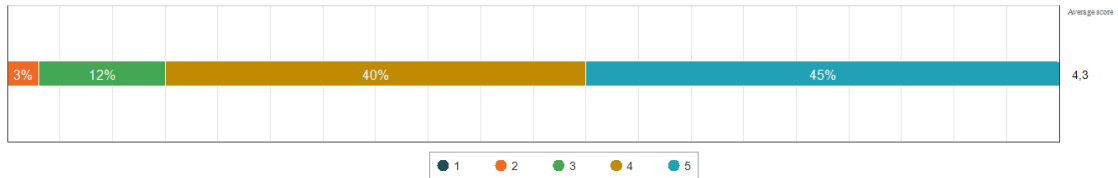
Number of respondents: 95



	1	2	3	4	5	Average	Median
	0,0%	3,2%	20,0%	40,0%	36,8%	4,1	4,0

We can openly discuss problems or concerns with Company X purchasers without fear of negative consequences.

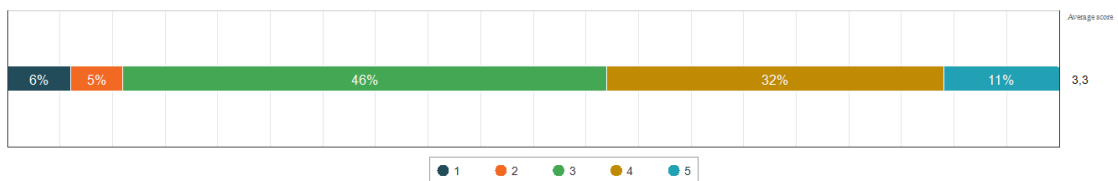
Number of respondents: 95



	1	2	3	4	5	Average	Median
	0,0%	3,1%	11,6%	40,0%	45,3%	4,3	4,0

Company X involves us in discussions and shares information about innovations and future improvements.

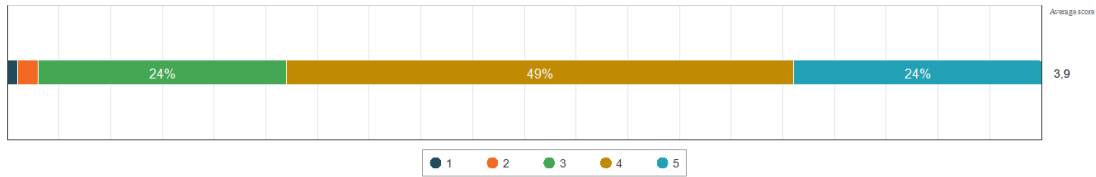
Number of respondents: 95



	1	2	3	4	5	Average	Median
	6,3%	5,3%	46,3%	31,6%	10,5%	3,3	3,0

Our feedback is taken seriously and acted upon.

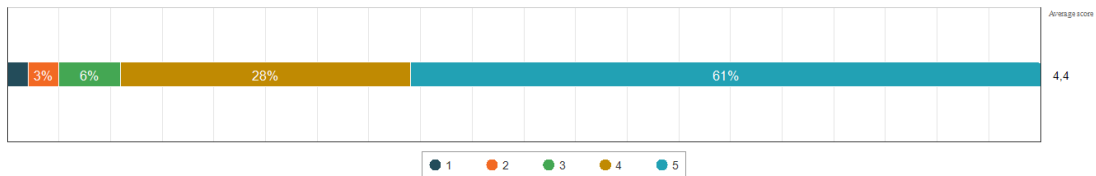
Number of respondents: 95



	1	2	3	4	5	Average	Median
	1,1%	2,1%	24,2%	48,4%	24,2%	3,9	4,0

We consider Company X as a long-time strategic partner rather than just a customer.

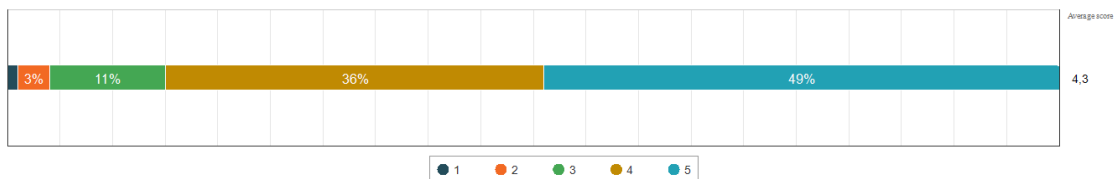
Number of respondents: 95



	1	2	3	4	5	Average	Median
	2,1%	3,2%	6,3%	27,4%	61,0%	4,4	5,0

We are satisfied with the collaboration with Company X.

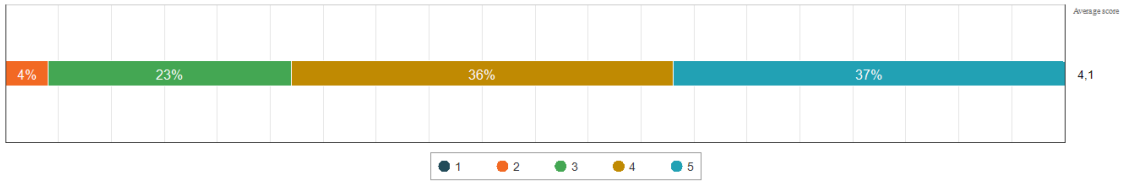
Number of respondents: 95



	1	2	3	4	5	Average	Median
	1,0%	3,2%	10,5%	35,8%	49,5%	4,3	4,0

Collaboration with Company X helps us improve our delivery reliability.

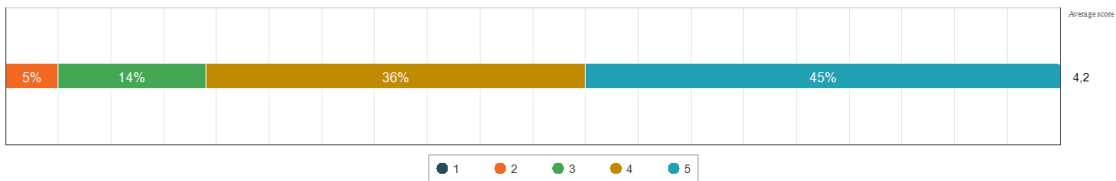
Number of respondents: 95



	1	2	3	4	5	Average	Median
	0,0%	4,2%	23,2%	35,8%	36,8%	4,1	4,0

Collaboration with Company X supports our ability to deliver high-quality products.

Number of respondents: 95



	1	2	3	4	5	Average	Median
	0,0%	5,2%	13,7%	35,8%	45,3%	4,2	4,0

What are the strengths in collaboration with Company X?

Number of respondents: 19

Responses
Company X is a reliable partner and we are proud of being a supplier
Information sharing
Open communication
Fairness in business relationships
Variety of products requested
A steady longterm partnership with a growing ammount of Turn-over
Great company that cares about the real safety of the employees
Your ability to respond quickly, offer solutions that truly work, and consistently maintain communication makes a strong impression

A long term partnership gives us a solid insight in what Company X needs and requires

- Rapporto consolidato negli anni
- Saper trovare la soluzione migliore alle richieste ed ai problemi
- Esperienza e competenza a servizio dell'azienda
- Pronto intervento

Reliability!

Flexibility

Long term companionship.

As a tower internals supplier with a long-term and stable cooperation with Company X, our advantages in working with them include:

1. **Proven Reliability**: Our consistent delivery of high-quality tower internals has ensured reliable operations for Company X 's systems.
2. **Customized Solutions**: We offer tailored tower internals that meet Company X 's specific requirements, enhancing the efficiency and performance of their processes.
3. **Technical Expertise**: Our team's in-depth knowledge and experience in tower internals contribute to innovative and effective solutions for Company X.
4. **Timely Support**: We provide prompt technical support and after-sales service, ensuring any issues are addressed quickly to minimize downtime.
5. **Cost-Effective**: Our efficient production and supply chain management help deliver cost-effective solutions without compromising on quality.
6. **Continuous Improvement**: We are committed to continuous improvement, working closely with Company X to enhance our products and services based on their feedback and evolving needs.

Good quality, competitive price.

Company X is a big global player in the maritime industry and we are proud to continue maintain long term relationship as a reliable supplier for Company X.

Good communications and flexibility regarding OTD. Furthermore, timely purchases of the parts, so almost rarely urgent.

Good communication

Company X understands the business capacity of our company and uses it to our mutual advantage Communication is fast, clear and open - we wish to have more customers with such ability!
Transparent, trustworth and long cooperation.
Long-term reliable performance, consistency
Cooperation and communication with Company X is smooth and fast. We are particularly pleased that, for example, delivery times can be flexible on both sides whenever possible.
Trust and reliability

What areas of co-operation could be improved?

Number of respondents: 18

Responses
- Visibility (advance order issuance, forecast improvement,...) for a better handling and balancing if high up/down trend of order volume occurred - optimization of minimum / typical batch But regarding these points, improvement actions have been already taken and we are feeling already the results
New building engines from Finland. with more repeating orders of new items
We will be happy to further discuss
The cooperation has been very smooth and effective.
Development of new projects
- Maggior coinvolgimento nei nuovi progetti dell'azienda - Richieste per vecchie lavorazioni previste come parti di ricambio - Riprendere forniture abituali interrotte per motivi sconosciuti
Communication in a timely manner on both sides.
-There is no real way for smaller suppliers to give suggestions of improvement. Purchasers are not interested and there is no connection to designers.

We can offer a large variety of welded metal constructions and we could improved the supply of pipes if we could make and agreement on large scale
RD could use our know how more.
It will be great to receive a feedback from Company X about our products and some info and update on the latest innovations in the industry to help us improve our product and keep it up to date.
We would like to machine and deliver more parts to Company X.
n.a.
We can gladly extend our services to other parts of Company X
Innovation, speed
When we give quotations it would be appreciated if we knew the outcome of the enquiry
Suppliers are required to spend a lot of time preparing all kinds of reports (e.g. PQAP, cleanliness of components etc.) and participating in continuous Teams meetings. At least compared to other large industrial customers. As a small subcontractor, these take up a disproportionate amount of time. For example, Teams meetings could be held a little less frequently, unless there is a special reason to organize them.
Delivery dates from our side

Appendix 2. Interview questions for strategic purchasers

1. What aspects of the supplier relationships with (your category's) suppliers are currently working well?
2. In your opinion, what improvements could be made to strengthen co-operation with (your category's) suppliers?
3. What challenges do you face in maintaining relationships with suppliers, and how do you address them?
4. What do you consider the most important elements of a successful buyer-supplier relationship?
5. How do you think supplier relationships affect suppliers' performance, such as delivery reliability and quality?
6. Can you share any examples where strong or weak supplier relationships have impacted performance outcomes?
7. Is there anything else you would like to share based on your experiences or thoughts related to supplier relationships and performance?

Appendix 3. Interview questions for the supplier development engineer

1. What do you consider the most important elements of a successful buyer–supplier relationship?
2. From your perspective, how do supplier relationships with Company X influence the supplier’s performance, especially in terms of delivery reliability and quality?
3. Can you describe any challenges or bottlenecks in the current buyer-supplier cooperation that affect performance?
4. How does Company X respond when delivery or quality issues occur – do you feel the response is constructive and focused on long-term improvement?
5. Do you think that Company X has encouraged enough innovation or process improvements through supplier collaboration? If yes, how?
6. Do you have any suggestions for how Company X could strengthen supplier collaboration from a development or engineering perspective?
7. Is there anything else you would like to share based on your experiences or thoughts related to supplier relationships and performance?