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Standardizing supplier onboarding

Case study

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ABSTRACT:

Due to globalization, competition between companies has intensified even further. Today, it is not only individual companies that compete with each other, but rather entire supply chains are in competition. For this reason, the selection of suppliers and their successful integration into the company's processes and supply chain has a significant impact on the company's performance. The purpose of the supplier onboarding process is to familiarize the supplier with the company's requirements and expectations, as well as to integrate the supplier into the company's systems and processes, thus providing the supplier with the capabilities to function as part of the company's supply chain.

This thesis aimed to conduct a current state analysis of the supplier onboarding process of the case company, identify the weaknesses of the process, and propose improvements based on the identified deficiencies and issues. Additionally, the study examined the side effects that the current process caused within the organization and how these emerge in practice. The third objective was to develop a supplier handbook for the business unit, which is intended to support the supplier onboarding process in the future and to prevent and/or minimize the issues and side effects of the current process from occurring again.

The empirical part of the thesis is qualitative and is based on an interview study conducted in the case organization. The interviews were practically the only data source used in the thesis because the current process was not documented in the organization. Therefore, the research results were based on observations made by the organization's employees. The aim was to interview as broadly as possible the individuals involved in supplier onboarding or those who observe the side effects caused by the supplier onboarding process.

As a result of the thesis, a development proposal for a standardized supplier onboarding process was formed, considering the weaknesses, deficiencies, and side effects of the current process. Based on the research, it can be concluded that a poor supplier onboarding process in the case organization manifests as weak supplier performance and an inability to meet the case organization's requirements in the purchase-to-pay process. Based on the observations, a supplier handbook was created for the business unit, which includes the supplier's prerequisites, the business unit's expectations, the requirements of the purchase-to-pay process, and the instructions for the operational systems offered to suppliers by the business unit. The purpose of the supplier handbook is to reduce the variance in supplier orientation and to minimize the dependency of the quality of supplier orientation on the competence of the person conducting the orientation.

AVAINSANAT: Supply chain management, Supplier selection, Supplier integration, Supplier onboarding, Supplier orientation, Process standardization

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TIIVISTELMÄ:
Globaalisaation myötä yritysten välinen kilpailu on koventunut entisestään. Nykyään ei voida katsoa, että pelkästään yksittäiset yritykset kilpailevat keskenään, vaan pikemminkin kilpailua käydään kokonaisten toimitusketjujen välillä. Tästä syystä toimittajien valinnalla ja integroimisen onnistumisella osaksi yrityksen prosesseja & toimitusketjua on merkittävä vaikutus yrityksen suorituskykyyn. Toimittajien käyttöönottoprosessin tarkoituksena on perehdyttää toimittaja yrityksen vaatimuksiin ja odotuksiin, sekä integroida toimittaja yrityksen järjestelmiin ja prosesseihin, täten antaen valmiudet toimittajalle toimia osana yrityksen toimitusketjua.

Tämän tutkielman tavoitteena oli tehdä nykytila-analyysi case yrityksen toimittajan käyttöönottoprosessista, tunnistaa prosessin heikkoudet sekä tehdä prosessiin parannusehdotuksia, perustuen nykyisen prosessin havaittuihin puutteisiin ja ongelmiin. Tämän lisäksi tutkittiin, minkälaisia lieveilmiöitä nykyinen prosessi aiheutti organisaatiossa. Kolmas tavoite oli luoda yksikölle toimittajakäsikirja, jota on tarkoitus käyttää jatkossa uusien toimittajien käyttöönottoprosessin tukena ja jonka tarkoituksena on ehkäistä ja/tai minimoida nykyisen prosessin ongelmia ja lieveilmiöitä toteutumasta jatkossa.

Tutkielman empiirinen osuus on laadullinen ja perustuu haastattelututkimukseen, joka suoritettiin case organisaatiossa. Haastattelut olivat käytännössä ainoa tutkielmassa käytetty datalähde, koska nykyistä prossia ei ollut organisaatiossa dokumentoitu. Tästä syystä tutkimuksen tulokset perustuivat organisaation työntekijöiden tekemiin havaintoihin. Tarkoituksena oli haastatella mahdollisimman laajasti henkilöitä, jotka ovat mukana toimittajan käyttöönotossa, tai havaitsevat toimittajan käyttöönottoprosessista aiheutuvia lieveilmiöitä.

Tutkielman lopputuloksena muodostettiin kehitysehdotus standardisoidusta toimittajan käyttöönottoprosessista, huomioiden nykyisen prosessin heikkoudet, puutteet, sekä prosessista aiheutuvat lieveilmiöt. Tutkimuksen perusteella voidaan todeta, että huono toimittajan käyttöönottoprosessi ilmenee case organisaatiossa toimittajan suorituskyvyn heikkoutena, sekä kykenemättömyytenä täyttää case organisaation vaatimukset osto-laskutus-prosessissa. Havaintojen perusteella tehtiin liiketoimintayksikölle toimittajakäsikirja, joka käsittää toimittajan ennakkovaatimukset, liiketoimintayksikön odotukset, osto-laskutus-prosessin vaatimukset sekä liiketoimintayksikön toimittajille tarjoamien järjestelmien käyttöohjeistuksen. Toimittajakäsikirjan tarkoituksena on vähentää toimittajaorientaatiossa esiintyvää varianssia ja minimoida toimittajaorientaation laadun riippuvuutta orientaation suorittavan henkilön kompetenssista.

AVAINSANAT: Toimitusketjun hallinta, Toimittajan valinta, Toimittajan integrointi, Toimittajan käyttöönotto, Toimittaja orientaatio, Prosessin standardisointi

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Abbreviations

BOM = Bill of material

ETO = Engineering to order

MCDM = Multicriteria decision making

MTO = Make to order

MTS = Make to stock

NPD = New product development

R&D = Research & development

SCM = Supply chain management

SET = Social exchange theory

SOM = Supplier onboarding manager

SPE = Supplier performance evaluation

TCE = Transaction cost economics

1 Introduction

In the introduction section thesis background is discussed and research objectives and questions are set. Also, the limitation of the study is determined, and the structure of the thesis is presented.

1.1 Thesis background

When a new supplier is chosen, all the agreements have been finalized by strategic purchasers and supplier handover from sourcing to operational purchasers has been done, the new supplier is not necessarily ready to operate with the buyer organization. An uncoordinated supplier onboarding process coupled with varying process execution methods might leave significant deficiencies in supplier orientation which might cause crucial problems later. These orientation deficiencies can lead to critical issues later, which causes extra work and often also extra costs for the buyer.

Today it is not uncommon that supply chains create over 80% of value added to the final product. Because of that suppliers have become an increasingly critical factor in the company's success. This underscores that competition is no longer solely among individual firms, but also among the supply chains. (Zimmer et al., 2016) For above mentioned reason proper supplier selection process is highly important since supplier selections can have positive, but also negative impact on company's performance. Successful supplier selections alone do not guarantee high performance, but also supplier integration is required to be successful on the markets. Supplier integration is handled as a key managerial strategy for improving buyers' performance. (Danese, 2013)

While there is extensive research on the significance of supplier selection and the importance of supplier integration, the impact of the supplier onboarding process on the organization, supplier integration, and consequently supplier performance has not been thoroughly examined. Understanding the impact of the supplier onboarding process on

the relationship between the supplier and the buyer is important to enable smooth and efficient collaboration from the very beginning. Previous literature usually purely concentrates on either supplier selection or supplier integration as a whole but has failed to point out how the supplier's integration into the supply chain happens in practice and what kind of practical effects a poorly coordinated integration process might have.

According to (Delke et al., 2023) supplier onboarding manager will be one of the future roles of purchasing and supply management. The key responsibilities of SOM will be collecting information and data in order to set up an organization as an approved supplier of digital environments and practices. The importance of this future role will be emphasized especially while implementing smart supply chains. Despite Delke's research focusing on the future, in reality, companies struggle with supplier onboarding even today.

1.2 Research questions and thesis objectives

The goal of this thesis is to investigate the current supplier onboarding process and practices of the case company and examine the impacts of these current procedures within the organization. Another goal is to provide suggestion for a new process model. Additionally, the intention is to create a supplier handbook based on the results of RQ: 1 & 2 which can be used in future supplier onboarding to enhance the process's effectiveness. To be able to accomplish the thesis objectives three qualitative research questions were set:

Research question 1. What kind of practices or processes the business unit already has in place for supplier onboarding?

Research question 2: How does the current supplier onboarding process affect the case organization on a daily basis and how does the outcome of the process emerge in practice?

Research question 3: What topics should the case company supplier handbook cover?

By addressing these questions, this thesis aims to provide a comprehensive understanding of the current onboarding process, identify areas for improvement, and propose a structured approach to enhance supplier onboarding and integration, ultimately improving supplier readiness and organizational efficiency. Additionally, the purpose of this thesis is to clarify how the outcome of the supplier onboarding process emerges in practice. By understanding and analyzing the results of RQ1 & RQ2 it should be possible to outline the main topics that the supplier handbook should cover.

1.3 Key concepts and research limitations

This thesis has several key concepts which are supplier selection, supplier onboarding, supplier integration, and process standardization. The suggestion of process structure which is provided as a result of this thesis is not meant to be implemented as described in the thesis but is more like corrective suggestions to existing process. The decision to adopt the new process structure remains with the case company. Additionally, the supplier handbook which is developed based on this research will be exclusively utilized within the business unit that commissioned this thesis and will not be distributed to other business units of the group. The handbook will not be published, as its value is closely tied to the case company, and it is based on observations of their internal processes and process weaknesses in a specific environment, it has no value for other companies.

1.4 Structure of the thesis

This thesis is divided into four Chapters. The first chapter is a literature review that goes through existing literature concerning topics such as supplier selection, supplier onboarding, supplier integration, performance, and trust in business relationships. The

literature review chapter also provides a basic understanding of supply chain management and procurement streams. The second chapter includes research methodology, case company introduction, data collection methods, data analysis and evaluation of the used data & research. In the third chapter, the results and empirical findings of the research will be discussed. The current process is described in detail and the weak points of the process are pointed out. Also, suggestion of standardized process structure and justification of supplier handbook is given. The final chapter is a conclusion, where empirical findings are summarized and analyzed.

2 Literature review

Since there isn't much research on supplier onboarding, the literature review section explores concepts and theories related to successful supplier onboarding. The literature review chapter concentrates on five main topics of this thesis.

The first section discusses on a very general level principles of supply chain management and its importance to organizations' ability to compete. The first section also defines roughly the main responsibilities, tasks and objectives of supply streams and procurement streams. The second section concentrates on giving a basic understanding of supplier selection, supplier selection-related tools and methods. Later, transaction costs, mechanisms of avoiding such costs and the importance of trust in business relationships are briefly discussed in the third section. In the fourth section, the importance of supplier onboarding and supplier integration for successful business relationships is addressed. It also goes through various forms of integration that take place in business relationships. The fifth section concentrates on supplier performance evaluation and demonstrates that product quality is just one aspect when assessing supplier quality. The sixth section handles processes in general and how processes can be improved and standardized. The section also justifies why process improvement and standardization are essential for success. The last section consolidates all previously discussed theories into a single framework, which serves as the foundation for the thesis and guides the analysis

2.1 Supply chain management

Today's manufacturing companies can't be considered as independent operators anymore. In the global field, a firm's competitiveness relies highly on suppliers and supplier performance. For the above-mentioned reason, competition is no more considered only between companies but also between supply chains (Zimmer et al., 2016). Also, the complexity in supply chains has been growing due to the increased level of globalization. (Habib, 2011, p. 3)

Supply chain management aims to integrate activities that are related to the flow of goods and transformation of goods, including related information flows. By integrating these activities better than others, firms can get a competitive advantage over competitors. Many authors argue that SCM integration effects positively to performance in the form of reduced costs and cycle periods, improved quality and decision making as a few examples. A well-managed supply chain plays a significant role in a firm's ability to compete. (Ellinger, 2000)

According to the council of SCM, supply chain management involves all the activities including all the parties that are needed to gather raw materials from the supplier to deliver finished products to the final destination. (Habib, 2011, p. 5) Supply chain management is not limited only to physical goods, but also includes services that are needed to deliver the finished goods. SCM contains multiple individual entities and activities that are tied together to enhance long-term competitive performance, encompassing all the internal and external activities that are involved at any stage within the procurement streams. (Al-Shboul et al., 2017)

According to Al-Shboul et al. (2017), SCM is classified into integrated logistics management, purchasing & supply management and integrated supply chain management. Supply chain management is required for multiple reasons. Well-executed SCM improves operations, enhances outsourcing activities and customer satisfaction, restrains competitive pressure and increases profits due to the cost savings. (Habib, 2011)

2.1.1 Supply chain streams

The supply chain consists of two streams, upstream and downstream. Upstream (known as supply-side) involves procurement activities, transportation, inventory management, and manufacturing. Downstream (demand-side) handles all the activities that are needed to deliver finished products from manufacturer to customer. To succeed in competitive global markets, integrating supply chain streams is vital. (Bode & Wagner, 2015)

As supply chain streams, procurement streams are also divided into upstream procurement and downstream procurement. Upstream contains all the strategic activities which begin with needs assessment and end with supplier contracting. Downstream activities start where upstream activities stop, at the contract phase. Downstream activities end at the needs assessment phase, thus forming a circulating loop of downstream upstream.

The upstream of procurement cycle is strategic and does not get involved with daily operations and interactions with suppliers. Strategic purchasers focus on long-term goals and actions. Strategic procurement defines and maintains a “playfield” within which operational purchasing operates. Strategic purchaser scans and analyzes the supplier markets, negotiates with current and potential suppliers and prepares and signs agreements with suppliers. By maintaining the supply chain, strategic procurement supports business strategy with supply chain strategy thus helping the firm to achieve business goals. (Nieminen, 2016, p.3)

While upstream procurement is strategic, downstream procurement stream is operational. Operational procurement interacts with suppliers on a daily basis. These activities include but might not be limited to ordering, following deliveries, handling invoices, supplier performance evaluation, supplier quality management and supplier performance improvement. (Nieminen, 2016, p.3)

2.2 Supplier selection, criteria and related tools

Companies often look to existing suppliers to satisfy their new purchase requirements. The attractiveness of this approach is based on the fact that the buyer does not need to add an additional supplier to their supply chain, which is a critical and time-consuming task. On the other hand, using an existing supplier might not be the best long-term approach and for that reason, companies are continuously looking for new more optimal sources for goods. The need for new suppliers might be based on various reasons, for

example: new product development, poor supplier performance, expiring supplier contracts, investing in new tools or machinery, or expanding into new markets. (Monczka, 2009, p.236-239)

A proper supplier selection process is crucial for efficient purchasing and manufacturing, but the decision-making in supplier selection is complicated because suppliers can be evaluated by multiple criteria and each supplier has its own specialty and thus a different criterion. (Park et al., 2010) Supplier evaluation and selection is one of the most important activities of strategic sourcing. Correct supplier selections can offer fruitful cooperation between buyer and supplier. (Sollish & Semanik, 2011, p.101)

Supplier evaluation is a laborious but critical task that requires clear objectives, in order to create value for the buyer. Generally meeting buyers' current material and service requirements is not sufficient, but suppliers should also fulfill buyers' long-term requirements and goals and be able to guarantee that it is capable of adapting without disturbances to supply flow (Imeri et al., 2015). The objective of the sourcing process is to decrease purchase risk, maximize overall value to the buyer and establish a long-term relationship between buyer and supplier. These benefits can be achieved by selecting the correct supplier. In addition, correct supplier selections reduce costs, improve profits, and product quality, although firms often consider supplier selection problem as a single-criteria decision, focusing only on cost factors in decision making. (Taherdoost & Brard, 2019)

According to Chenini at al. (2021), strategic procurement begins with benchmarking firms' current performance and assessment of needs and targets by evaluating costs, resources and growth projections. The first step is followed by scanning the supplier markets and collecting information about suitable suppliers based on the needs of the organization. Selecting potential suppliers, negotiating, and developing potential suppliers is the final step of the strategic procurement process. During the whole process, organizational targets should be primarily considered.

Taherdoost & Brard. (2021) describes supplier selection on a more detailed level. They separate supplier selection and evaluation into three different steps. These three steps are listed below.

1. Supplier selection criteria identification
2. Supplier questionary
3. Multicriteria decision-making model. (MCDM)

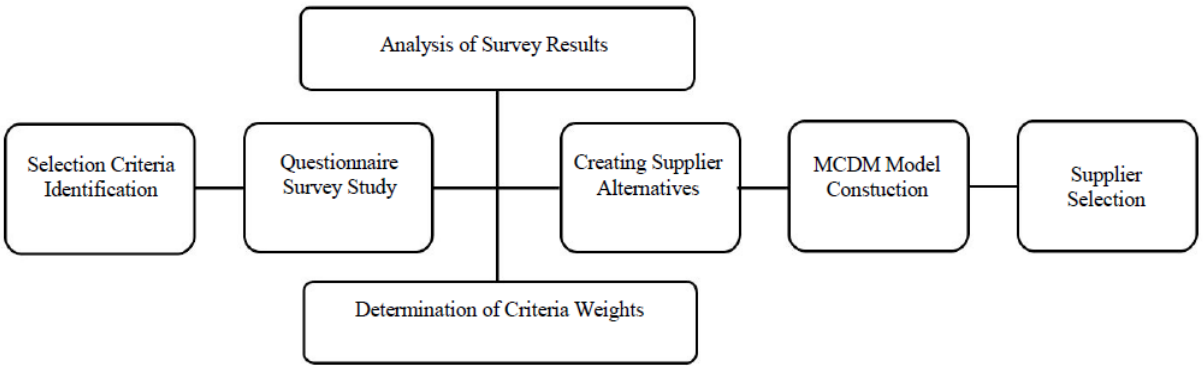

Figure 1. Supplier selection steps (Taherdoost & Brard, 2019)

Shortlisting

Before starting the actual supplier selection process, the buyer must consider some issues concerning the upcoming supplier selection: What is the nature of the supplier-buyer relationship, what are the preliminary qualification factors of the potential suppliers and prepare RFQs for potential suppliers. (Taherdoost & Brard, 2019) These steps are needed to decrease the group of candidates and this process is called shortlisting. Once shortlisting has been done, the buyer can proceed to the actual supplier selection process.

1. Supplier selection criteria identification*:*

Organizations might have multiple supplier selection criteria. In the past common criteria have been price, quality, and delivery. On top of traditional selection criteria, buying organizations have also increasingly concentrated on supplier sustainability for the past

two decades. Sustainability criteria can be roughly divided into environmental-, social- and economic sustainability aspects. (Igarashi et al., 2013) Examples of these aspects can be for example level of carbon emissions, certificated health and safety systems, and human rights. Buyers' sustainability requirements should not end with a first-tier supplier but require similar conditions also for lower tiers and across the whole chain. These selection criteria should be chosen carefully since the same criteria used in the supplier selection process should later be used also for supplier performance evaluation. (Sollish & Semanik, 2011, p.101) Inappropriate supplier choices reflect directly on the performance of the company. To prevent bad engagements from happening, the possible risks of new suppliers should be evaluated. (Taherdoost & Brard, 2019)

2. Supplier questionary:

According to Sollish & Semnik (2011, p.101-115), there is a large number of decision criteria when considering new supplier selection, but all these criteria are not equally valuable in all situations, so the criteria should be chosen carefully with the objectives clearly in mind. Evaluation criteria have dual functions since they are later used for evaluating ongoing performance. Authors recommend using at least business and operational criteria in evaluation, which are two major categories considered in the supplier evaluation process.

Business criteria

Business criteria can be categorized into financial and non-financial analyses of the supplier. Financial analysis includes measures of liquidity and measures of profitability. Financial analysis is used to mitigate the possibility of engaging with suppliers that have a risk of bankruptcy or liquidity gap. Nonfinancial business criteria are measures of efficiency, market share, customers and reputation.

The potential supplier's financial condition should be assessed before a detailed evaluation is started. Financial stability can be considered as a preliminary condition that suppliers must pass in order to proceed to the actual evaluation stage. There are three

potential pitfalls that must be considered related to a supplier's financial condition. The first pitfall is that the supplier may go out of business. Secondly, a poor financial condition might affect their ability to make necessary investments and thirdly, the supplier might become too dependent on one customer. (Monczka, 2009, p.252)

Table 1. Business selection criteria. (Sollish & Semanik 2011)

Type of criteria	**Criteria description**	**Evaluation criteria**
Financial	Measures of liquidity	Current ratio, Quick ratio, Receivables of turnover ratio, Payables turnover ratio, Debt-to-Equity ratio
Financial	Measures of profitability	Gross profit margin ratio, Net operating margin, Return of assets ratio, Return of total assets. Return of investment
Non-financial	Measures of efficiency	Productivity, Receivables turnover ratio, Inventory turnover ratio
Non-financial	Market share	
Non-financial	Customers and reputation	

Operational criteria

Operational criteria are a quality-oriented point of view of supplier capability. Evaluation of operational criteria concentrates on process and product quality management, quality measurement and engineering excellence.

Table 2. Operational selection criteria. (Sollish & Semanik 2011)

Type of criteria	**Criteria description**	**Evaluation criteria**
Operational	Quality management process	Certification, Acceptance testing, Inspection process
Operational	Quality performance measurement	Statistical process control, Six Sigma, Iso standards, Tolerances, Benchmarking, Defects, cost of poor quality
Operational	Engineering expertise	
Operational	Site visits	

3. Multi-criteria decision-making.

Multi-criteria decision-making helps when selecting the most optimal solution is highly complex. MCDM is pertaining to structure and solve decision- and planning problems with multiple decision criteria and the method helps with choosing the best alternatives. The optimal solution can be reached by analyzing the various aspects of the decision-making criteria by assigning appropriate weights to the criteria used. (Aruldoss et al. 2013)

Supplier scorecard

A supplier scorecard is a tool to solve simple decision problems. The buyer selects the most critical supplier selection factors for the scorecard. Evaluation factors can have equal weights or relative weights can be used corresponding to the needs of the firm, thereby minimizing subjective evaluation. After the weights have been set, the buyer evaluates the supplier based on predefined questions. The scoring scale can be for example from 1-10, where 1 does not meet the buyers' expectations at all, and 10 exceeds the buyer expectations. After the evaluation has been done, the most suitable supplier is the one that ends up with the highest total score.

Table 3. Example of supplier scorecard. (Sollish & Semanik 2011)

Evaluation criteria	**Overall weight**	**Question X**	**Question Y**	**Total score**
Criteria X	X			
Criteria Y	X			
Criteria Z	X			
Criteria W	X			
	=1.00			

Analytical hierarchy process

AHP is used for much more complex evaluation than a scorecard. AHP is a multi-criteria decision-making model that was introduced by Saaty, first in the late 70s and later in the early 90s. With the help of AHP, complex decision-making problems can be solved. AHP uses a multi-level hierarchical structure of objectives, criteria, sub-criteria, and alternatives and derives results from pairwise comparisons. These results are used as weights of the decision criteria. Traditionally comparison is made by a scale from 1 to 9, where 1 is used when two elements contribute equally, and 9 is used when a factor is extremely important over another factor. The purpose of these comparisons is to assess the significance of decision criteria and gauge the relative performance of alternatives based on each specific decision criterion. In instances where the comparisons lack perfect consistency, the tool provides a mechanism for improving consistency. (Mann & Triantaphyllou, 1995)

Table 4. Example of AHP matrix.

	Price	Quality	Service	Technology
Price				
Quality				
Service				
Technology				

AHP matrix is used to define preferences between selection attributes.

By using AHP, the critical aspects of a decision problem can be structured into a hierarchical structure that resembles a family tree. By simplifying the complex decisions into a simple series of comparisons and rankings, and then combining the results, AHP does not only help with making the best decision but also provides rationale reasoning for the selection. (Sevkli et al., 2008) On the hierarchy tree objective of the process is placed on top, which is known as level 1, possible candidates are placed at the bottom level, and the selection criteria and possible sub-criteria are placed in between.

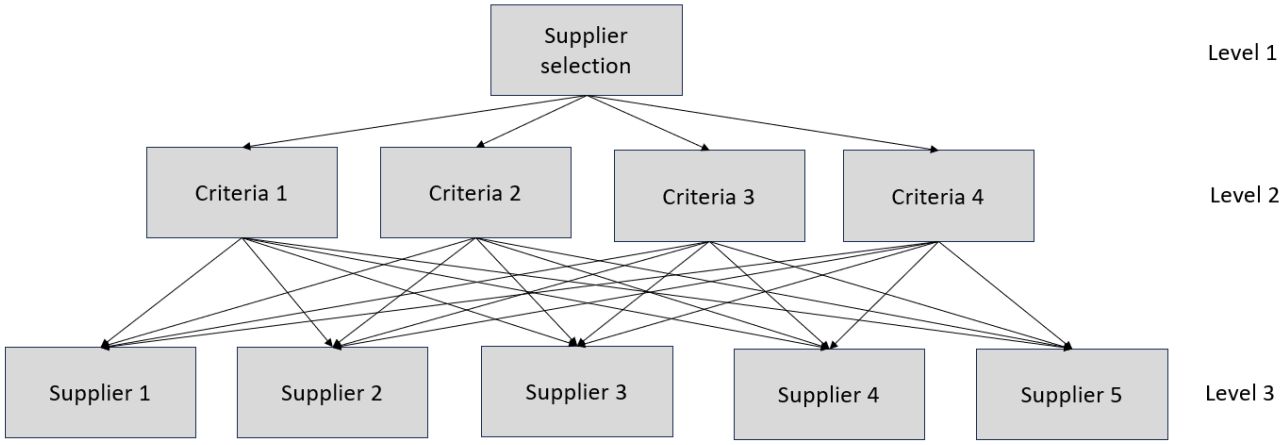

Figure 2. A simple example of AHP family tree.

2.3 Transaction cost economics & Social exchange theory

Transaction costs economics theory originally presented by Williamson 1985 deals with the costs generated by transactions. These costs can be divided into ex-ante costs (costs that occur before the transaction) and ex-post costs (costs that occur after the transaction). Ex-post costs occur in the form of contracting costs, monitoring costs, enforcement costs, or any similar kind of costs that are related to the transaction. Rigid contract mechanisms are effective means to mitigate and decrease transaction costs, but overly rigid contract mechanisms may affect the interfirm relationship negatively, especially in a

situation where contracting parties are not equally dependent on each other. On the other hand, overly lax contract mechanisms may leave room for opportunism (exploitation of loopholes in the contract in their own favor).(Shahzad et al., 2018)

According to Shahzad et al., (2018), business relationships that are only based on economic exchange with well-defined contract mechanisms do not alone ensure successful business relationships but also require a cooperative environment in order to be successful. A cooperative environment is described by social exchange theory as an environment where parties enjoy mutual trust and engage in effective communication. Where contract mechanisms are more effective at minimizing ex-post transaction costs, sociological governance caused by trust and communication is effective at maximizing mutual commitment to the relationship. So, these elements are not mutually exclusive, but rather essential mechanisms for ensuring that cooperation in a business relationship functions effectively. These can actually somewhat function as substitutes for each other, which can be explained by the fact that the better communication prevails between the parties and the more they trust each other, the less likely it is that the counterpart will engage in opportunism and fewer contractual mechanisms might be needed. The same logic also applies in the other direction. However, neither of these can be fully replaced by the other. (Shahzad et al., 2018)

2.3.1 Transaction costs

As stated earlier in transaction cost economics theory, costs are divided into two subcategories, ex-ante costs and ex-post costs. Ex-ante costs refer to costs that occur before a transaction, for example, searching for information about potential suppliers and alternative candidates and costs that are caused by negotiations and contracting with the suppliers. The costs associated with the supplier after the contracting are ex-post costs. These costs include for example costs caused by monitoring the supplier's performance, enforcement costs in case the supplier is not reaching the expected level of performance

and from remedial actions which are actions that are forced to be taken to get the supplier back on the right track.

2.3.2 Trust in business relationship

Trust is a key factor in business relationships. There are many different definitions of trust, but Huang & Wilkinson (2013) defines it as a" willingness to rely on an exchange partner in whom one has confidence based on a belief, sentiment, or an expectation about an exchange partner that results from the partner's expertise, reliability, and intentionality". According to Shamsollahi et al. (2020), trust is important, especially at the beginning of a relationship, even though it is not likely that the parties enjoy a high level of trust in each other at the early stage.

Variance and process-based models of trust illustrate that trust is not just a static state, but the level of trust is dependent on other factors (environment, actors, behavior, performance, events, activities & choices) in business relationships and can change over time by changes in other attributes or by events, activities or choices made. Figure 3. represents the relation between the aforementioned attributes and trust. Huang & Wilkinson (2013)

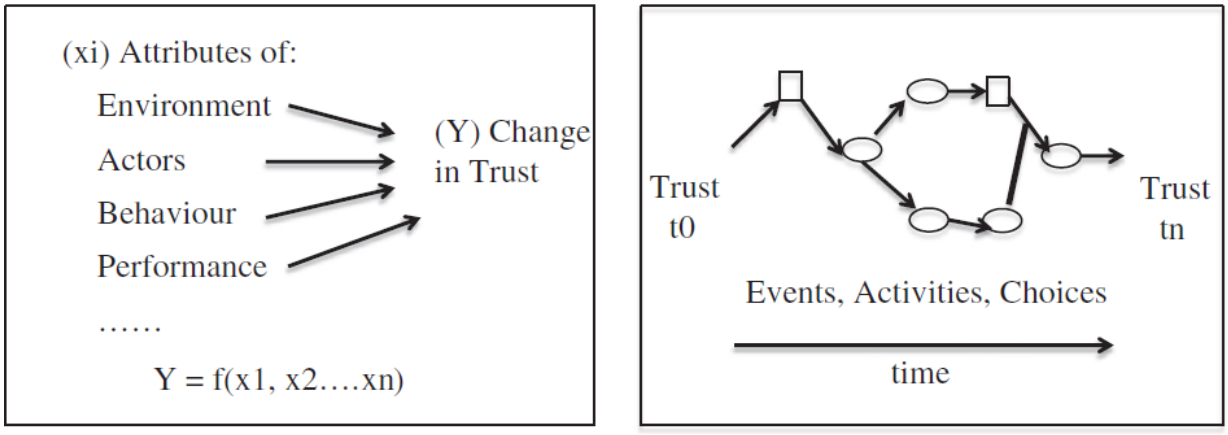

Figure 3. Variance-based model & process-based model of trust (Huang & Wilkinson, 2013)

Dynamics of trust

Figure 4. illustrates how the attributes influencing trust are interdependent. The dynamic interaction among perceptions, experiences, actions, interactions, and other variables occurring within the business environment over time contributes to the development of trust. It is important to consider that development can occur in both negative and positive directions. These dynamics affect the intentions, resources, feelings and beliefs of the parties involved. It illustrates how beliefs and feelings influence the nature and extent of trust between firms, and how all these different factors collectively impact subsequent actions and events. The outcomes and changes in the model are not a simple sum of individual events. Factors such as initial conditions, the sequence of events, and interaction effects are crucial, and even small changes can lead to disproportionate effects. The core idea is that the outcomes and changes emerging over time are co-produced, complex, and do not develop linearly. (Huang & Wilkinson, 2013)

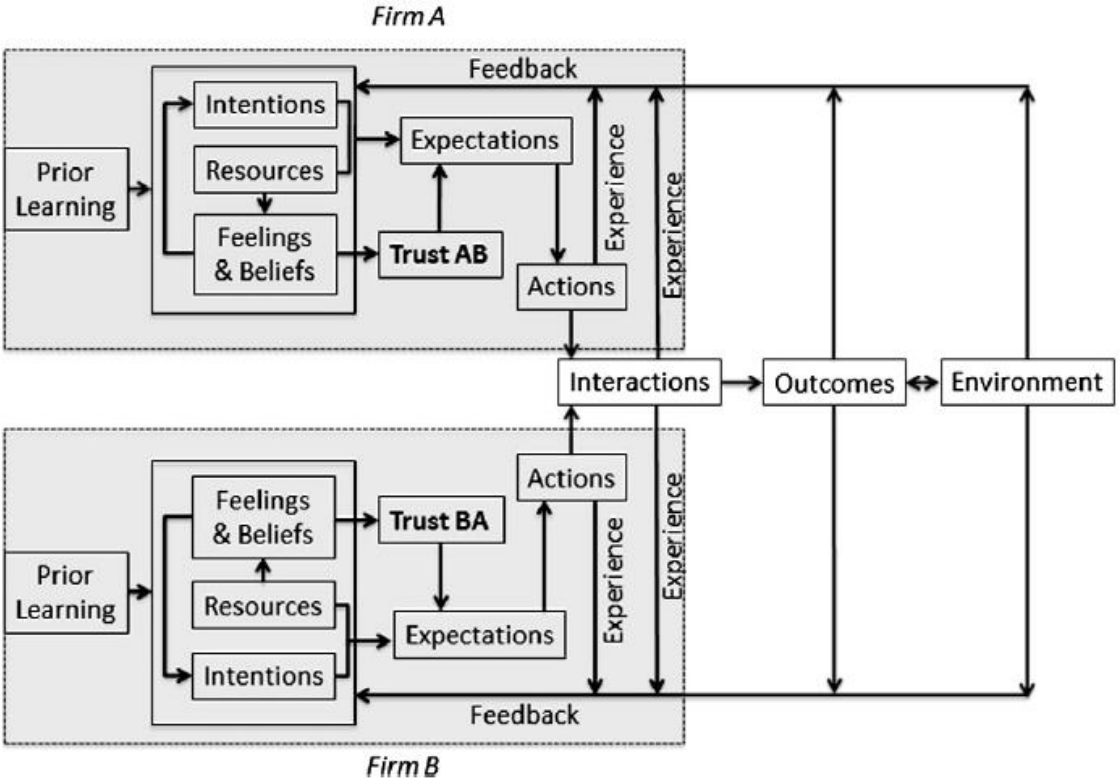

Figure 4 Dynamic model of trust (Huang & Wilkinson 2013)

As well as insufficient contract mechanisms also distrust in supplier relationships results in higher transaction costs and a lower level of commitment. Moreover, distrusted partners have a higher threshold for solving problems and are reluctant to adapt to changes to unforeseen circumstances. (Shahzad et al., 2018)

2.4 Supplier onboarding and supplier integration

"Supplier onboarding" is a term that is not commonly used in existing literature. Oxford English Dictionary, (2024) describes onboarding as "*The action or process of integrating a new employee into an organization, team, etc.*" or "*The action or process of familiarizing a new customer, client, or service user with a product or service, esp. a piece of software*" Nevertheless term is recognized and widely used by commercial enterprises.

Supplier onboarding is a process of collecting supplier information, assessing suppliers compliance and risks, and integrating suppliers into the buyers' workflows and supply chain. Simply put supplier onboarding is about developing streamlined processes to build a strong buyer-supplier relationship that results in improved business outcomes that benefit both parties. The process starts with supplier evaluation and approval. Detailed information about suppliers is gathered and used for supplier qualification and registration. Also, product quality is tested in practice. Business requirements and expectations are presented to the supplier and the supplier's understanding of these requirements is ensured. Supplier is qualified and registered to buyers ERP and other systems and communication is established. For strategically important suppliers a separate onboarding process is recommended. (Lucidchart, 2024). While supplier selection focuses on choosing the right supplier, the supplier onboarding process is about integrating the selected supplier into the company's processes and operations.

2.4.1 Supplier onboarding

Supplier orientation entails the communication and establishment of comprehension regarding the management objectives, work requirements, and guiding principles. It enables visibility to the expectations and criticality of the scope of work as perceived by the buyer. Developing a cooperative buyer-supplier relationship is not only about what parties do together but also how they interact and what they believe about each other. By onboarding a supplier, the buyer provides an environment where the supplier and buyer can collaborate and gain proper understanding and agreement. A well-managed supplier orientation can be mutually beneficial and lead to a win-win situation. (Durivage, 2016, p. 213-214)

Supplier onboarding is a crucial part of the supplier management system, which provides an opportunity to introduce suppliers to the fundamentals of working requirements and involved processes at the very early stage of the relationship. The supplier orientation process contains a structured series of activities to provide an understanding of requirements and working methods. With the help of this framework, the buyer is able to share the expectations in detail through communication with the supplier. (Durivage, 2016, p. 210) According to (Delke et al., 2023) Onboarding is needed during the first phase of supplier integration. Onboarding includes involving stakeholders, making contracts and explaining processes to make sure that everything works as expected.

As mentioned above, at the beginning of the orientation process, it is critical that the chosen suppliers have a solid understanding of working requirements, roles, and responsibilities. The aim of the supplier orientation process is to integrate suppliers successfully into the supply network and give suppliers preparedness to operate with the buyer. Durivage argues that the orientation process can be divided into a planning phase, a development phase and an execution phase. These phases are described with key activities as follows:

Onboarding planning

The onboarding planning phase begins with identifying key resources of supplier onboarding process. Once resources have been identified and defined, relevant processes, working instructions and methods that are necessary to share in order to interact with the supplier, need to be identified next. Also setting up communication with the supplier and scheduling the orientation session is an essential part of the planning phase.

Onboarding Development

During the development phase, the buyer gathers and prepares required processes, including plans, procedures, work requirements and supplier expectations that are defined in the planning phase. These expectations, requirements and processes should be formally communicated to the supplier. Processes and expectations should be developed based on the nature of the relationship with the supplier.

Onboarding Execution

The execution phase is the final step of a supplier onboarding process. In the last phase, all the things that have been defined in the planning and development stages are delivered to the supplier by arranging an orientation session. The purpose of the orientation session is to ensure that suppliers understand work requirements, roles and responsibilities of the relationship, means and methods, deliverables and buyer's expectations.

Responsibilities of onboarding process

The onboarding process requires a clear definition of roles and responsibilities for both the supplier and the buyer. The buyer organization is primarily responsible for carrying out orientation, but in order for orientation to be effective supplier must also play an active role throughout the whole process. According to Durivage, the roles and responsibilities of the process can be roughly divided as follows (Durivage, 2016, p. 212-213).

Table 5. Responsibilities of supplier onboarding process (Durivage 2016)

Buyers responsibilities	**Suppliers responsibilities**
Identify all necessary contacts in the supplier's organization, including engineering, quality, production, etc.	Gain an understanding of work and process requirements, expectations and reporting requirements.
Arrange training sessions encompassing orientation, follow-up, and feedback as necessary. Specify the frequency of these sessions according to work requirements.	Clarify any issues, discrepancies, or ambiguities with the customer.
Uphold frequent communication flow concerning product- and work-related issues.	Collaborate with the buyer to resolve issues through effective communication.
Ensure understanding of work and process requirements including future expectations to the supplier organization.	

2.4.2 Integration

During the past two decades, authors have been debating about integration and have not reached an agreement about the concept. (Näslund & Hulthen, 2012) Multiple studies address that the objective of integration is to eliminate waste in the value chain. Oghazi et al., (2016) define integration as an action that coordinates multiple organizational processes with the goal of performance improvement, whereas Turkulainen et al. (2017) describe integration as the level of collaboration with supply partners and collaboratively manages internal and external processes.

In the past, most manufacturing organizations used to own raw material suppliers fully or partially. Later firms realized the stiffness of the arrangement in their supply chain in case of changing demand (Kumar et al., 2017). Early research focused on make-or-buy decisions and referred to vertical integration, whereas modern integration involves

much wider concepts. Supply chain integration is about linking a firm with its customers, suppliers, and other stakeholders, by integrating their relationships, activities, functions, processes, and locations. Such integration supports the transition from conventional, arms-length, and often conflict-laden relationships to cooperative, long-term business partnerships, and strategic alliances.(Morash & Clinton, 1998)

Internal and external integration

Integration occurs as internal integration as well as integration between the company and its stakeholders, also known as external integration. According to Chen et al. (2009), internal integration appears within a firm. Internal integration can be defined as "the quality of the state of collaboration that exists among departments that are required to achieve unity of effort by the demand of the environment." External integration occurs between a firm and its external counterparts. This integration takes place when two or more companies share the responsibility of exchanging common planning, management, execution, and performance measurement information. Customer and supplier integration is part of external integration. (Barratt & Oliveira, 2001) One of the key roles of the purchasing function is to effectively integrate the supply activities between external suppliers and internal organizational customers. (Paulraj et al., 2006)

Chen et al. (2009) acknowledged that connectivity plays a key role while integrating processes. According to them, connectivity is crucial regardless of whether it concerns transactional efficiency or relationship management. For businesses that are transaction-oriented, connectivity is needed to make sure that transaction flow is seamless through functional areas. In business process-focused relationships, connectivity is required to set up relationships between firms at multiple levels within both organizations.

Information connectivity highlights the links between suppliers and customers. Information sharing through IT systems supports companies to obtain information directly from customers, which reduces dependence on forecasts and simplifies supply chain collaboration. Even though connectivity is crucial for integration, it is not sufficient to make

integration successful. According to Chen. et al. (2009) simplification is also needed for successful integration. By simplification, the authors mean that excessive elements of the process need to be identified and eliminated. In other words, inefficient tasks need to be re-engineered to improve process efficiency and process effectiveness. Simplification includes designing effective and efficient routines by establishing and adhering to common operational policies and procedures, which is also referred to as inter-functional unification and process standardization. Connectivity and simplification are crucial when integrating processes in both an intra-company and an inter-company context. Shortly, connectivity refers to "connecting related processes to meet the overall organizational objectives, whereas simplification is stated as an ability to identify and eliminate excessive elements within the processes." (Chen et al., 2009)

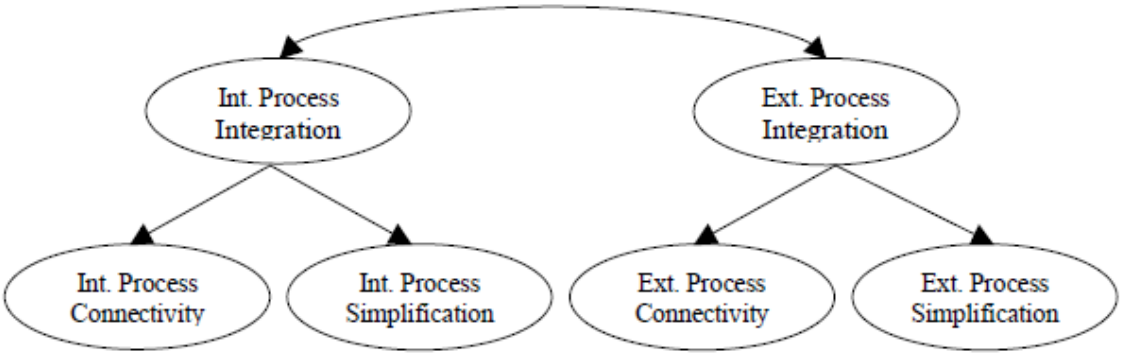

Figure 5. Internal & External integration (Chen et al., 2009)

2.4.2.1 Supplier integration

Outsourcing has resulted in increased interaction among firms in a supply chain and has set closer relationship requirements among the supply chain to ensure the flow of products, information, and payments. Managing these relationships requires inter-organizational business processes with an appropriate level of information sharing, operational coordination, and close partnerships. (Leuschner, et al., 2013)

Chen et al. (2009) define integration as a firm's objective to achieve efficiencies via collaboration with another firm. Many studies have shown that well-managed supplier integration can lead to improved financial performance, whereas an unorganized integration process can lead to extra costs and the opposite outcome as desired. (Oghazi et al., 2016)

Molinaro et al. (2022) have identified and categorized supplier integration into three different dimensions. These dimensions are: Relational-, operational-, and information integration. On top of these (Paulraj et al., 2006) identified 4th category of supplier integration, which is cross-organizational teams.

Relational integration

Supplier relationships have increasingly become long term and suppliers are willing to share more precise information about their processes, quality performance and even cost structure with their customers. At the same time, buyers are narrowing their supply chains to fewer qualified suppliers and concentrating on strategic relationships with the remaining ones. (Paulraj et al., 2006)

Relational integration, also known as strategic integration, relates to the strategic connection between supplier and buyer. Strategic integration concentrates on integrating actions and interactively adjusting behavior while pursuing opportunities over time and planning business activities jointly while considering each party's long-term success. Strategic integration should consider short-term objectives, such as production scheduling, inventory visibility, and capacity planning but especially long-term objectives, for instance, achieving joint flexibility, and adaptation. (Leuschner, et al., 2013)

Studies have shown that through a long-term relationship, the suppliers become a part of a well-managed supply chain and have an effect on the competitiveness of the entire

chain (Paulraj et al., 2006). According to the authors, relational integration can be operationalized by a limited number of suppliers and long-term relationships.

Operational & process integration

To decrease organizational slack, close coordination with supply chain partners is essential. Process integration extends beyond the manufacturing enterprise to encompass the entire supply chain, treating it as a competitive unit rather than focusing solely on a single firm. High level of process integration across firms are for example characterized by better coordination of the firm's logistics activities with those of its suppliers and blurred organizational distinctions between the logistics activities of the firm and those of its suppliers. (Paulraj et al., 2006)

Operational integration is associated with collaborative joint activity development, work processes and coordinated decision making within firms in the supply chain. (Leuschner, et al., 2013) Operational integration concerns the degree of the buyer company and its supplier's coordination and synchronization of activities that are happening on a daily basis such as scheduling, order processing, operational planning, and goods deliveries. Operational integration has positive effects on buyer organization in the form of increased operational performance, production flexibility, delivery reliability, and production costs. Integration also decreases transaction costs and increases innovation. (Molinaro et al., 2022) Optimizing firms' internal operations is pointless unless inter-organizational operations are also optimized. (Imeri et al., 2015)

Information & E-Information integration

Effective inter-organizational communication stimulates the integration of information between buyers and supplier firms. To find solutions to material or design-related problems counterparts must be prepared to share precise and even sensitive information. Information integration is not only limited to the purchasing-sales interface but also occurs in multiple other departments such as design, engineering, quality, and other functions that are directly or indirectly participating in the relationship. Previous research

points out that suppliers' quality performance is experienced to be much better when the interaction between buyer and supplier is expanded from the purchasing-sales interface to also other departments. (Paulraj et al., 2006)

Information integration involves coordinating the transfer of information, fostering collaborative communication, and utilizing supportive technology within supply chain firms. (Leuschner, et al., 2013) Step further is when firms integrate activities in addition to the sharing of information. Proper communication also improves supply chain flexibility because supply chains with proper communication flow can better adjust to changes in demand. (Kumar et al., 2017).

The introduction and usage of information systems can have a significant impact on value creation by integrating a firm's supply chain. Such systems could lead to advantages only if they are properly utilized. (Kim & Narasimhan, 2002) E-information integration deals with the usage of information systems and e-business technologies to share information and communicate between buyers and suppliers. Information technology has a significant role in supplier integration. IT enables sharing of more complex and more precise information in real-time which increases visibility in the supply chain. (Vanpoucke et al., 2017) Internet-based applications such as EDI also lower transaction costs and ease inter-organizational operations. (Molinaro et al., 2022).

E-information integration has multiple positive effects on the buyer organization. It is widely noted that dyadic systems enhance operational performance in general in the form of increased delivery performance, increased quality, decreased costs and shorter new product introduction time. Additionally, multilateral systems increase quality and flexibility, since multilateral systems allow communication with a larger number of parties at once. (Molinaro et al., 2022) Information integration allows the sharing of knowledge and critical operative information among the members of the supply chain such as demand information, inventory situation, plans concerning capacity, production

& shipment schedules and demand forecasts. (Leuschner, et al., 2013) , (Paulraj et al., 2006)

Cross-organizational teams

Integration of personnel through cross-organizational teams is increasingly common in supply chains, with firms expecting significant contributions from such teams as they reshape their value chains and supplier relationships. Teamwork, central to cross-functional teams, has been crucial in organizational change efforts since the 1990s, addressing various corporate objectives and facilitating broad organizational transformations. Cross-functional teams have played critical roles in initiatives such as supplier selection, product design, just-in-time manufacturing, cost reduction, quality improvement, and enhanced communication. Suppliers' involvement in new product development, ranging from minor design suggestions to complete responsibility for development, design, and engineering, has been extensively discussed. Effective supplier involvement in new product development is seen as essential for competitiveness, with research documenting its benefits in strategic planning. Sub-constructs like "supplier involvement—general purposes" and "supplier involvement—product development" are included to examine the usage extent of cross-organizational teams. (Paulraj et al., 2006)

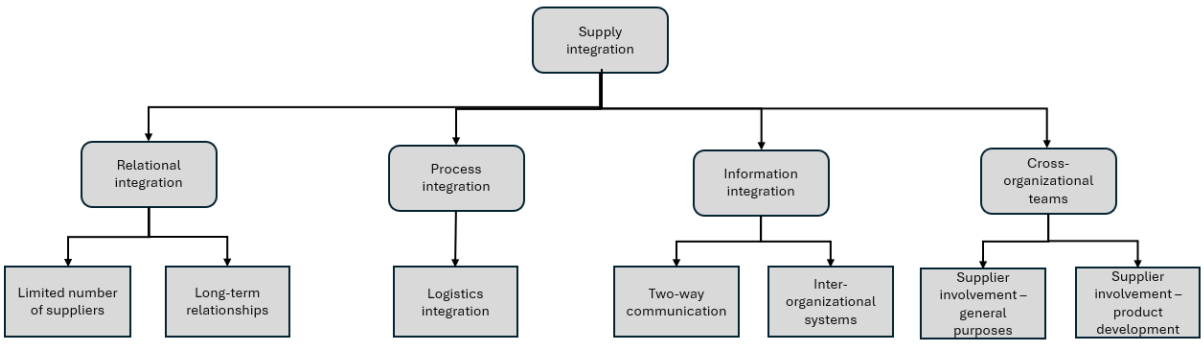

Figure 6. Elements of supply integration (Paulraj et al., 2006)

2.5 Supplier performance measurement

Supplier performance measurement has been focused on literature widely in the past decades, but empirical research has remained limited. (Jääskeläinen & Thitz, 2018) Performance measuring has an important role in success by performance evaluation and benchmarking results against similar operators. There are a high number of different performance meters in different industries, and meters that suit one but do not necessarily suit another, because measurement is subjective and key performance indicators should be chosen based on the supply chain strategy. In general, performance meters can be categorized into quality, finance, time, flexibility, overall performance, and innovation. Cassandra et al. (2013) Based on the literature, price is usually weighted over other attributes in terms of Supplier performance evaluation. Quality is another factor which has been highly valued in the SPE.

On top of general performance meters, authors highlight the importance of effective communication performance as a supplier performance evaluation criterion. According to Jääskeläinen & Thitz (2018), communication measures are highly important especially while working in a close collaborative relationship. Communication measurement aspects can be such as the effectiveness of communication, information exchange, information quality and timelines, and the level of feedback from the supplier. To support inter-organizational collaboration both financial and non-financial measures are required.

The outcomes of collaboration are easier to measure when pre-set targets of collaboration are identifiable. Supplier measurement data does not have value unless the result is communicated in appropriate practices and the results are concretized, but only giving supplier access to performance data does not automatically increase the actual performance. (Jääskeläinen & Thitz, 2018)

2.5.1 Different dimensions of quality

Product quality can be measured in various ways. One of the most used quality criteria is PPM, which measures the defect rate of a million delivered goods. PPM targets should be strict, but achievable. Noshad & Awasthi (2015) have listed a total of 12 product quality attributes from different authors: Acceptable parts per million, compliance with quality, low defect rate, perfect rate, percentage of products or items not rejected upon inspection, net rejections, rejection in incoming quality, refection from customers, reliability of quality performance, functionality, costs of quality. The buying firm should pick the ones which suit best for their needs. Quality is a multidimensional concept and is not limited only to product quality. Product quality is often described as fitness for use and product reliability, but supplier quality is a much wider concept. Suppliers' total quality includes product quality but also process quality and service quality.

Table 6. Service quality & Process quality (Noshad & Awasthi 2015)

Service quality:	Service quality credence
	Service quality experience
	Non-conforming material control system
	Number of bills received from the supplier without errors
	Warranties and claim policies
	Quality of support services
	Responsiveness
	Ease of communication
	Complaint management system
Process quality:	Shipment quality
	Process control capability
	Quality planning
	Rejection in production line
	Quality data and reporting

	Quality manual
	Quality management practices and systems
	Quality control
	Operational controls
	Delivery performance
	Process capability

Suppliers represent a critical resource to a firm providing both direct and indirect material and services, which are inputs to the organization's product offerings. (Modi & Mabert, 2007) Therefore, organizations should focus on managing their suppliers. Effective supply chain management is a critical part of creating stable material and information flow from suppliers to customers. (Noshad & Awasthi, 2015) Organizations might face situations where suppliers that meet their requirements primarily do not exist or are not available in the supplier market. In that case, one effective way to solve the issue is to develop existing suppliers. Supplier development aims to improve supplier capability and performance in the predefined direction. (Noshad & Awasthi, 2015)

Supplier development might require investments from the buyer. According to Wagner & Krause (2009), investments might take the form of information sharing, training programs and technical assistance. Poor communication is primarily responsible for defects in the products or processes. Ineffective communication raises conflicts which might lead to misunderstandings and frustration in both parties. (Modi & Mabert, 2007)

The target of successful supplier development is to feed the suppliers who continuously deliver high-quality products in an agreed schedule with required documentation and are easy to co-operate with. (Noshad & Awasthi, 2015) Based on research made by Urbaniak, buyers prioritize supplier quality improvement on products, processes, and communication over other improvement objects. (Urbaniak et al., 2023)

2.6 Process improvement and standardization

Process

A defined business outcome is typically attained through the execution of a set of logically connected activities and events. The set of these activities and events is also known as processes. Process activities can be divided into system activities: which are done independently by the information system, user interaction activities: which are done by humans with the help of the information system, and manual activities, which are done manually by humans. (Weske, 2019).

Münstermann et al. (2008) approach business processes from the perspective of process inputs and outputs. The author identifies several distinct sub-dimensions of a business process. These sub-dimensions are workflows, activities, resources, and entities.

- Workflow expresses the connection of activities.
- Entities follow the connectors as they are processed by the process model.
- Activities express the main functions of the process and are linked by connectors to represent the flow of entities.
- Resources are assets that add value to the entities of the process. All the assets that are used in the process can be defined as resources, IT systems, workers, consultants, etc.
- Entities are objects that are processed by resources.

Flowchart

Traditionally flowcharts are used to depict processes in a visual format. Flowcharts facilitate the understanding of processes, as process description is not solely in written form. The flowchart contains different kinds of shapes that display start and finish points, activities, decisions, inputs/outputs, documents, manual operations, waiting points and the progression direction of the process. (Andersen 2007, p. 46-48)

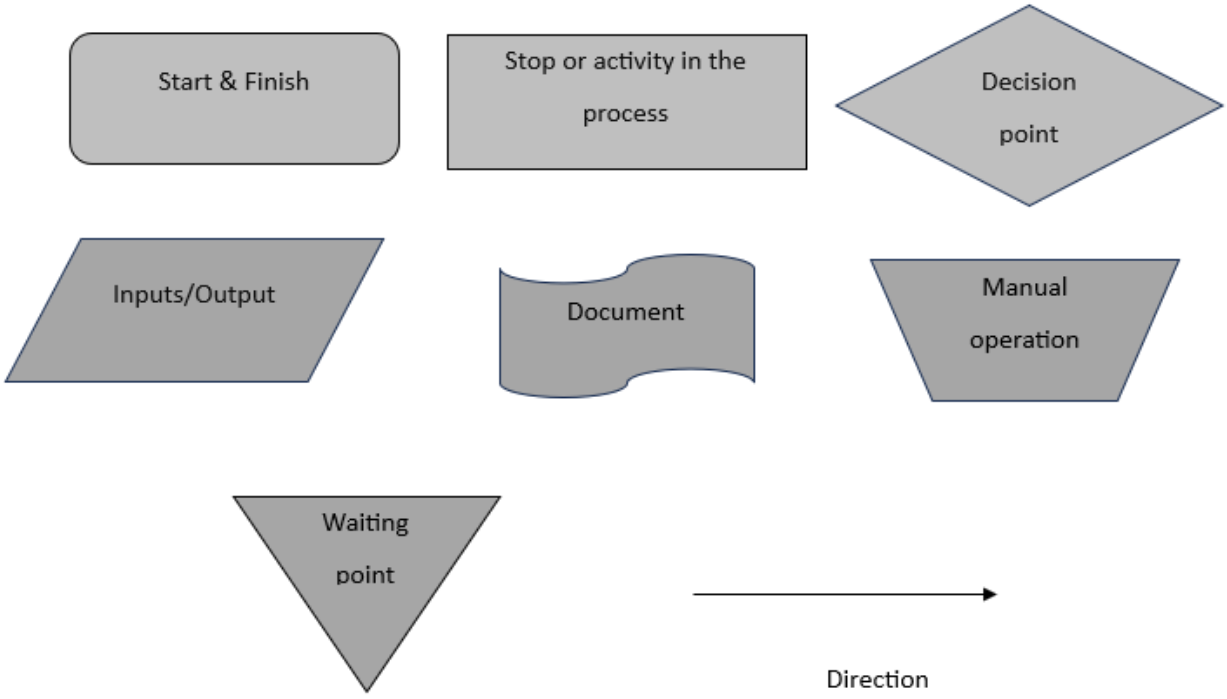

Figure 7. Flowchart shapes

Process improvement model

According to Andersen (2007, p.32-33), processes utilize an organization's resources to refine an object to achieve specified and measurable results for internal or external customers. Improving processes is not an easy task, but in case an organization desires to do so, there are some prerequisites for successful process development. Andersen has developed a process improvement framework that contains six elements.

- The organization's stakeholders and its strategy are included because they form the overall priorities of the organization. They define the critical improvement areas, and even though the improvements don't always necessarily have success, they should be the backdrop against which any improvement project ideas are assessed.
- A thorough understanding of the current process. Understanding how a process is currently performed is a precious platform for improvement.
- Performance measurement helps to address which process should be improved and provides a good view into the current execution of the process.

Performance measurement also allows tracking the process value of process improvement.

- A business process improvement roadmap, which outlines the necessary processes to be developed.
- Environment and culture that fosters improvement. This kind of environment contains expertise, incentives, and attitudes. If employees do not have basic values that support continuous improvement or incentives are missing the effects of improvements will be dismal.
- The business improvement toolbox.

Documenting the current process is necessary in order to understand how the process works, and how process parts are related and connected. While considering process improvement, large entities should be broken down into smaller pieces to make the process more manageable. This can be done in various ways, but it might not be easy to generate a logical flow of activities in a process model. One problem that is related to process modeling is that, even though processes are typically portrayed as a linear set of tasks, the processes are rarely so neat. For that reason, process improvement is vulnerable to phase skipping, retracing the steps, and reiterating work. Andersen (2007, p.107-109)

A process improvement model:

1. Develop improvement priorities based on an overall performance understanding. This is the preliminary stage, that precedes specific improvement projects and aims to understand which processes will be important to improve.
2. Understand the current business process and the performance shortcomings in question. This is the first stop of the actual improvement project and is necessary to understand how the process works at the moment and what seems to characterize experienced problems.
3. Collect data about the performance shortcomings. Process improvement works at its best when it is based on facts and data.

4. Analyze the performance shortcomings to understand the nature of the problem causing undesired performance.
5. Generate ideas about the causes of the performance shortcomings and possible improvements.
6. Develop improvements to remedy performance shortcomings. This includes the selection of the improvement tools.
7. Implement the improvement.

Process standardization

Process standardization and optimization are increasingly gathering companies' attention resulting in a shift to looking at processes as a strategic asset. Standardizing business processes has been proven to generate value for the organization. Well-managed process standardization leads to cost reduction, increased quality of products and/or services, increased process transparency, process time reduction, and better process performance measurability. Process standardization doesn't only increase the performance of the company at many levels, but also can increase customer satisfaction due to the decreased probability of process defects. (Weske, 2019) (Münstermann & Weitzel., 2008, p. 6) In the service industry process standardization also enhances technical interchangeability, compliance with regulations and improved customer confidence. Before going deeper into the process standardization, standardization is described briefly.

Standardization

Standardization is the activity to formulate and record a restricted number of solutions aimed at addressing actual or possible matching problems, directed at benefits for stakeholders involved balancing their needs. These solutions are expected to be repeatable and continuously utilized by a large number of parties over a specific period. (Münstermann & Weitzel, 2008, p. 4).

Ungan (2006) defines standardization as the degree of instructions, policies and operating procedures are formalized and followed. Variability and uncertainty of the process

can be mitigated by routines that are defined by standardization. One big reason that causes process deviation is humans, and the differences in their skill levels, competency, and behavior, which lead to a situation where the same task performed by different people might end up with a different result. Such deviation can be managed by making instructions at a detailed level. Standardization also enables smoother process handover within departments and organizational boundaries. (Goel et al., 2023) Goel divides process standardization into seven stages:

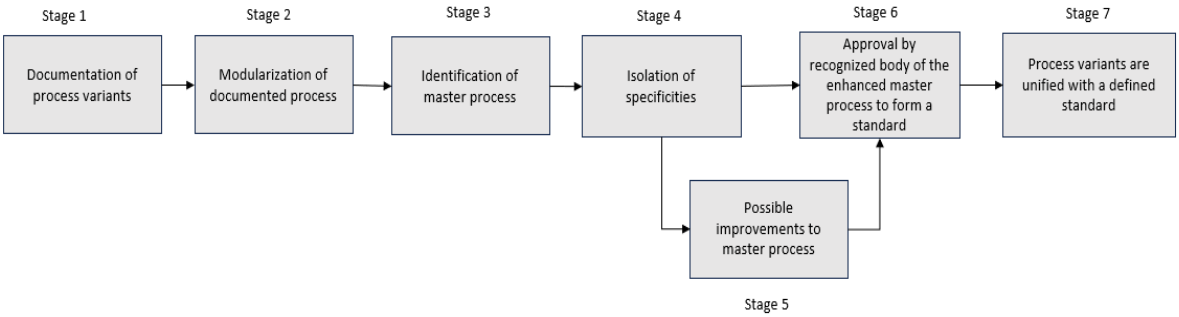

Figure 8. Process standardization (Goel et al., 2023)

Stage 1. Documentation of process variants: Gathering all the process variants to be standardized. Usually done in the form of process models and descriptive text.

Stage 2. Modularization of the documented process: Modularization refers to arranging subprocesses to logical entities. This stage contains defining responsibilities of process tasks and accountability for the execution of process parts. Also making sure that necessary aspects are documented at the required level is part of the second stage.

Stage 3 Identification of a master process: Once process variants have been documented and modularized, and the best practices have been identified, the master process can be shaped in three different ways:

- One of the process variants can be selected as the master process.
- Master process can be combined from multiple process variants using the best practices of all the process variants.
- Completely external process. External processes can be adopted, for example from another firm.

Process performance indicators such as quality, cost- and time efficiency are generally used to identify the best solution as a master process.

Stage 4. Isolation of specificities: Some process variants might include specifications that do not apply to other process variants. Specifications that are not common for all the variants must be isolated from the master process. After isolation, the number of variations has been minimized from the master process.

Stage 5. Possible improvements to the master process: Goel argues that the 5th stage "improving the master process" is optional and should be executed only if the master process still needs further improvements to be adjusted at this stage. A company might want improvements at this stage if the master process does not meet the requirements or satisfy them as it is.

Stage 6. Enhanced master process approval as standard: After possible adjustments have been made in stage 5, the next stage is process approval as a standard. The process becomes a standard only if it has been approved by a formal authority.

Stage 7. Unifying variants with the standard master process: Once the master process has been approved by the authority, the final stage is to unify process variants with the standard process. The process becomes standard after the process variants are homogenized against the standard.

Process implementation and implementation barriers

Some employees might be reluctant to accept the new processes due to earlier experience of poorly implemented processes. To hold back reluctance, process implementation must be justified, and the organization should reserve enough resources for the process implementation. (Reif et al., 2019)

2.7 Study framework

The purpose of the study framework is to combine all the literature around supplier onboarding and summarize how they are related to each other. Also, understanding

process improvement is important to make suggestions for the current process of the case company.

To improve current processes, it is crucial to understand how the process parts are related and connected, what the outcomes of the current process are, why such outcomes occur, and why these outcomes are not able to meet expectations. If these steps are not taken, and data is not collected & analyzed about the shortcomings the correct improvement steps can't be taken, since the improvement should be based on data and facts. While considering process improvement, large entities should be broken down into smaller pieces to make the process more manageable. It is essential to allocate sufficient resources to implement a process successfully. Under-resourced process implementations are known to be prone to failures.

If supplier onboarding is observed purely from the suppliers' perspective, supplier onboarding is simply about ensuring a "smooth start" for the supplier, providing them with all the necessary information and understanding to collaborate effectively with the business unit. However, from the buyers' perspective, it has a much wider purpose.

As stated earlier, supplier onboarding involves collecting information from a supplier selected by sourcing for qualification and registration. It also involves sharing the buyers' expectations, process procedures, and business requirements, as well as integrating suppliers into the supply chain and IT- systems. (Lucidchart, 2024) IT-Systems themselves don't generate advantages but organizations that utilize systems to streamline processes benefit from reduced transaction costs, smoother information flows and higher responsiveness from the supply chain. (Kim & Narasimhan, 2002) Therefore, these advantages are only achieved if the integration is done successfully, and the systems are properly utilized. Supply chain integration is driven by the demand for seamless processes and information flows. Supplier integration makes the supply chain upstream more visible and helps to reduce uncertainty in the supply chain. More specifically integration lowers uncertainty arising from changes in orders, demand volatility and lead-time fluctuations.

These are crucial factors in reducing transaction costs. (Vanpoucke et al., 2017) For the aforementioned reason, in practice, supplier onboarding plays a significant role in the successful integration of suppliers, hence decreasing transaction costs.

The results of collaborations are more meaningful to measure when collaboration expectations and business requirements are identifiable and known by both parties. (Jääskeläinen & Thitz, 2018) These targets should be set and clear at the beginning of the relationship before the buyer implements the supplier to their supply chain.

Trust is not something that either exists or doesn't exist, rather, trust is based on several different factors, including beliefs, actions, and experiences. Trust is reflected in the interaction within the relationship, outcomes, the operating environment, and perceived experiences, which in turn influence the development of trust. (Huang & Wilkinson, 2013) As mentioned earlier in chapter 2.3.2, particularly in the early stages of a relationship Shamsollahi et al. (2020), trust plays a significant role in determining the direction in which trust will develop in the future. Since the supplier onboarding process occurs at the beginning of the business relationship, it can therefore be assumed that the outcome of the process (how the process is conducted and how the outcome of the process appears to the parties involved) affects the building of trust. This is because if the process is not carried out properly, it can impact the supplier's ability to work with the buyer, and the supplier's inability to meet the buyer's expectations (occurs in the form of poor performance) can affect trust-building between the counterparts.

3 Methodology

The methodology chapter provides a framework for understanding the research approach used in this study. This section presents the methodological approach to the research and explains how data is collected and why certain methods were chosen to answer the research questions. The case company is briefly introduced, and the principles of case study research are described. Additionally, data used in this research is analyzed and the quality of the research and the used data is evaluated.

3.1 Case company introduction

The case company operates globally in the field of electrification of motion. The case company competes among market leaders of the industry and has multiple production sites on different continents. The case company has a global customer base, and several customers are internationally significant operators and market leaders in their industries. A large portion of the company's products are exported. This thesis was executed at the request of the company's local business unit and the results of the thesis will be utilized only in a local business unit.

Business units' production strategy lies somewhere between Engineering to order & mass customization but also has some nuances of MTO & MTS. Especially, ETO and mass customization cause a lot of variety in production which reflects directly down to the supplier network. Product BOMs can contain anything from dozens to hundreds of different components. Needless to say, keeping up with the business of such a production strategy requires a well-managed supplier base. The supply base covers approximately 100+ active different kinds of suppliers from retailers who deliver standardized parts to workshops who produce highly customized components for the needs of the business unit.

3.2 Methods and data collection

3.2.1 Case study

A case study is a commonly used approach in business research and is a method that is used to investigate a real-world phenomenon in a certain circumstance or certain environment, concentrating on a single organization, a single location, a single person, or a single event and these are precisely the elements that distinguish case study research from other research methods. To provide a detailed examination of a case, generally unstructured interviewing and participant observations are good data collection methods. Typically, case studies are associated with qualitative research methods, which is not entirely true. Instead, case study research generally favors qualitative methods. Case studies can contain only one case or multiple cases. (Bryman and Bell, 2011, p. 59–62)

3.2.2 Qualitative research

In qualitative research, the data can be collected from primary and secondary sources. Primary data is collected by interviews within a range of unstructured-structured, qualitative surveys, or observations. Secondary sources are pre-processed information such as documents, books, and journals. It is important to keep in mind that none of the above-mentioned methods of information collecting is 100 percent accurate and reliable. (Kumar. 2018, p. 215-216)

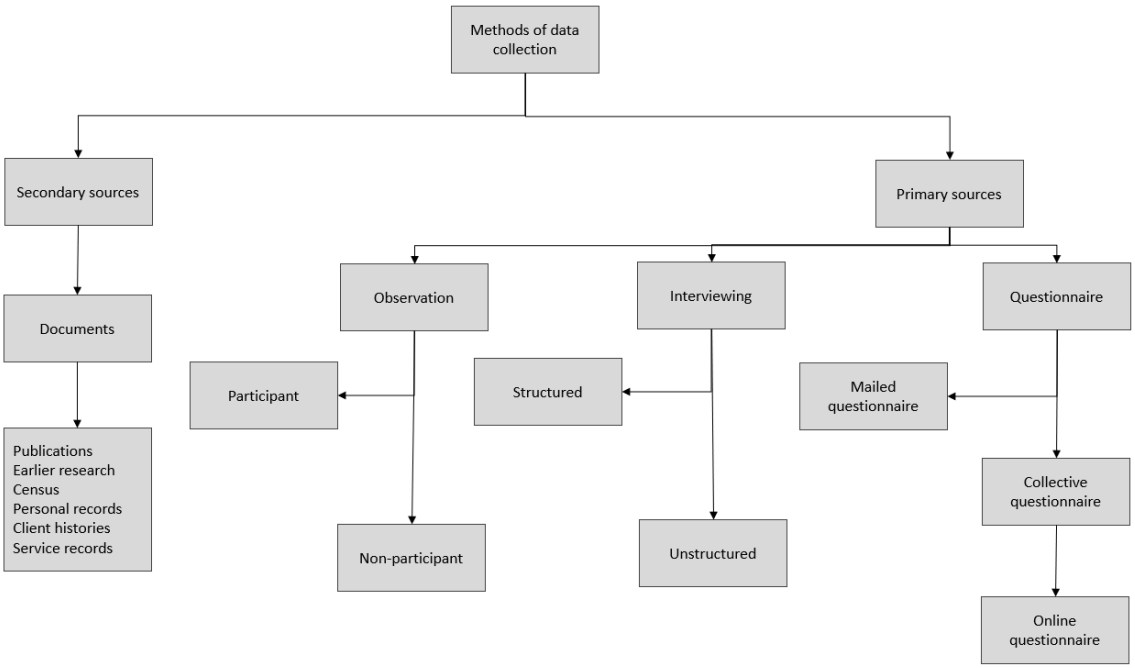

Figure 9. Methods of data collection (Kumar 2018)

Qualitative research considers the natural context where individuals or groups function and aims to provide a profound understanding of real-world phenomena. According to many qualitative researchers, the surrounding reality is observed through social, cultural, historical, and individual lenses, which explains the differences in experiences of real-life problems and phenomena. In general, whereas quantitative research deals with calculable issues and answers to research questions such as “how much”, “how many”, or “how often”, qualitative research tries to justify and answer questions like “what”, “how”, and “why”. (Korstjens & Moser, 2017) Typically, in the qualitative approach, research starts with wide and more or less open research questions, that may narrow as the research is carried out. (Denny & Weckesser, 2022)

3.2.3 Interviews

Data utilized in this research is primarily gathered by interviews. All the interviews were semi-structured, which means that the questions were predefined, but the discussion around the questions was open and interviewees might have been asked clarifying

questions depending on their responses to the predetermined ones. The interviewees were divided into three different interview groups, based on their roles and contribution to the supplier onboarding process. Interviews had three different sections: Supplier selection, supplier onboarding & integration of suppliers, and daily operation with suppliers. Participants' working experience in their current positions varied from less than a year up to 19 years. Participants also had comprehensive working experience from different departments and different roles in business unit, such as project management, sales, production development & production supervising. 16 interviews were done in total.

The first interview group involved four sourcing managers, who have the main responsibility for supplier onboarding process. The questions assigned to sourcing managers addressed supplier selection process, supplier onboarding process & integration of suppliers, and daily operations between the business unit and suppliers. In other words, sourcing managers answered all the interview questions. Work experience in their current role ranged from two to 11 years.

The second interview group represents people who are either partially responsible for supplier onboarding process or partially involved in the process. The second group involved three operational purchasers and three operational purchasing managers. The interviews covered the supplier onboarding process & supplier integration and daily collaboration with suppliers. Their experience in their current position varied from four to 19 years.

The third group involved different kinds of professionals across the organization. Questions for the 3rd interview group addressed people from different departments who are perceiving the outcome of the process in their daily work. The 3rd group was formed of people from logistics, production, and quality department. The questions for the third interview group concerned the weaknesses of the supplier onboarding process

outcomes which they observe in their daily duties. Working experience for 3rd interview group for the current position was from less than a year up to eight years.

Table 7. Interview participants

IG	Professionals attended	Number of participants	Working experience in current position	Subject of questions	Number of questions
1.	Sourcing managers	4 Sourcing managers	2-11 years	Supplier selection, Supplier onboarding & integration, Daily operations with supplier	13 Main questions 5 Clarifying questions
2.	Operative purchasers & Managers	3 Purchasers 3 Managers	4-19 years	Supplier onboarding & integration, Daily operations with supplier	9 Main questions 3 Clarifying questions
3.	Logistics, Production, Quality	3 Logistics 2 Production 1 Quality	<1-8 Years	Daily operations with supplier	2 Main questions 3 Clarifying questions

3.3 Data analysis

Interviews were the main source of data for this thesis. There was an intention, and it would have been adequate to collect data for the research by multiple methods. During the research planning phase, it was intended to use existing materials and documentation in addition to interviews and combine all these. However, very soon after the interviews began, it became clear that such documentation did not exist, and at that point, it was clear that the answer to RQ1 had to be formed based purely on the interviews. For

the credibility of the research, it would have been important that there would have been also other sources of data, which could have been utilized to answer especially RQ1, which concerns current state analysis.

The interviews were done during March-April 2024. The length of the interviews varied from 13 minutes up to over two hours, so some of the interviewees simply answered predetermined interview questions, but in most cases, there was also open discussion around the interview questions. 14 of 16 interviews were held remotely via Microsoft Teams and the last two interviews were organized face to face because job roles for the two last participants required face to face approach and they could not attend a remote interview.

All the interviews were individual and anonymous, which means that there were no external stimuli that might have influenced the interview responses. Interview questions were sent in advance only for IG1, this is to ensure as accurate a description of the current process as possible, and that the interviewee's description of the process is not limited to only those aspects that came to mind during the interview. For the remaining interviewees, questions were not given in advance. This is because the responses were as spontaneous as possible, and to prevent the interviewee from having the opportunity to think about what the interviewer might want them to answer.

The interviews were recorded and during the interviews, the main observations were written down as bullet points. After the interview was done, summaries were made for every interview and for each question based on the answers received. Before summaries were concluded the interview recordings were listened to multiple times, to make sure that no important findings were missed.

After all the interviews were done the answers were structured in Excel tables, with the purpose of identifying how the responses relate to each other, and if there are similarities or differences among the interviewee’s responses. When the answers were

tabulated, charts were created to depict the overall results of the interviews. Main themes were identified and if the theme occurred in the interview, it was given 1 as a value, and if there were no occurrence the value was set to 0. Eight charts were provided in total, to help illustrate interview observations. These charts are used in chapter four. What comes to the errors made by the suppliers (presented in section 4.3), the data was organized in a way that the nature of the errors was examined and analyzed to determine whether the error could be attributed to the supplier's weak orientation or if it was caused by some other factor.

3.4 Quality tests of the research

Case studies are one form of empirical research. According to (Yin, 2003, p.35-39), four tests are relevant to evaluate the quality of empirical research. These are construct test that basically concerns if correct measures are selected for the concepts that are studied, internal validity test is used to find out the causal relationship of the research findings (does certain condition lead to other conditions), external validity test is used to determine can study findings be generalized and under what conditions, and reliability test is used if researchers intention is study if someone else can repeat the same study, with same data, ending up with similar results.

Construct validity

Construct validity is hard to prove since the research is based on the experiences of the case company employees. On the other hand, the findings of RQ2 support the findings of RQ1 (Problems that occur are caused by the poor state of the current process.) In this research construct validity has also been gathered by collecting literature related to the thesis topic such as supplier selection, supplier integration, supplier onboarding and performance measurement, creating a framework for the thesis by linking all these together.

Internal validity

In research, it is not possible to completely exclude other factors that may affect the results. These factors can include, for example, negligence of the supplier, personal chemistry, misunderstandings, and cultural differences. Nevertheless, it is important to remember that, initially, a business relationship is in the interests of both parties, and one party cannot be forced into a business relationship. Therefore, negligence cannot be given significant weight when analyzing the results.

External validity

External validity most likely causes data quality problems, since premises in each company are different, and the objective of this thesis is to find out the current state of a specific process, in a specific environment, and problems related to the process are based on the experiences of employees of a specific company. The research is so related to a single case company, that expanding it to external environment might not be possible without getting different results.

Reliability

To answer RQ1 two prerequisites were defined for the sample (interviewees) to interview groups 1 & 2. The first requirement was that the person needed to have sufficient work experience within the case company, this is to make sure that participants have proper understanding of business units' processes. The second requirement was that the person needed to have previous experience of the actual supplier onboarding process in the case company. Because of these requirements, part of the overall population was excluded from the sampling, as these two predefined conditions were not met by those individuals and thus, they would not have had significant value for the research results, or their perspectives could have not been based on the experience and could have distorted the research outcome. However, the sample size which was used to answer the RQ1 was quite high, since the sample size represented 66% of sourcing managers of the business unit and 60% of the operational purchasers including purchasing managers.

When investigating RQ2 all the interviewees had equal weight. Interview group 3 represents only a minor group of the total existing population since the business unit has hundreds of blue-collar workers. That is why participants were selected from as many departments that was deemed practical, but since there were significantly more potential interviewees, it is possible that if someone else had conducted the research the responses could have been different. The departments for interview group 3 were chosen by the fact that they are directly or indirectly observing the outcomes of supplier onboarding process and participants to the interview were selected by their working experience in current roles and their previous experience of different roles in the business unit.

If this research had been done by someone else, most likely the data gathered from IG1 & IG2 would have been similar. Regarding data from IG3, results could be different if the sample had been selected using different criteria.

4 Results and findings

This chapter discusses the observations that were made about the process based on the interviews. This chapter aims to describe the current process structure in as detail as possible and discuss process-related documentation. At the end of this chapter the weaknesses of the current process, the problems caused by these weaknesses and associated costs will be analyzed. Additionally, a development proposal for the current process will be provided in the form of a new structured process model.

4.1 Existing documentation

The company has a lot of documentation and instructions concerning supplier selection. This documentation goes through the supplier selection process on a very detailed level and the process has step-by-step walkthrough instructions, which sourcing managers can follow while making new supplier selections.

The same can't be said about supplier onboarding. The supplier onboarding process is documented only on a very high level from the divisions' perspective. This documentation does not describe the process on a detailed level, so this kind of high-level documentation does not serve the needs of the business unit concerning the process execution. Only one of the 10 interviewees from IG1 & IG2 recognized that this kind of onboarding documentation exists, so this documentation is not publicly available for the interviewed departments. Because of a lack of detailed level documentation, the current process structure is defined purely based on the details collected from the interviews.

The current documentation obligates the business unit to go through a demand and supply handling process, invoicing procedures, reporting quality and delivery issues, code of conduct, business ethics & global terms and conditions. The process documentation needs to be more precise to execute the process successfully. Also, in practice, a lot of

information needs to be shared with suppliers on a very detailed level, especially concerning the demand and supply handling process.

4.2 Current process (As Is)

This section covers the supplier selection and onboarding process as these have been described in the interviews with sourcing managers. At the end of chapter 4.2, an attempt has been made to illustrate the current process in figure 11. as it has emerged from the interviews.

If the supplier is intended to be utilized only by the local business unit, the responsibility of negotiating and supplier onboarding belongs to local procurement teams. Local procurement is divided into strategic- and operational procurement, which are solely responsible for one or multiple MDF (Material description framework) categories. If the supplier is new to the business unit but is also already used by other business units of the division, the global sourcing team is responsible for certain phases of the supplier onboarding process.

Weak documentation has led to a situation where the process is carried out in an unstructured way, even though the process contains multiple tasks that must be or are beneficial to be executed in a specific order. Currently, the process structure depends highly on the responsible person’s (sourcing managers) individual working experience and working methods. Additionally, new suppliers are added to the supplier network quite rarely, which means that there isn't much repeatability in the process, but process execution remains recollective. Lacking documentation of the process and general process instructions enables variability in the process, which makes the process “vulnerable”. In this context, vulnerability refers to forgetting necessary process stages or improperly executed stages.

Supplier selection

Supplier selection begins with needs assignment. Demand for a new supplier might arise from the need to replace the current supplier for existing products or product categories. Also, a common trigger for the process is new product development. When the process is triggered by NPD, the business unit's R&D engineers participate in the process and collaborate closely with sourcing managers, providing technical expertise, and giving support for decision-making, to ensure suppliers' technical capability. R&D engineers also might attend later in the part qualification stage.

Before BU starts RFQs with suppliers, suppliers are required to sign an NDA contract. Contract can be unilateral or bilateral depending on the type of relationship. NDA contracts cover patents, immaterial property and other confidential information that should not be shared with third parties and set sanctions on possible leakages.

Generally, the business unit seeks to utilize suppliers that are already doing business with other BU's (Later legacy suppliers). In the case of a legacy supplier, the global sourcing team takes care of negotiations and contracting with the supplier, which is observed as a benefit, since it reduces the workload from the local sourcing team. In the case of legacy suppliers, an NDA contract has already been signed and part of supplier qualification is already done by another business unit. These are globally applicable, which reduces overlapping work. On the other hand, the global sourcing team does not attend to the actual supplier onboarding process so, after negotiations the responsibility of supplier onboarding is shifted to local sourcing managers.

When the business unit is selecting new suppliers, the selection criteria are more based on the individual impression of the sourcing manager than on general guidelines or common policies. The lack of general supplier evaluation methods makes systematic supplier evaluation hard especially for new employees who don't have previous experience in such decision making. New employees are thus largely dependent on their colleagues

when making such decisions. Therefore, the success of the selection might be highly dependent on the working experience and expertise of the person making the decision.

Based on the interviews frequent decision-making criteria patterns could still be identified. The most common criteria that appeared in the interviews were: suppliers' capability of producing required quality and quantity (capability and quality), suitable machinery and equipment concerning business unit's needs, third-party certificates, suppliers engineering expertise, previous experience of working with other business units of the group and price. In all the interviews emerged very clearly that price is the most dominant single decision factor, which forces shifting the supply chain from domestic to foreign countries.

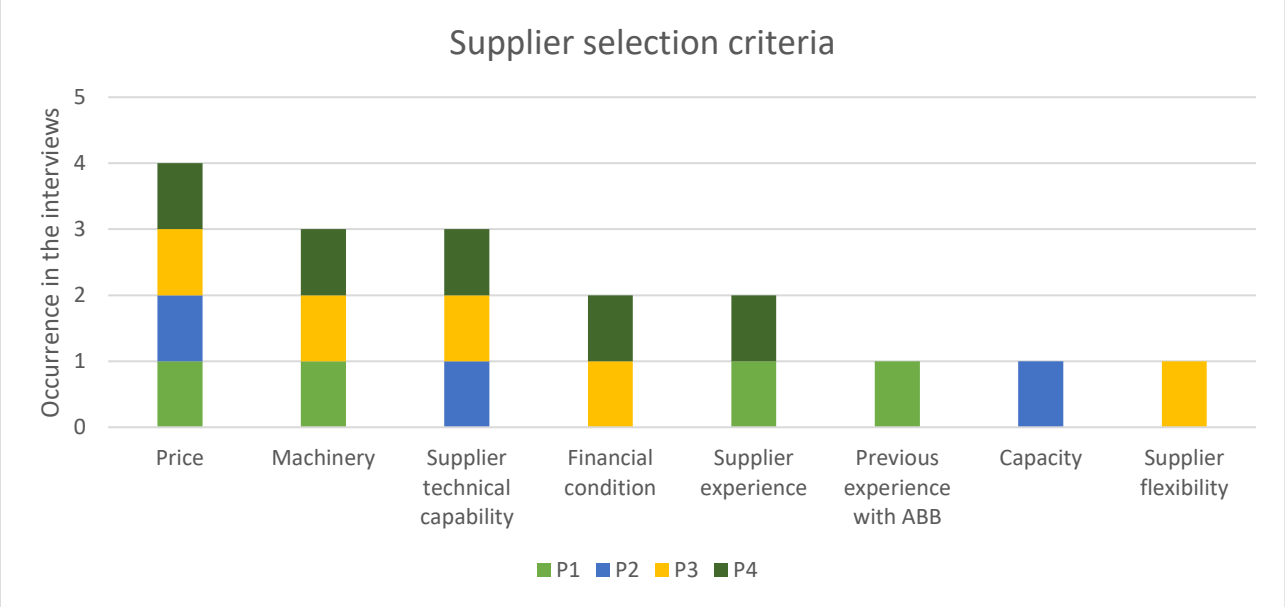

Figure 10. Supplier selection criteria

Supplier evaluation

Based on the literature, supplier evaluation is used for mitigating risks and bad engagements. By evaluation, the organization strives to find the most suitable supplier concerning their needs. Usually, a comparison of candidates is done by using various comparison tools. However, business units do not utilize supplier scorecards, AHPs or any similar

tools, but evaluation and comparison are also mainly based on individual impressions. Therefore, supplier selection is not supported by any traditional comparison tools or analyzing methods. On the other hand, since purchasing price is the main if not the only decision-making attribute, whereas other criteria mentioned in the last section are more like prerequisites, such comparison might be unnecessary. At this stage, it is relevant to note that "price," is only referred to purchasing price, not total cost efficiency.

An interesting observation of the supplier selection phase was that the business unit does not necessarily sign contracts with new suppliers. In the case of a lack of supplier contracts, daily operations and procedures are based on the general terms and conditions of the case company. Based on transaction cost theory, contracts are used as forcing mechanisms to ensure suppliers are operating as required by the customer. The absence of a contract that can be customized on a case-specific basis according to the nature or criticality of the relationship can lead to a situation where the business unit lacks sufficient means to sanction a poorly performing supplier.

The price advantage that is gained by shifting the supply chain to foreign countries does not come without disadvantages or tradeoffs. The disadvantages of shifting the supply chain from domestic to foreign suppliers were brought up by the 2nd interview group. These disadvantages occur in the form of communication barriers, cultural differences, time zone differences and long transportation times, which in case of supply chain disruption reduces the resilience and flexibility of the supply chain. These disadvantages might cause dissatisfaction and may be weighed up when making supplier selection decisions.

Qualification process

The qualification process is separated into two phases, supplier qualification and part qualification. In the supplier qualification stage, the business unit ensures that the supplier meets the preliminary requirements and there are no obstacles to starting the

collaboration. In part qualification stage supplier's product quality is assessed and the supplier's production process is documented.

The supplier qualification phase is divided into two stages. Qualification stage 1 contains request and registration. In the qualification stage 2 actual supplier evaluation and qualification are done. For supplier qualification company uses the SAP Ariba system. The system is used globally and always contains the standard pattern of qualification questions. SAP Ariba is a cloud-based supplier management & sourcing system, provided by the market leader of ERP and other business software solutions, German-founded SAP company.

Supplier qualification stage 1

Request

In the request phase, basic information about the supplier is collected through a request form, which is provided for the supplier to be filled in. Basic information refers to address details, contact details, tax codes, etc. The code of conduct is also shared with the supplier for approval. The information the supplier provides in the request phase is used for supplier registration and simultaneously for ERP integration. In the case of legacy suppliers request phase can be skipped because the request phase done earlier by another business unit applies globally.

Registration

The second phase of supplier qualification stage 1 is registration. In the registration phase, the supplier profile is opened to the SAP Ariba system. Once the supplier has been registered to the SAP Ariba, the system provides a unique guide number for a supplier, which is used to integrate the supplier into the ERP system by linking the guide number to the ERP system.

Supplier qualification stage 2

Qualification

Qualification stage 2 contains the actual supplier evaluation and qualification. The supplier is required to respond to a set of questions concerning suppliers' fundamentals and capabilities to operate with the business unit. Whereas in the qualification stage 1 basic supplier information was collected, in supplier qualification stage 2 more detailed information of supplier capabilities is collected and evaluated. The information collected at stage 2 concerns:

Data security

The data security questionnaire intends to ensure that the supplier understands and meets the requirements concerning data security. That means the business unit requires that they have implemented appropriate data protection in the case the supplier utilizes or provides sensitive information for/from BU.

Sustainability

By questionnaire, the company ensures that the supplier has the authorization to conduct business and follows local laws and regulations concerning human rights, health & safety and that suppliers' operations are environmentally sustainable. These things are also covered in BU's code of conduct which suppliers must approve at the first stage of the qualification process. By approving a code of conduct suppliers commit to adhere to the CoC, not only by themselves but also by their own supplier base and partners. These questions intend to exclude any possibilities of abusing unreasonable working conditions, child labor and utilizing conflict minerals. Also, suppliers are required to have valid environmental and OHS management-related certificates and provide copies of the certificates as proof of appropriate working methods and conditions.

Integrity

In the integrity phase, BU's intention is to clarify supplier connections and share/stakeholders. The intention of the investigation of such things is to make sure that suppliers

do not engage in corruption, do not operate, or have any connections to sanctioned parties and do not have any operations in sanctioned or restricted locations. Suppliers' intention of using subcontractors for goods that are delivered to the business unit are also thoroughly inspected, to ensure that the matters are not circumvented through any arrangements. Suppliers' internal integrity programs are also evaluated.

Operational capability

In the operational capability section, BU is eager to find out what kind of operative management, monitoring and measurement procedures suppliers have already in place with their current customers. By these questions, BU tries to clarify the fundamental level of operative readiness to operate with BU. This section contains questions regarding quality management, performance monitoring, risk mitigation plans in case of disruptions in the supply chain, continuous improvement program, traceability, and other operative-related issues. The goal is to gain a precise view of the operational readiness level of the supplier to collaborate with the business unit. The supplier is also asked to provide a copy of possible third-party certifications as evidence of operational readiness.

The whole qualification stage is completely system-controlled, which makes it highly structured. Even though sourcing managers experience that SAP Ariba is a very rigid system, a system-controlled process has been found beneficial, as the system doesn't allow shortcutting or skipping in the process, instead, the process always follows the same steps. The rigidity of the system has been perceived as an annoying factor, but the need for this kind of stiff system-oriented process is commonly identified and broadly accepted. This is explained by the fact that new suppliers wouldn't be adopted on a whim, as the new supplier onboarding and integration process is heavy and time-consuming. Additionally, some of the product categories always require supplier site audits on top of qualification questionnaires. Supplier audits can also be conducted in situations where sufficient clarity regarding the supplier's readiness hasn't been obtained through questionnaires.

After the questionnaires are done and evaluated, based on the evaluation results supplier can be either fully qualified, partially qualified, or disqualified. In case of disqualification, the next candidate is chosen from a shortlist that the sourcing manager has provided in the supplier selection phase.

Part qualification

Before taking regular deliveries from suppliers, a product qualification process is executed to make sure supplier product quality meets the requirements in practice. Ideally, product qualification should contain three different batches of goods, sample batch, 0-series batch, and production batch. Based on the interviews, all these different batches may not necessarily be implemented. Execution of batch numbers is highly dependent on a situation where a new supplier is onboarded, and usually, the supplier is fully implemented after one successful sample batch, because the process is executed in a rush due to the business unit's business strategy. In the case that onboarding happens based on a long-term consideration, it is more likely that the product qualification goes through all three different steps, but if the requirement for a new supplier arises from urgent demand (for example triggered by sales unit) 0-series and production batch are likely to be skipped, due the lack of time reserved for the process. Therefore, can be concluded that the project schedule impacts the product qualification stage.

The internal quality department, sourcing department, and purchasing department are directly attending the product qualification stage. Also, production is involved indirectly by making assembly tests at the assembly lines. The sourcing department is responsible for determining the nature of sample products and sample sizes. Operational purchasing places the sample order and the quality department does testing and quality measurements for the sample batch. The quality department either approves or rejects the sample batch. In case of rejection, the quality department provides a list of defects and necessary changes for the supplier.

PPAP

The case company's primary process of production process and part qualification is the Production Part Approval Process (PPAP). It is a structured method of defining and establishing the steps necessary to ensure that the material/part satisfies the customer. Production Part Approval Process (PPAP) is a rigorous process intended to ensure the supplier's ability to manufacture sustainable high-quality parts at a proven volume. PPAP focuses heavily on the supplier's processes and capability to yield conforming material. The supplier must receive PPAP approval from the business unit prior to the first regular delivery of production parts. As a result of the PPAP process, the Part Submission Warrant (PSW) will be executed and documented by both the case company and the supplier. The PPAP Process is executed simultaneously with the sample process.

System integration

BU offers different systems and system interfaces to ease and enhance suppliers' daily operations with the business unit. Each system has a specific purpose of use, that the supplier can and should utilize in daily work with the unit. Each of these systems is used for providing and sharing information between BU and the supplier.

System X

System X is a system interface, that is used in the purchase-pay process. This system has multiple functionalities concerning the purchasing process, and the interface communicates directly with BU's ERP system. Through the system interface suppliers can pick up purchase orders, divide purchase order lines, confirm & reconfirm orders, manage order backlog, and provide order backlog reports. As the supplier makes changes to purchase order statuses in the interface, the information will be transferred to the ERP system of the business unit in real-time. This enhances data reliability in the ERP system.

System Y

Some of the production operations of the business unit have been outsourced to suppliers. These operations are managed through system Y. When the business unit initiates

the first operation of the production phase in the ERP-system, information about the start of production is conveyed to the supplier through System Y, enabling the supplier to commence their own process on time. Suppliers can pick up work orders and order-specific instructions from system Y.

System W

System W is a system where technical drawings are stored. These technical drawings contain product-specific information, such as product dimensions, tolerances, and surface treatment requirements, which suppliers need when producing deliverables. Quality measurements are done against these drawings at the business unit.

System Z

System Z is a system that contains specific working- & manufacturing method-related instructions for suppliers. For some components, suppliers need to follow the instructions in order to achieve the required quality, because quality for some of the products is highly dependent on the manufacturing method.

System Q

System Q is used for two-way exchange of information. System Q is used to share product-related certificates, meeting materials, storage levels, pricelists, forecasts, and other documents and information that is utilized in daily operations.

Certain systems are utilized globally by multiple business units, but the functionality of the systems varies between BUs. This means such systems must be adopted on a local level because each unit can enable or disable system functions, which means that for example, legacy suppliers might not be able to utilize systems as they are accustomed to. For suppliers who are doing business with multiple BU’s this kind of system variation might appear confusing.

Supplier data setting and supplier orientation

The data maintenance and supplier instructions phase contain a few different tasks that are required in order to get the supplier onboard. Firstly part-level data must be established and maintained in the ERP system before the business unit can start purchases from the supplier. Part-level data refers to material master data, info records of suppliers, source lists, and allocation. In the last phase, the supplier is instructed to operate with the business unit. These instructions include purchase-to-pay process instructions and general process requirements on a superficial level.

Current process summary

Figure 11. tries to illustrate the current process structure. Basically, most of the necessary process steps are identified, but the content of process stages and the order of execution of the steps is not standardized. Additionally, roles and responsibilities are not clear for process participants for each process step.

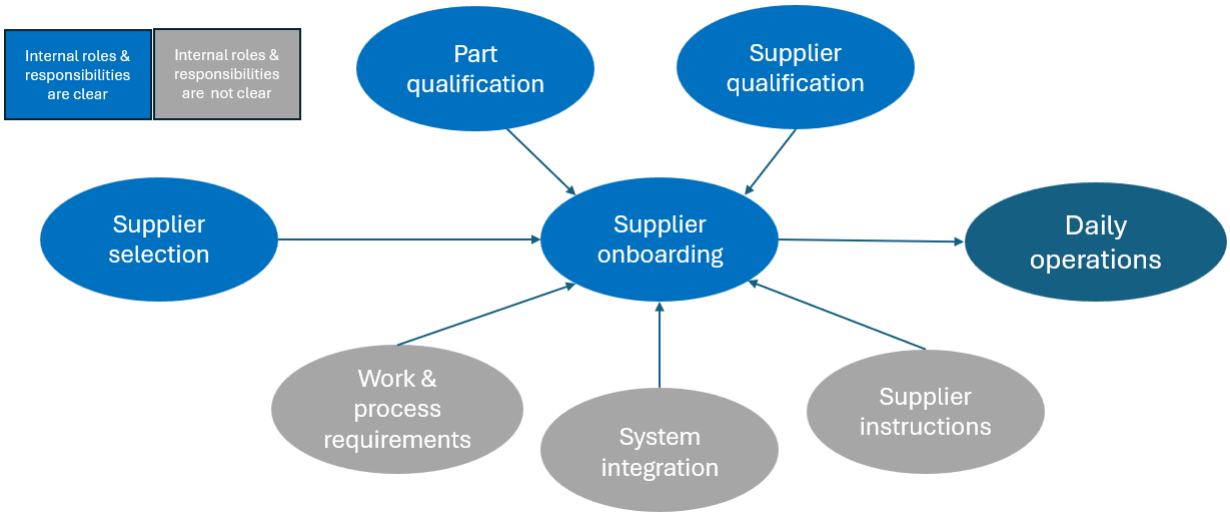

Figure 11. Sketch of the current process

4.3 Problems of the current process

Unstandardized process structure

The first observation that was made in the interviews was that the business unit does not have a standardized process structure to carry out supplier onboarding. The process is carried out based on experiences of previous projects. Unstandardized process structure increases the risk of inconsistency and leads to varied executing procedures, resulting in the situation that process activities or order of process activities might vary case by case, even though some of the activities are related and should be carried out in a certain order. This also poses a risk that some critical process steps are left unexecuted or carried out inconsistently.

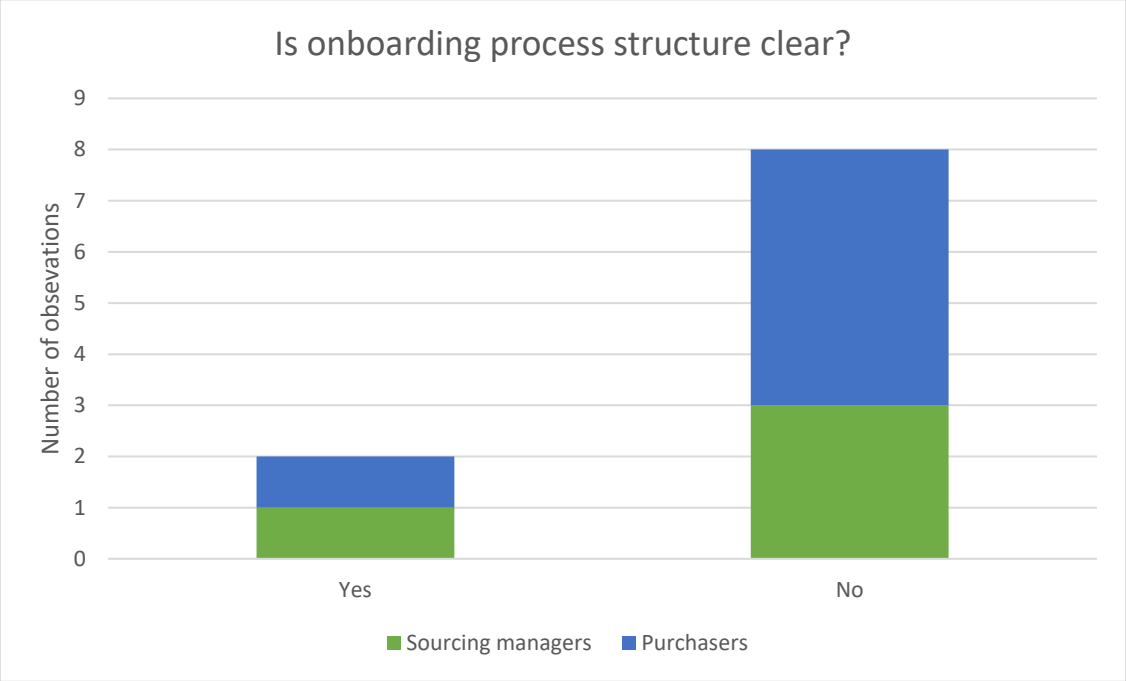

Figure 12. Onboarding process clarity

Internal roles and responsibilities

Even though sourcing managers have the main responsibility for process execution, the supplier onboarding process consists of multiple stages and involves other internal departments as well. Other departments should be partly or mainly responsible for the

execution of certain process stages, especially when considering the process from the point of expertise. The division of responsibilities for certain process stages divided opinions among the interviewees, and some participants couldn't name the responsible departments for certain stages at all. Assumptions of responsibilities without clear liability distribution also pose a risk of gaps in the process that may not necessarily be noticed during execution.

Figure 13. Roles and responsibilities of supplier onboarding in the case company

In the interviewees' views, there was also variation in the division of responsibilities within the process. This is likely due to the fact that different product categories have developed different practices over time, based on previous experience in the absence of a standardized structure.

"The responsibility of an operational purchaser must not include anything that slows down the initiation of operational work. It is sourcing's responsibility to ensure that the supplier is ready for use before the handover from sourcing to operational purchasing occurs." (P7-Operarational purchaser)

Supplier selections should be made based on supply chain strategy. Therefore, in the interviews, there was a consensus among the interviewees that supplier selection and negotiations with suppliers fall under the responsibility of sourcing. The same applies to supplier qualification because it is strategically important to evaluate suppliers before they are qualified. Also, interviewees had a common perception that the main responsibility of the supplier onboarding process belongs to the sourcing managers. They are responsible for ensuring that onboarding is done appropriately and in a suitable scope.

Operational purchasers and quality specialists join the process in the part qualification stage. Operational purchasers are responsible for sample orders, meanwhile, quality engineers are responsible for measuring samples and giving feedback to suppliers. The sourcing and quality department share responsibility for carrying out the production part approval process.

When it comes to the system integration and the supplier orientation sections, internal roles and responsibilities were not clear to the interviewees. In addition, as mentioned earlier, the lack of a standard process structure has led to the situation that these roles and responsibilities vary between the product categories. In some categories, sourcing is responsible for system integration and instructing suppliers but in another category, the responsibility for those has fallen to operational purchasers. In some product categories, the roles for such things are not defined at all.

These uncertainties may lower the quality of supplier instructions by leaving gaps or even significant deficiencies in the guidance. That is because sourcing is not involved in daily operations with suppliers and might not have the competence to give suppliers adequate instructions for daily operations, or do not know what kind of systems the nature of the relationship requires. This can also lead to insufficient system integration or even excessive system integration.

In the past, there have been cases in which it has been noticed afterward that some of the necessary systems have not been properly implemented and suppliers do not have access to systems that the nature of the supplier requires. On the other hand, operational purchasers lack the expertise to instruct suppliers considering the needs of sourcing managers.

Internal uncertainty about roles and responsibilities results in a situation that is complicated in two ways. Firstly, new suppliers do not receive comprehensive instructions about operating with the business unit. Secondly, the instructions for new suppliers are not consistent with each other.

Non-existent supplier handbook

The business unit does not have an existing supplier handbook that is shared with suppliers to get familiar with the business unit requirements, expectations, and procedures. Instead, the person who delivers instructions compiles a guidance package for the supplier, which includes instructions deemed necessary by the person. As a result, the experience and competence of the instructor also have a significant impact on the quality of the orientation the supplier receives to work with the business unit. The current approach does not adequately consider factors such as suppliers' diverse backgrounds, geographical locations, or cultural differences.

“Often it becomes apparent when a new supplier comes on board that some instructions are based on 'tacit knowledge,' and that some of the instructions are very vague, leaving a lot of room for interpretation for the supplier. Additionally, the supplier often follows unclear or weak instructions without questioning them or asking for clarification.” (P13-Quality specialist)

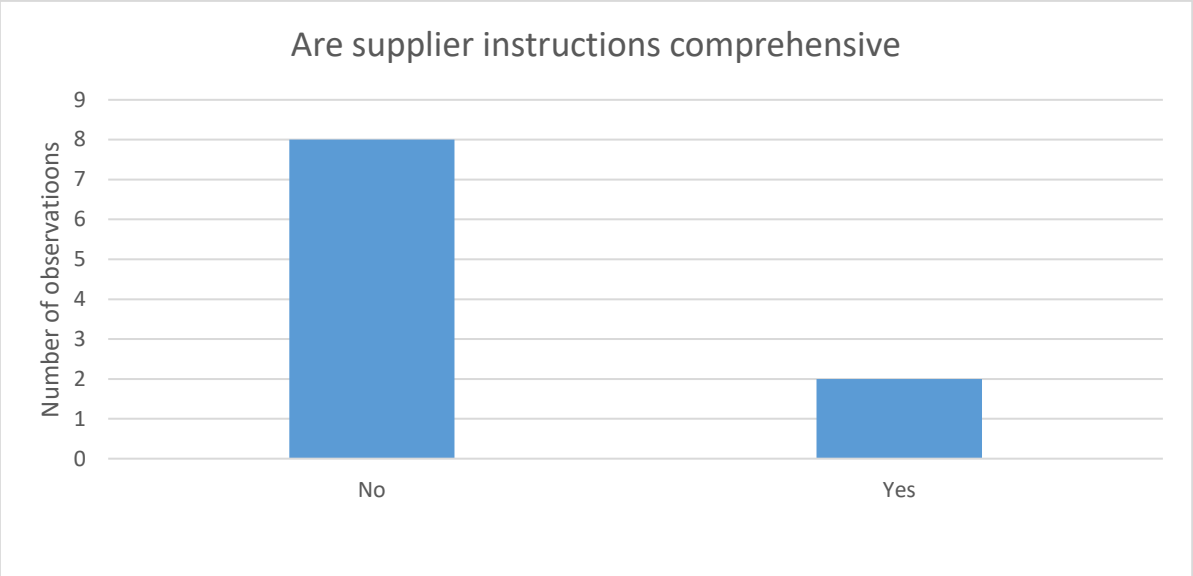

Figure 14. Instructions comprehensiveness.

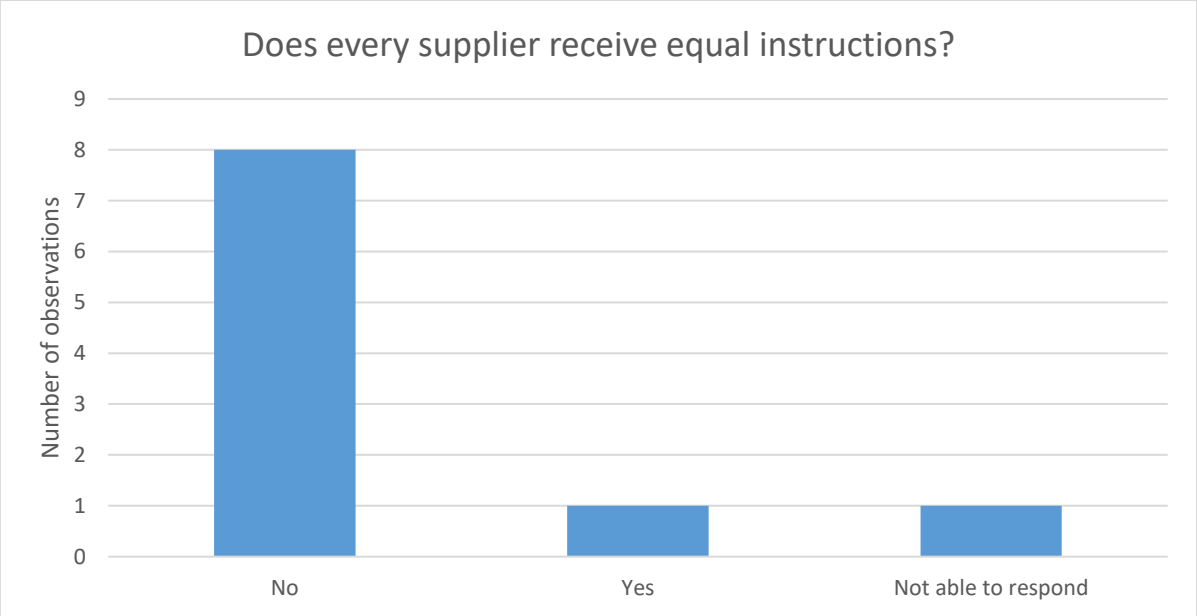

Figure 15. Instructions equality.

4.4 Supplier errors and caused costs

The study revealed that an unstructured supplier onboarding process with internal uncertainties creates a wide range of problems. These problems occur in the form of

supplier errors. The identified errors made by new suppliers are listed below from most common to least common:

Document quality

The business unit requires multiple different documents in its purchasing operations. The documents that arose in the interviews were order confirmation documents, packing lists, and invoices. These documents are used for order monitoring, goods receptions, custom clearances, and invoice payments. Based on the interviews, problems with documents occur in the form of missing information on documents, faulty information on documents, document language, document unclarity, and missing documents. Unusable documents cause downtime in the processes and generate investigation costs.

Poor document quality can also cause external warehousing costs, for example, if customs clearance can't proceed as scheduled. Indirectly problems with documents can also create overtime costs if the production schedule needs to be altered due to prolonged custom clearance. The problems with documents were the most widely recognized supplier error and were brought up in 13 of 16 interviews. This is likely explained by the fact that these documents are used by several different departments for their own purposes throughout the organization.

Document requirements should be presented to the supplier in the onboarding process, during the orientation phase. Regardless of the nature of the supplier, document requirements are generally the same for every single supplier and the requirements are something that doesn't usually change suddenly. Because these documents are used in multiple different departments for various purposes, document quality affects the execution of multiple different processes in the organization. Currently, the business unit does not share guidelines regarding document requirements with suppliers.

Packing and package markings

Another widely recognized category of supplier errors is packing and packaging-related problems, which were also brought up in 13 of 16 interviews. In conclusion, it can be inferred that packing & packaging markings are the most common problems alongside document quality that the business unit faces when they are starting with new suppliers. These problems refer to incorrect packaging methods, inadequate packaging quality, improper labeling of packages, and the placement of packaging documents within the package. Incorrect methods and inadequate packaging quality expose the goods to transportation damage and might make the handling of the packages hazardous. Poor packaging practices resulting in component breakage can lead to inspection costs, reclamation costs, material handling costs, as well as labor costs for both white and blue collars, production rescheduling, production delays, and can cause even customer delays.

In the interviews, it was brought up that the business unit has a vast amount of various component types, which means a huge amount of various packaging instructions. Also, business units have a few different packaging instructions which are partially contradictory. Currently, the suppliers are provided with guidelines that the instructor is accustomed to using.

Product quality

Product quality was the third biggest new supplier-related problem. This cannot be justified by a poor onboarding process, especially when the supplier's poor quality is dependent on the supplier's negligence or other factors affecting the quality of components supplied by the supplier. However, it should be noted that some of the poor-quality components result from the supplier's potential lack of awareness regarding how to track revisions of technical drawings. This is something that has been brought up in the interviews. In some cases, the suppliers have been incorrectly instructed on how frequently the revision of the drawings should be checked, or the instruction of revision changes has been totally neglected.

“In general, it can be stated that the supplier's overall quality is good, but there are occasional instances of negligence in production.” (P13- Quality specialist)

Missing product markings

As stated earlier, the business unit utilized a vast number of different kinds of components in their production. Most of these components are very similar to each other. Therefore, the supplier should mark individual components so that they can be identified in production. Component marking is a procedural matter that should be discussed with the supplier during the orientation phase. Inadequate and missing product markings cause problems for the organization when the product cannot be identified visually.

Delivery times

On-time deliveries are critical to the business unit, which produces small batches of various products and aims to minimize storage costs. The issue is not necessarily the extended delivery times, but rather that new suppliers do not understand well enough the time models that the business unit operates with. An early delivery is as problematic as a late one, and the business unit has determined a specific time window when deliveries are allowed. This is also something that should be thoroughly discussed with the supplier during the orientation phase to avoid such problems.

Other addressed problems

Other problems that occurred in the interviews were less frequent: component prices (4) (Suppliers do not adhere to agreed price lists, or they do not understand the applicability of the price list.), components quantities (3) (Suppliers do not adhere to ordered batch sizes, but deliver entire batches completed from a single batch, prepackaged batch, or entire pallet size.), communication (1) (Suppliers do not recognize designated contacts and approach the wrong individuals with incorrect inquiries.) and freight carrier nominations (1)(Suppliers do not use the nominated freight carrier.)

As seen in Table 6, these kinds of errors are not so much related to product quality, but rather to service and process quality. It can be assumed that the errors are of such a nature that they could at least partially be avoided if the supplier's orientation and instructions were adequate.

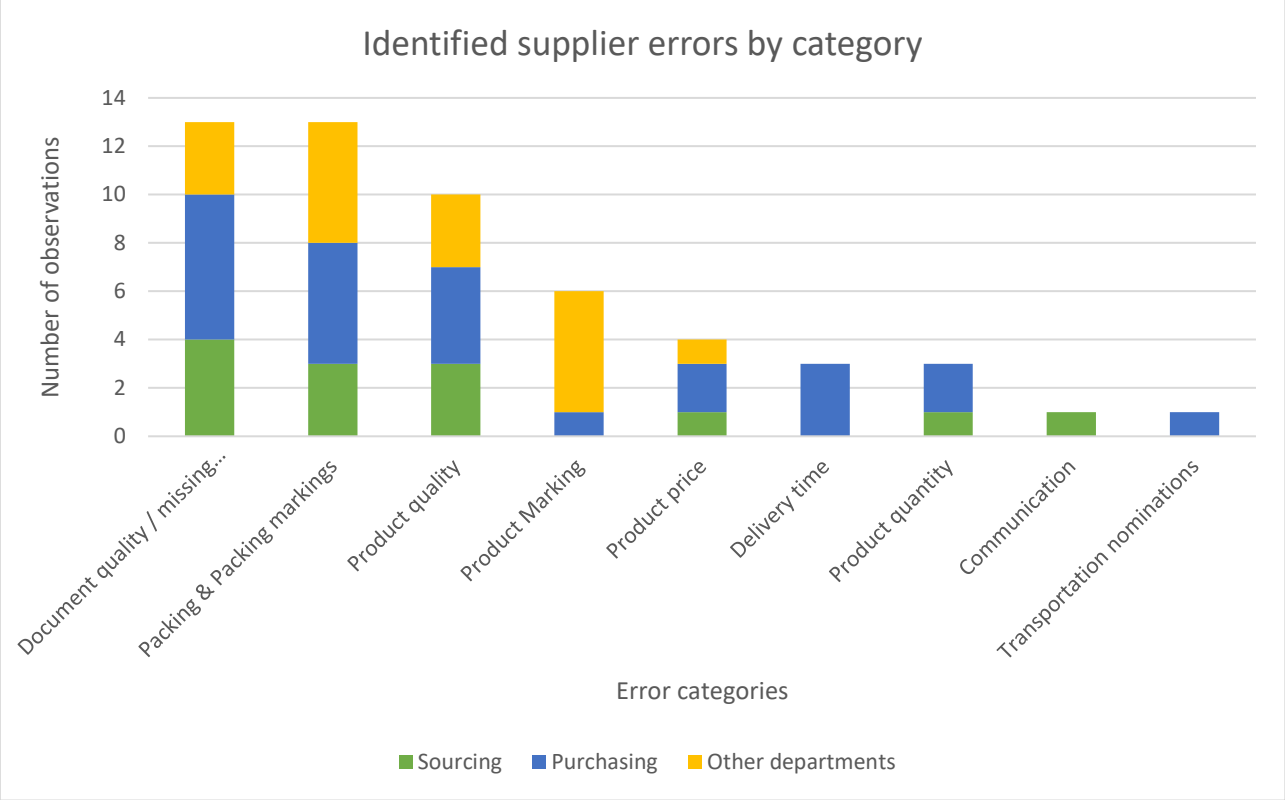

Figure 16. Supplier error categories

Time spent on supplier errors

The results of the amount of time spent on supplier error investigation are not surprising. Most of the participants admitted that they are facing these problems on a weekly basis, even with suppliers that have been operating for a while. The distribution of time spent on errors is also not surprising.

Figure 17. illustrates well the fact that the departments primarily affected by a poor process are those that are not directly involved in the supplier onboarding process and do not have direct interactions with the suppliers. In the chart, the time spent by the other

departments of the organization is broken down, with and without the quality function. This is because resolving supplier errors is an integral part of the daily work of the quality department. Therefore, including the quality department in the same column as the rest of the organization would distort the chart due to the nature of their work. These observed problems by other departments are primarily tangible and almost always require problem resolution before the work can proceed. All the time spent on resolving supplier errors detracts from productive work time.

Also, purchasers are facing a lot of errors, because errors observed in other parts of the organization are typically reported directly to operational purchasers. Purchasers are responsible for guiding the supplier towards corrective actions.

Figure 17. Avg. time spent on errors

The following types of costs were identified as resulting from supplier errors. Instead of focusing on the monetary amounts, in this case, it is more meaningful to examine the nature of the costs incurred by the errors.

Direct costs

Direct costs are expenses that can be directly attributed to supplier error.
Investigation costs arise whenever a supplier error is detected within the organization, whether it is related to documentation, packaging, quantity, or quality. These errors require extensive involvement of employees within the organization, which certainly explains why these costs were frequently mentioned in the interviews.

Handling costs refer to the physical handling or work done on defective deliveries, for example**:** moving, scrapping, and repacking or re-palletizing defective products or packages, which is also a common expense resulting from supplier errors. In product and packaging-related errors investigating and handling costs are cost types that pretty much go hand in hand.

Indirect costs

Indirect costs are more difficult to define than direct costs. Indirect costs refer to expenses that do not directly result from the supplier's error but would not have arisen if the error had not occurred.

Special freight costs usually result from poor product quality but can also result from the supplier's inadequate understanding of the business unit's production schedule and production lead times, damaged- and irreparable products during transportation. Also, inadequate documents that cannot be used appropriately might cause minor delays. These problems often occur, especially with overseas suppliers. In such cases, the business unit has no choice but to use express shipping or place a replacement/repair order to a local supplier if possible. In the worst case, BU is forced to pay alternative local suppliers overtime costs, if the general delivery schedule of replacement order does not fit

in with their production schedule. Simultaneously, production overtime costs own production or production rearrangement costs may arise if production falls behind schedule.

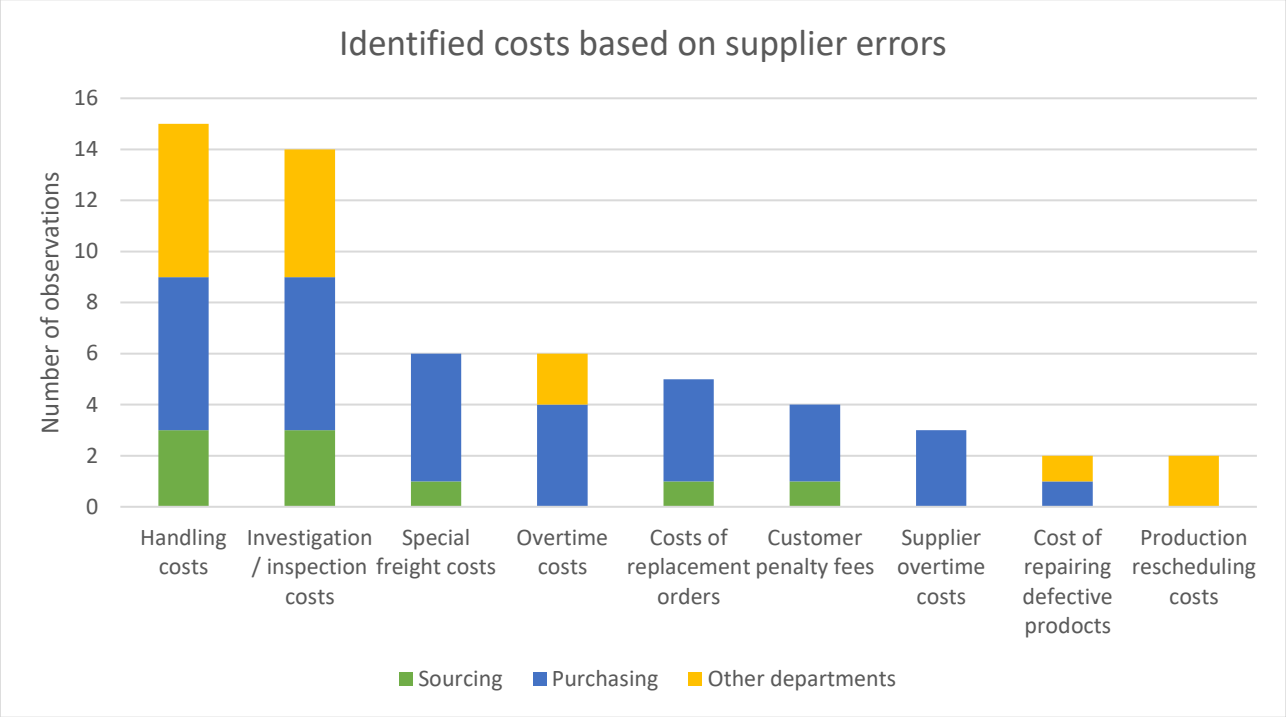

Figure 18. Identified costs

4.5 To be

To eradicate fundamental issues within the process, both the structure and responsibility allocation of the process need to be standardized. Also, a new supplier handbook was produced, to mitigate orientation-related issues. The supplier handbook includes general process requirements of the business unit and a wide range of necessary operational instructions.

The need for standardization of the process divided opinions among the interviewees. Six out of ten interviewees believed that the supplier onboarding process should be standardized, while four out of ten believed the onboarding process cannot be

standardized into one mold. The opinions against standardization were justified by the fact that not all suppliers can be fit into one mold since the nature of suppliers needs to be considered in the process. One interviewee also expressed concern that if the process is standardized, it may become overly burdensome for local suppliers, while for foreign suppliers, the process may become too light. However, these are issues that can be addressed in the standardization process with different process variations. Most of the interviewees agreed that in the majority of supplier onboarding projects, the same steps need to be taken, regardless of the nature of the supplier.

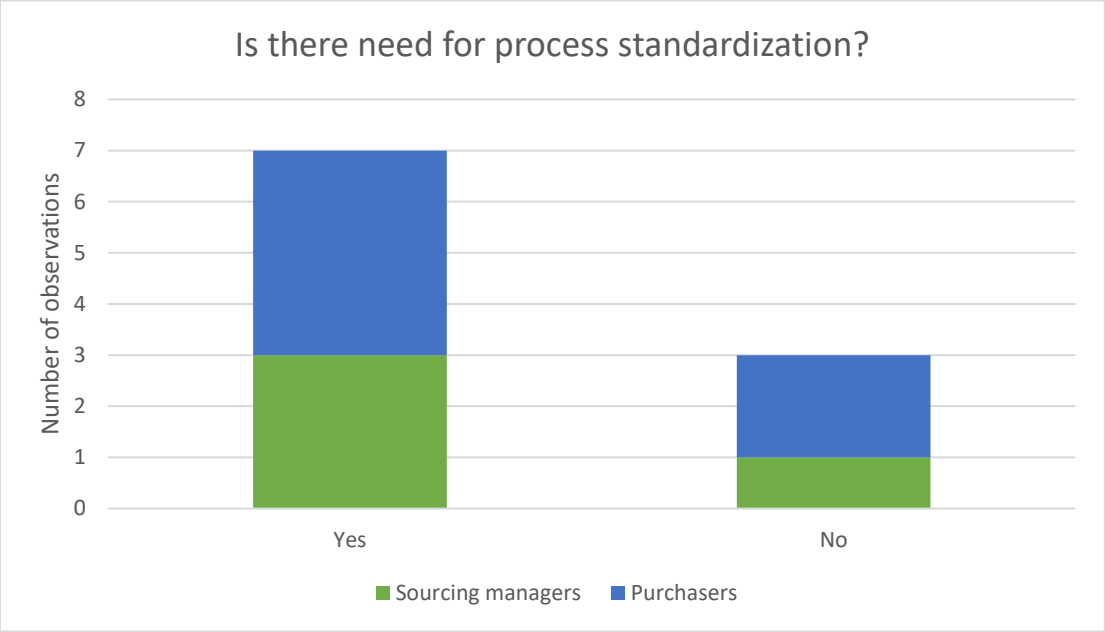

Figure 19. Demand for standardization

4.5.1 Fixed process structure

As a result of this thesis, a gate-modeled fixed process flowchart proposal has been developed for the company, aimed at standardizing the structure of the supplier selection and onboarding process. To be able to do so, it is crucial to identify all the necessary process steps/tasks and understand the relation between them.

The process is scalable regardless of the nature of the relationship. The process is divided into five distinct phases, each delineated by gates. The purpose of these gates is to depict the point at which all steps to the left of the gate must be completed in order to pass through and proceed with the process. Gate-based process model eases the internal traceability and transparency of the process and makes process status communication easier.

The identified stages of the process include supplier selection, supplier qualification, part qualification, system integration, supplier orientation, and daily operations. The objective of the standardized process structure is to ensure that henceforth, when onboarding new suppliers, the same process phases are always followed, thus preventing any steps from being overlooked or skipped. By utilizing the process chart for future executions, suppliers will have equal starting capability to work with the business unit, and the structure of the onboarding process will no longer be contingent on specific individuals.

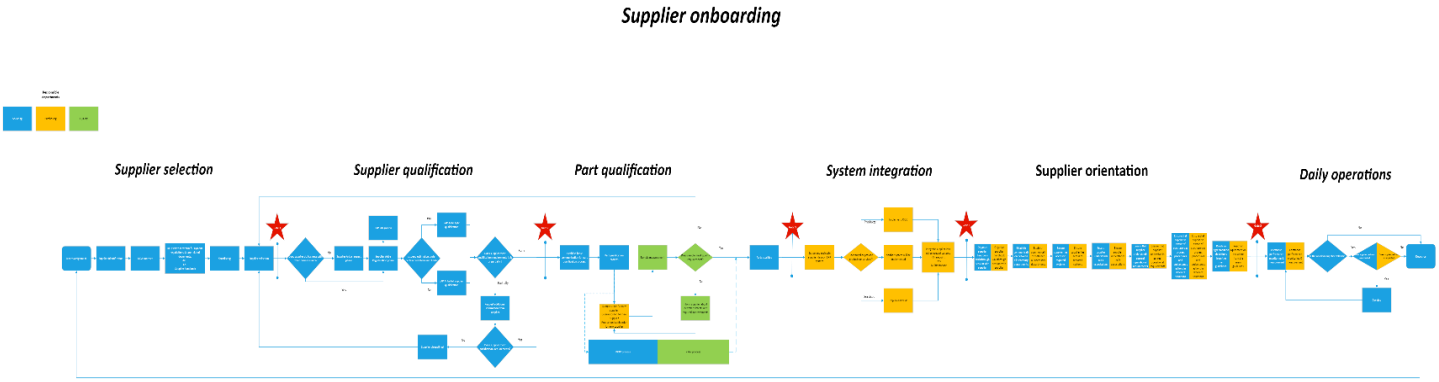

Figure 20. Redefined supplier onboarding process chart

Responsibilities

In the new process model, responsibilities are allocated so that at each stage of the process, the individuals with the most relevant expertise regarding that stage are responsible for executing certain stages. The determined responsible departments are sourcing-, purchasing- and quality department. The project team comprises the sourcing manager,

who is responsible for the product category of the new supplier, and the responsible purchaser for the same category. If the supplier provides multiple product categories, the responsibility falls on individuals whose areas of responsibility are expected to have the largest volume. Additionally, there is a supplier quality and development engineer tasked with duties related to part quality.

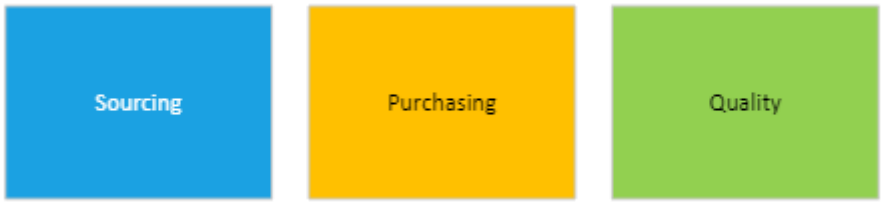

Figure 21. Responsible departments of supplier onboarding process.

Supplier selection

As mentioned earlier, supplier selection is a strategic decision and for that reason, the responsibility for supplier selection decisions falls on the shoulders of sourcing managers. The main difference in the supplier selection stage in the new process compared to the previous practice is that the supplier handbook is delivered to the supplier already during the request for proposal stage. This is because the requirements of the business unit may influence the RFQ results. In the new process structure, the supplier is able to take into account all the business unit's requirements during the RFQs, and these requirements do not come as a "surprise" to the supplier at the later stages of the supplier onboarding process, as might have been in the past.

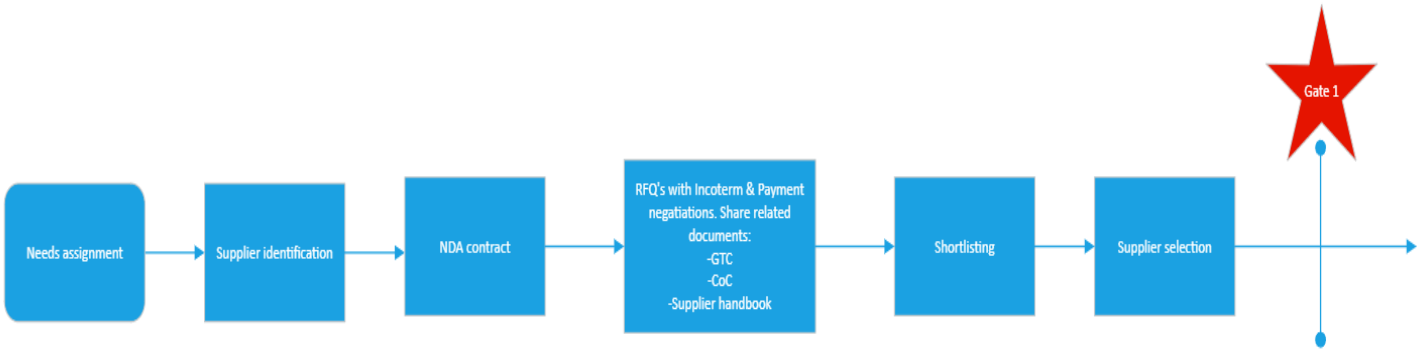

Figure 22. Supplier selection flowchart.

Supplier qualification

As stated earlier, strategic procurement is solely responsible for the supplier qualification. A process flowchart has been created to clarify the process stage, but no changes have been made to the actual process, as the process is largely system-driven and the structure of the supplier qualification phase is standardized at the division level. Additionally, the supplier qualification phase has been deemed clear and effective, so there was no deemed need for business unit-specific process adaptations.

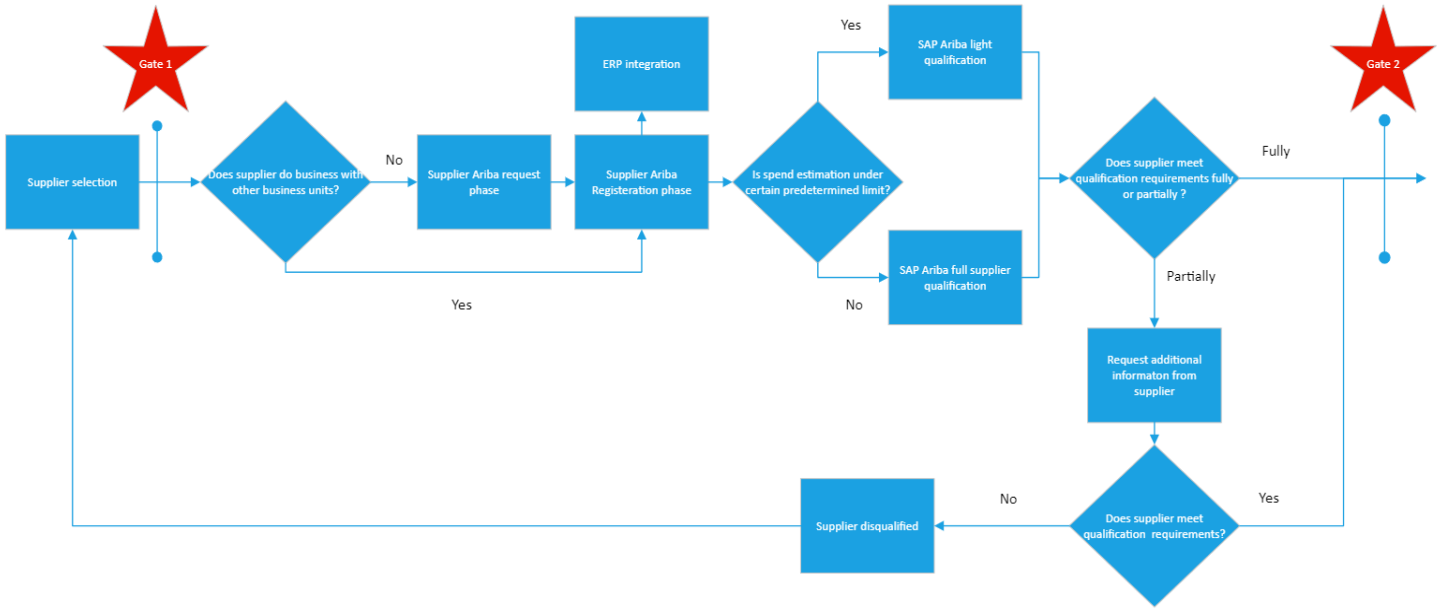

Figure 23. Supplier qualification flowchart

Part qualification

The part qualification phase is crucial since the products manufactured by the business unit mainly consist of components designed by the business unit itself and use very few off-the-shelf products, therefore product quality must be tested, and the suitability of the products must be ensured before the supplier is implemented. In the case that a new supplier provides catalog products, the part qualification phase may not necessarily be appropriate.

The part qualification phase is the first stage where there are shared responsibilities for executing the process phase. Sourcing-, purchasing-, and quality departments are responsible in this phase, with each having its own tasks to carry out the process. The sample process is implemented until the supplier is able to deliver the required product quality, or if the supplier is rejected, in which case the process returns to the supplier selection stage and a new candidate is chosen from the shortlist. Concurrently with the sample process, the PPAP (Production Part Approval Process) is implemented, documenting the supplier's component manufacturing processes.

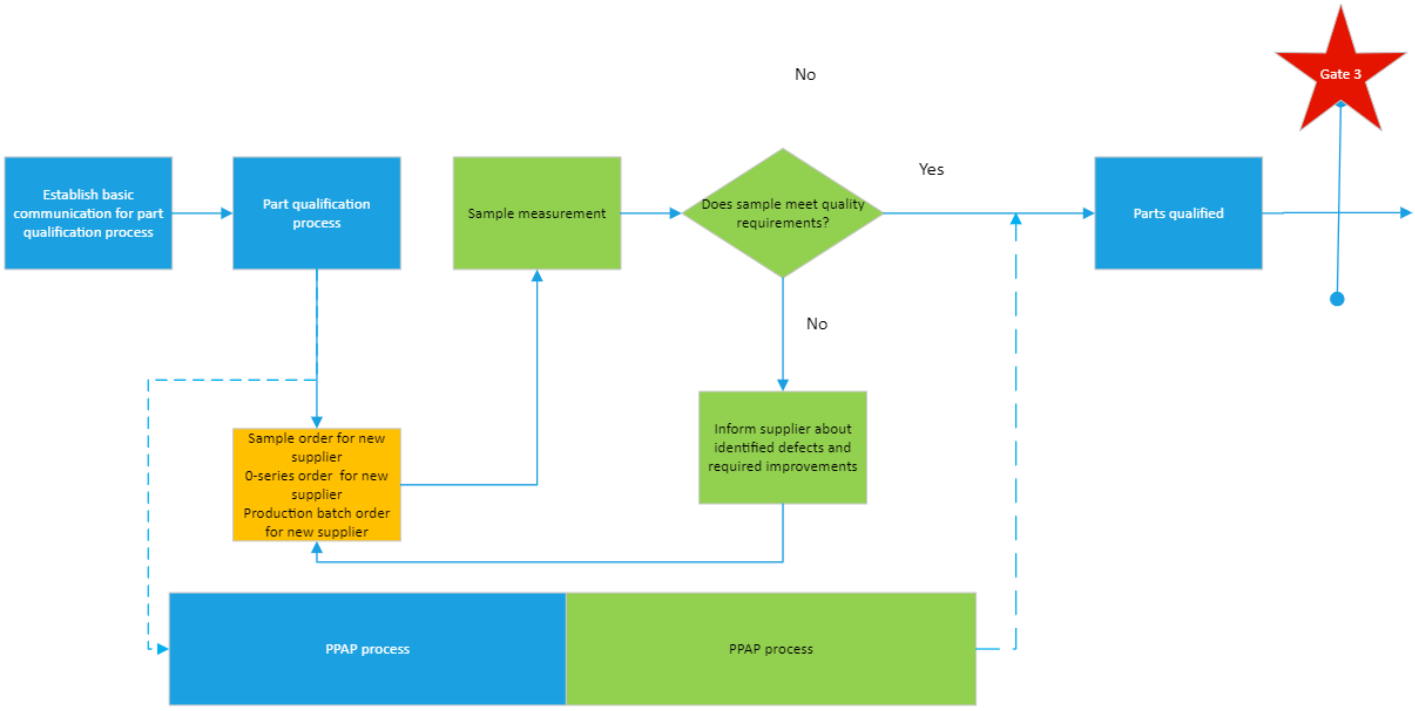

Figure 24. Part qualification flowchart

System integration

Up to this point, the responsibilities of system integration have not been clear. In the new process model, the responsibility for such integration has been determined to belong to operational purchasers. There are two reasons why this decision was reached. Firstly, all systems offered to the supplier by the business unit are related to operational activities, so operational purchasers have better expertise than sourcing managers regarding the systems required by the nature of the supplier. Secondly, operational

purchasers themselves use some of these systems on a daily basis, giving them better competence to guide the supplier in the use of these systems. The setting up of ERP data before this stage of the process has been unnecessary work in the case that the supplier does not successfully pass the part qualification stage.

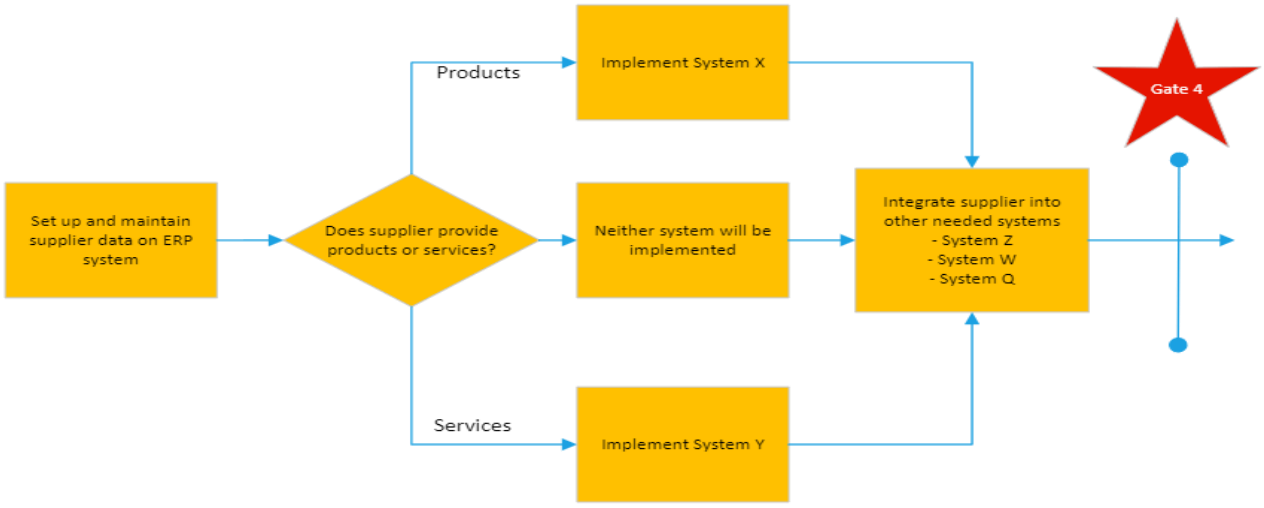

Figure 25. System integration flowchart

Supplier orientation

Until now, there hasn't been a specific phase in the supplier onboarding process where the business unit's requirements and guidelines are discussed with the supplier. Instead, the supplier has only been provided with guidelines deemed necessary. The purpose of the orientation phase is to ensure that both the supplier and the business unit have all the necessary contact information for the business relationship. Additionally, it aims to ensure that the supplier has access to the required systems and understands the business unit-specific process requirements and expectations. The walkthrough session also provides the supplier with the opportunity to ask clarifying questions if any guidelines are unclear and allows for agreement on deviations from normal practices, if necessary, before starting daily interaction with the supplier.

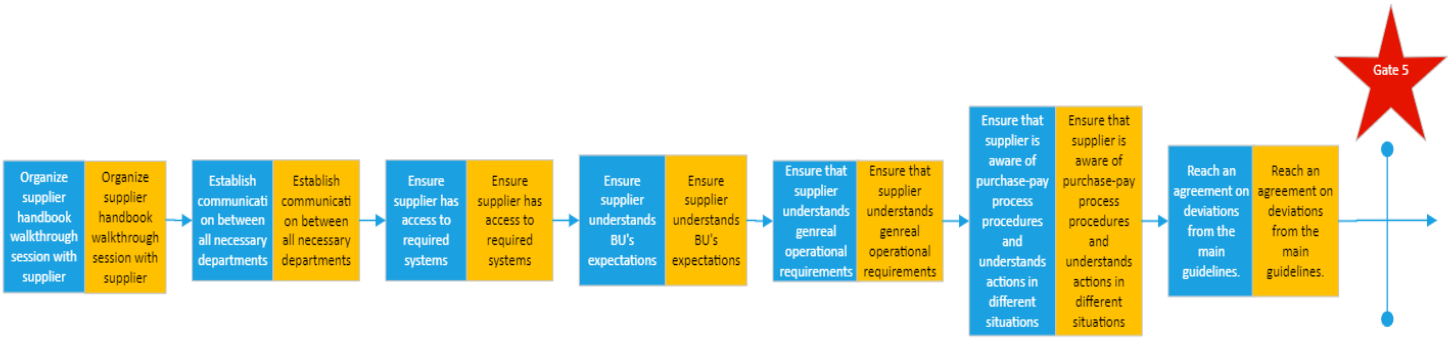

Figure 26. Supplier orientation flowchart

Daily operations

Only after all the previous process stages have been completed, daily operations with a supplier can be started. Daily operations with the supplier involve continuous measurement and monitoring. Simultaneously, the business unit can assess if the need for the supplier is still justified. If the business unit's demand changes, or if the supplier fails to meet the expectations, the supplier can be desourced. If the desourcing happens due to a change in demand no replacement supplier will be sought, but if the desourcing happens due to the supplier's performance, the current supplier is desourced, and the entire process is restarted.

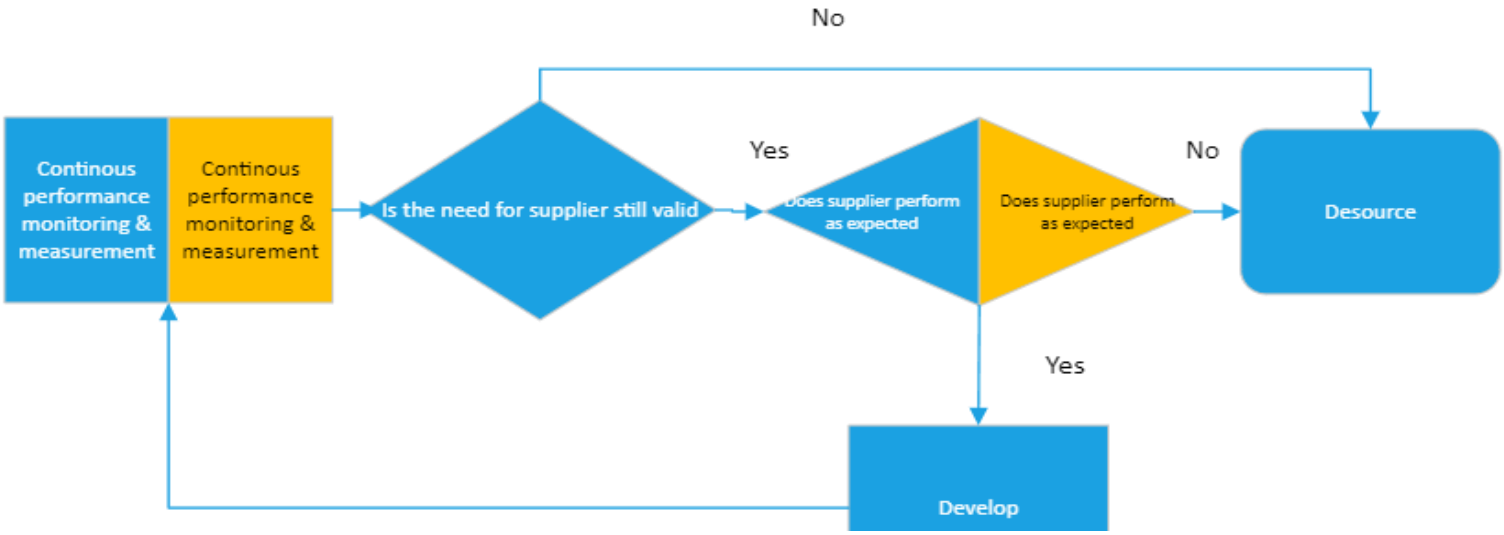

Figure 27. Daily Operations flowchart

4.5.2 New supplier handbook

In order to eliminate insufficient supplier instructions also supplier instructions had to be standardized. Standardized instruction serves the purpose from the perspective of the entire organization. A business unit-specific supplier handbook instructs suppliers from the very beginning of the supplier onboarding process to daily operations with the business unit. The purchase-to-pay process is defined at a very detailed level with business units' requirements and expectations. Topics that are instructed in the handbook are chosen based on the findings of the pitfalls of the current process.

With the help of the supplier handbook, the supplier should be equipped to collaborate with the business unit in various situations and conditions. The handbook contains fundamental information or a brief description of comprehensive instructions. Comprehensive guidelines are available to suppliers through external links. This ensures that in case of changes in instructions, the handbook does not become outdated, and the latest instructions are always accessible to the supplier.

The supplier handbook has been compiled from the existing guidance documents of the business unit, and if such documents have not existed, they have been created specifically for the supplier handbook. In cases where there have been multiple conflicting instructions within the business unit, the discrepancies have been resolved by revising the guidelines. A supplier handbook is provided based on the findings of the RQ1 & RQ2. The handbook can be divided into four main topics. These topics are preliminary requirements for suppliers, purchase-to-pay process requirements of the business unit, system instructions, and supplier onboarding checklist. The table of contents for the supplier handbook is available at the end of this thesis in the appendices section.

5 Conclusion

In the final chapter of the thesis, a summary of the research will be provided, research questions will be answered, and results will be discussed. At the beginning of this thesis, an introduction was presented, discussing the background of the thesis and determining research questions and thesis objectives. This was followed by a literature review, where the theoretical framework was provided.

In the methodology chapter, the approach to data collecting was introduced and the quality of used data was evaluated. The empirical part of this thesis concentrated on the as-is state of supplier onboarding process structure, process procedures, and the impact on the organization of the current state. Also, a to-be proposal was provided for the case company, which considers the pitfalls of the current process, and a supplier handbook was provided based on the outcome of empirical findings.

To understand the existing stage of the supplier onboarding process of the case company and the side effects of the process, in total 16 interviews were done. Additionally, existing documentation should have been useful in the mapping of the current process, but during the study, it became clear that there was no proper documentation of the current process, so interviews ended up being practically the only possible data collection method.

Existing research argues that supplier selection is one of the most important duties of strategic sourcing. Correct supplier selection can lead to fruitful cooperation and business relationships and provide a competitive advantage, on the other hand, failed supplier selections can result in the opposite outcome of what was desired. Also, supplier integration is a widely studied topic from multiple different approaches and angles. Researchers argue that among other things one of the key roles of the purchasing function is to effectively integrate the supply activities between external suppliers and internal organizational customers.

However, based on this research can be stated that supplier onboarding actually holds a critical role in supplier integration. As stated in the previous research successful supplier integration is a combination of multiple different aspects of integration and the supplier onboarding process is the point where system & information integration and process integration are established in practice. If a buyer fails to integrate these in the onboarding phase, it can cause problems later. Based on the findings these problems occur mostly in the form of poor supplier performance and solving these causes frustration, creates ex-post transaction costs, and is time-consuming.

As stated in the literature review chapter trust is critical, especially at the beginning of the relationship, and it is formed from the sum of many different factors and the performance of the supplier can either increase or decrease the buyer's trust in the supplier. Traditionally the purpose of supplier performance monitoring is to find the most successful suppliers and feed them with business. The problem here is that, if the buyer fails to deliver business requirements, expectations, and instructions in the orientation phase of supplier onboarding, it can appear to the buyer as poor supplier performance, even though the reason for the poor performance lies not with the supplier, but rather with weaknesses in the buyer's own processes. This can undermine the trust of both parties because due to a bad process supplier appears poor to the buyer, but from the supplier's perspective, it seems that the buyer has not managed to present their requirements and instructions adequately.

After the empirical findings, the research questions set at the beginning of the thesis can be answered:
RQ1: "What kind of practices or processes business unit already has in place for supplier onboarding?"

The business unit has some kind of framework for the supplier onboarding process, with approximately all the necessary process stages, but it is not documented on an appropriate level and the process does not have a standard structure. For those reasons, the

process has not been able to deliver desired results. This means that process structure can vary case by case depending on the individual that is executing the process and might lead to varying process outcome quality. Also, the responsibilities of participants in the process vary depending on the product category. Suppliers do not get equal instructions because firstly, the business unit does not have a general supplier handbook or standard set of instructions & requirements, that should be shared with new suppliers, and secondly, the quality of the instruction's supplier receives is dependent on the experience and expertise of the person who delivers the instructions.

When it comes to supplier integration, the current procedure fails to integrate suppliers at least partially operational/process- and informational-wise. Investigation of relational integration has been left outside the scope of this thesis since the empirical part of this thesis concentrated on operational issues.

RQ2: "How does the current supplier onboarding process affect the case organization on a daily basis and how does the outcome of the process emerge in practice?"

As empirical findings indicate, a poor supplier onboarding process exposes the organization to various problems associated with suppliers and causes unnecessary costs. These problems occur in the form of generic and recurring supplier errors related to process- and service quality, concerning the purchase-to-pay process. A lot of different kinds of problems regarding the document forms, inappropriate packing and marking, and process practices were found. These problems and costs can be observed across the organization and could be at least partially avoided by improving the quality of the supplier onboarding process and by formalizing the process so that all necessary steps have been completed before actually commencing daily operations with the supplier is possible. Additionally, the business unit offers multiple different kinds of systems to new suppliers, which eases daily operations and reduces manual work in the business unit, but these systems might not be utilized by the supplier if the benefits of the systems are not clear for suppliers, or the supplier has not been properly instructed to use such systems.

RQ3: “What topics should the case company supplier handbook cover?”

Based on the answers for RQ1 & RQ2 four main topics for the supplier handbook were identified. These topics are preliminary requirements for suppliers, purchase-to-pay process requirements of the business unit, system instructions, and supplier onboarding checklist. Alongside the new process structure and with the help of the supplier handbook, the quality of supplier onboarding is no longer dependent on the experience and expertise of the responsible employee, and the business unit can be sure that from now on every single new supplier receives exactly the same instructions, requirements of purchase-to-pay process, system instructions and is aware of prerequisites of business relationship. When every supplier receives consistent guidelines and the business unit's requirements are presented to everyone in the same manner, it also enables impartial comparison of suppliers' performance.

Other findings:
According to transaction cost theory, a supplier contract is an effective mechanism to mitigate ex-post transaction costs. In the empirical part of the thesis, it was found that the business unit does not necessarily sign contracts with new suppliers if certain predefined conditions are not met, even though these kinds of supplier relations might also be crucial for the business unit. In the case of the absence of a supplier contract, the company’s GTC will be applied. GTC is a rigid document and is globally used within the company, which cannot be customized according to the requirements of the relationship. GTC also does not address business unit-specific requirements, such as delivery time requirements, document requirements, or any other requirements that are important for the business unit to operate efficiently, so solely relying on GTC may not necessarily meet all the needs of an individual business unit. This is why the supplier handbook was produced as a part of this thesis. Handbook covers a lot of things that are common for every supplier, but also are traditionally agreed upon in supplier contracts. That is why the handbook may partially compensate for the weaknesses of this kind of approach and

reduce ex-post costs resulting from the absence of a supplier contract because it does not only instruct suppliers but also presents these business unit-specific requirements.

5.1 Managerial implications

Case company's purchasing- & sourcing managers should seriously consider utilizing the process model created based on the observations of this thesis. As this study shows, the problems related to the current process procedure are widely identified within the organization, but the root cause of the problem seems to have solid roots since the problems are known by the employees, but no solution has been found. The new process model does not necessarily solve all the issues related to the onboarding process but is surely a step in the right direction. As shown in figure 19. seven out of ten interviewees perceive the process standardization as a positive change and the concerns of the remaining interviewees can be addressed if the standardization is done properly.

5.2 Future research gap

It is generally perceived that the onboarding process is associated with the induction of a new employee into the organization's practices. For future research, it would be interesting to study what kind of proven practices companies can adopt from employee recruitment and onboarding to supplier onboarding. Employee onboarding is a topic that has been extensively researched, which companies focus on, and to which they usually allocate a lot of resources to find the most qualified employee to meet the needs of the company. It seems that there are many similarities between supplier onboarding and employee onboarding, so it would be beneficial to investigate what practices could be replicated from employee recruitment and onboarding processes to supplier selection and onboarding processes and how these processes could benefit from each other in this regard.

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Appendices

Appendix 1. Haastattelupohja / Interview template

Haastatteluryhmä / interview group

Haastateltavan nimi / Name of interviewee:

Haastateltavan työnimike / Jobtitle of interviewee:

Haastateltavan työkokemus KO. tehtävässä / Working experience in current position:

Haastatteluryhmät / Interview groups:

1. Hankinta vastaa kaikkiin kysymyksiin / Sourcing managers answers all the questions.
2. Ostajat vastaavat kysymyksiin 5–13/ Purchasers answer questions 5–13
3. Organisaation muut työntekijät vastaavat kysymyksiin 12–13/ Other employees from the organization answers questions 12–13.

Toimittajan valinta / supplier selection

1. Mitkä ovat tärkeimmät valintakriteerit toimittajavalintaa tehdessä? / What are the most important factors concerning supplier selection?

2. Mitä arviointityökaluja käytetään toimittajavalintaa tehdessä? / What kind of tools does a business unit use for supplier evaluation at the supplier selection phase?

3. Periytyykö toimittajia muista yksiköistä, jos periytyy, niin miten se vaikuttaa toimittajan käyttöönotto/onboarding prosessiin? / Does the business unit import suppliers from different business units of a group, if yes how does it affect the supplier onboarding process?

4. Kuvaile nykyistä toimittajan valinta- & toimittajan käyttöönottoprosessia / Describe the current supplier selection and onboarding process.

    a. Mitkä sisäiset osastot ovat mukana supplier onboarding prosessissa? / Which internal departments are involved in the supplier onboarding process?

    b. Käydäänkö sama prosessi läpi kaikkien toimittajien kohdalla, vai onko joissain tapauksissa käytössä mukautettu prosessi? / Does the business unit follow the same procedure with all new suppliers or is there a process variant for certain cases?

Toimittajan käyttöönotto & integrointi / Supplier onboarding & supplier integration

5. Onko onboarding prosessi selkeä ja dokumentoitu? / Is the current process clear and documented appropriately?

6. Onko prosessin vastuut jaettu mielestäsi selkeästi hankinnan/oston välillä? / Are responsibilities of the process clear between strategic- / operational purchasing?

7. Mitkä ovat prosessin hyvät ja huonot puolet? / What are the benefits and drawbacks of the current process?

8. Onko prosessille tällä hetkellä asetettu mittareita? / What kind of meters are used to measure current process?

9. Onko mielestäsi prosessin yhtenäistämiselle tarvetta, jos kyllä niin perustele miksi? / Do you think there is a need for standardization of the process? If yes, please justify.

10. Onko tämänhetkisessä prosessissa toimittajan ohjeistus mielestäsi kokonaisvaltaista? / Are supplier instructions comprehensive in the current process?

11. Saavatko toimittajan mielestäsi nykyisellä toimintatavalla yhteneväiset ohjeet ja yhteneväiset valmiudet toimia yksikön kanssa, jos eivät niin miksi? / Do all new suppliers get equal readiness to operate with the business unit with the current process and if not, why so?

Daily operations with suppliers

12. Minkälaisiin toimittajien tekemiin virheisiin törmäät päivittäisessä työssäsi? / What kind of supplier errors do you encounter in your daily work?

    a. Paljonko virheiden selvittäminen vie työaikaasi? / How much time does solving these errors take from your work hours?

    b. Minkälaisia kustannuksia virheet aiheuttavat organisaatiolle? / What kind of costs do these errors incur for the organization?

c. Onko nämä virheet raportoitu tiedoksi vastuuosastolle? / Have these errors been reported to the responsible department?

13. Oletko törmännyt tilanteeseen, jossa on huomattu toimittajan virheen johtuneen selvästi ohjeistuksen puutteesta tai muusta prosessin heikkoudesta, jonka takia virhettä on jouduttu korjaamaan reaktiivisesti? / Have you encountered a situation where a supplier's error was clearly attributed to a lack of instructions or other process weaknesses, necessitating reactive correction?

Appendix 2. Supplier handbook contents

1. Introduction

2. General issues

2.1 Legality

2.2 Conflicts between instructions & contract

2.3 Immaterial property rights

2.4 GTC

2.5 Confidentiality

3. Code of conduct

3.1 Sustainability

3.1.1. Social sustainability

3.1.2. Environmental sustainability

3.1.3. Responsible minerals / Conflict minerals

3.2 Integrity

4. Supplier qualification

4.1 Supplier Audits

5. Component qualification

5.1 Sample process

5.2 Sample process at the business unit’s premises

5.3 Sample process at the suppliers’ premises

5.4 PPAP

6. Quality standards & quality requirements

6.1 General certificate requirements

6.2 Component-based Audits

7. Communication

7.1 Responsible purchasers at the business unit & Backup person

7.2 Responsible sourcing manager at the business unit & backup person

7.3 Quality contact person

7.4 Suppliers contact person & backup person.

7.5 Form of communication

7.6 Office hours

7.7 Communication language

8. System interfaces

8.1 System X

8.2 System Y

8.3 System W

8.4 System Z

8.4.2. Drawing revisions

8.5 System Q

9. Purchase-to-pay process

9.1 Order confirmations

9.1.1. Confirmation document requirements

9.1.2. Confirmation price

9.1.3. Confirmation date

9.1.4. Reconfirmation

9.1.5. Partial deliveries

9.2 Delivery policy

9.2.1. Accepted delivery schedule.

9.2.2. Material identification and labeling

9.2.3. Packing

9.2.4. Packing list and other documentation

9.2.5. Incoterm

9.2.6. Freight carrier nominations

9.2.7. Container usage

9.2.8. Customs clearance

9.2.9. Part certificates and testing reports

9.2.10. Quality reclamations

9.2.11. Regular order backlog reporting

9.2.12. Regular operative meetings

9.3 Invoicing