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The success factors to improve supplier performance and the role of buyer-supplier relationships in supplier development

- a case study of a supplier development program in a Finnish MNC

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TIIVISTELMÄ

Tämän tutkielman tarkoitus on tutkia toimittajan kehitysprojektin menestystekijöitä kansainvälisessä organisaatiossa. Tutkielmassa keskitytään tarkemmin toimittajan toimitustäsmällisyyteen sekä toimittajan ja ostajan välisiin suhteisiin ja niiden vaikutukseen kehitysprojektissa. Tutkimuksen teoriaosuus esittelee toimittajan kehittämisen konseptin teorian valossa keskittyen sen hyötyihin, menestystekijöihin sekä haasteisiin. Lisäksi erilaiset toimittajan kehittämiseen liittyvät toiminnot käydään läpi. Tämän jälkeen teoriaosuus käsittelee toimittajan suorituskyvyn mittareita ja esittelee yleisimmät teoriat sekä lähestymistavat suorituskyvyn mittaamiselle.

Empiirinen tutkimus on toteutettu kvalitatiivisella tapaustutkimuksella. Tapaustutkimukseen valittu yritys on suomalainen teollisuusalan kansainvälinen yritys, jolla on kompleksi toimitusketju, kattaen toimittajia sekä Euroopasta että Kiinasta. Tutkimuksen data on kerätty haastatteluilla, havainnoilla sekä tukevana datana on käytetty ostajayrityksen dataa. Data on kerätty yhden vuoden ajalta.

Tutkimuksen tulokset osoittavat, että kommunikointitavoilla sekä toimittajan suorituskyvyn aktiivisella seurannalla on merkittävä hyöty toimittajan kehitysprojektin onnistumiseen. Tekijät kuten suorituksen mittaaminen, informaation ja toimintojen läpinäkyvyys sekä kommunikaation avoimuus vaikuttavat suoraan toimittajan ja ostajan välisiin suhteisiin positiivisesti parantaen yhteistyökyvykkyyttä. Lisäksi ostajayrityksen useimpien sidosryhmien osallistuminen keskusteluihin toimittajan suorituksesta edesauttaa vähentämään vääriä tulkintoja sekä pienentää riskiä kehitysprojektin epäonnistumiseen. Lisäksi tulokset osoittavat, että ostajayritykseltä saatu tuki toimittajan kehitysprojektin aikana edesauttaa projektin onnistumista, edellyttäen, että toimittajan kehitys nähdään yrityksessä jatkuvana parantamisena lyhytvaikutteisten korjaavien toimenpiteiden sijasta.

Tulevan tutkimuksen toimittajien kehittämisen alueella tulisi keskittyä aiempaa tarkemmin ostajayrityksen osallistumiseen sekä sen vaikutuksiin toimittajan kehittämisprojektin menestyksessä. Myös toimittaja- sekä ostajayrityksen kehittämistoimenpiteiden yhteensovittamista sekä sen vaikutuksia kehitysprojektin onnistumiseen tulisi tutkia lisää. Lopuksi mitä tulisi tutkia jatkossa, on ostajayrityksen eri sidosryhmien – erityisesti operatiivisen tason sekä johtoryhmän – välinen informaation jakamisen rooli toimittajan kehittämisprojekteissa.

AVAINSANAT: toimittajan kehittäminen, toimittajan suorituksen mittaaminen, toimittajan toimitusvarmuus, toimittajasuhteiden johtaminen

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1. Introduction

1.1. Background of the study

1.1.1. Supplier development and performance measurement in supply chains

Supply chains have become more complex and vulnerable, as organizations have started to outsource many of its competences to achieve competitive advantage. One of the key factors for organizations to coordinate and keep the desired level of performance within the supply chain is supplier development. (Krause 1997). Supplier development is one of the most important supplier management activities, first introduced by Leenders in 1966, and it has been studied extensively in past literature. Supplier development refers to any activities from the buyer company's side to enhance either supplier capabilities, performance or both. By conducting supplier development programs firms can achieve increased competitive advantage and operational efficiency (Krause 1997). According to Bai & Sarkis (2011), supplier development is divided into four categories: knowledge transfer, investment and resource transfer, feedback and communication and management and organizational practices. Moreover, supplier development can be divided into direct and indirect activities, depending on the level of investment from both supplier's and buyer's side (Bai et al. 2011).

Supplier development has been proved to increase the level of supplier capability and supplier performance by variety of authors (i.e. Leenders and Blenkhorn 1988; Krause 1997). Indirect supplier development activities are enablers to increase both supplier delivery performance and supplier capabilities, whereas direct supplier development activities have the strongest impact on developing supplier capabilities (Wagner 2010). However, before automatically choosing to develop an existing supplier, companies first need to weight the alternatives and make a sourcing decision on whether to develop an existing supplier or switch to another supplier based on the analysis of maximized profits (Gunther & Wagner 2012). This sourcing decision has been excluded from this study, as the focus is only on developing an existing supplier's competences by selected performance metrics and analyzing the outcomes. According to Dalvi et al (2015), past literature has mainly focused on supplier development activities related to direct involvement activities rather than indirect activities, such as supplier evaluation, assessment and supplier incentives. Moreover, what is strongly linked to

supplier development and should be considered, is buyer-supplier relationships. When developing a supplier, the depth of buyer-supplier relationships plays an essential role, and therefore as one of the goals in supplier development should be to look into building a long-term, trustworthy relationship rather than only improving supplier's performance in a short-term (Forkmann et al 2016).

Furthermore, supplier development and supplier performance are strongly linked together, improved supplier performance being one of the desired outcomes of a supplier development program. Literature has defined studies about the influence of implementing a supplier development program enhancing supplier's performance. As an example, Arroyo-López et al. (2012) concentrate on the relational aspect and find that relational learning and collaboration environment has an important effect on supplier performance development and Routroy & Kumar (2014) study supplier development program enablers that trigger successful supplier development program implementation. According to Routroy et al (2014), there are only few specific studies measuring and evaluate the extent to which a supplier development program has been implemented and what are the targets that the development program aims to achieve.

Supplier performance itself has not been defined in literature as a separate concept, as usually supplier performance indicators are defined by each company itself, depending on the company's strategy, goals and requirements for the specific suppliers (Gould 2000). Therefore, it is important to consider, which are the performance goals and targets when developing a supplier. To categorize the various possible targets, literature defines supplier performance measurement indicators to improve supplier performance. These indicators can be i.e. cost-, quality-, flexibility or time related metrics that measure the performance of the supplier. (Gould 2000; Kim & Ellegaard 2011.) Previous research widely studies performance measurement frameworks and management processes for performance measurement in order to support decision-making and to gain a better understanding of the strengths, weaknesses, current performance and the potential development targets of the supply chain and suppliers (Ip, Chan & Lam 2011).

Moreover, Maestrini et al (2018) study supplier performance measurement systems from a perspective of communication and reaction modes, and an essential research gap is found

when it comes to analyzing supplier's reaction modes in supplier performance measurement and evaluation. According to Maestrini et al (2018), positive relationship has been found between the signals sent by the buyer and the supplier's ways to react to them, however empirical data to test these findings is still lacking.

1.2. Justification for the study

Supplier development aims to improve the performance and capabilities of suppliers, which further can lead to the buyer's increased competitive advantage, cost reductions and improved efficiency. (Krause 1997.) The need to increase capabilities and performance of suppliers is not being neglected from the field of supply chain management, as there are always improvement possibilities, especially when the external pressures are getting stronger as well as when business environment is constantly changing in international business. Handfield, Krause, Scannel & Monczka (2000) state that only 20% of suppliers are responsible for as much as 80% of poor performance, which supports the need to run development programs to the worst performing suppliers rather than the better performing ones. Focusing on the worst-performing suppliers is the most effective way for the company to acquire results and pay off from their investments in the development program (Handfield et al 2000).

Despite supplier development programs are being commonly used for many decades, there is still a lack of analyzing the effectiveness of these programs (Routroy et al. 2016). Moreover, what Routroy et al (2016) find, is that despite the wide range of literature existing on the aspects of supplier development, there is a lack in assessing the implementation performance of a supplier development program along the time. Therefore, one of the purposes of this study is to respond to this need and analyze the effectiveness of a supplier development program along the time, in one-year time scope in order to understand the effectiveness and the link between the chosen supplier development activities to the supplier delivery performance. Furthermore, the goal for this study is to implement a generalized supplier development framework that can be applied effectively with other suppliers.

Delivery performance, which is one of the main time-based metrics having a direct impact on the supplier's overall performance level, is a very critical element to improve in order to gain competitive advantage. Further, what is learnt from the case company of this study, is the lack

of a generalized model on how to efficiently measure and improve supplier's delivery punctuality especially in an operational level. This study is responding to this need and explains and analyzes the factors that have an influence on the delivery performance of a supplier. The delivery performance in this study refers to the *inbound punctuality percentage,* as the focus is on inbound deliveries from suppliers to the distribution centers.

Literature has defined models for the supplier development process however it has been mostly studied only on selected steps. According to past literature, more models are needed for gaining a deeper understanding for supplier development process as an integrated system, in order to maximize the improvement of suppliers' performance (Gunasekaran et al 2007). Moreover, Gunasekaran et al (2007) proposes further research to validate the proposed performance metrics for supplier delivery performance via empirical research or case studies. Literature also suggests going deeper than only focusing purely on supplier development, suggesting finding the suitable performance metrics that needs to be implemented when forming a partnership with the supplier and further gaining open and transparent communication, leading to cooperative partnership between the supplier and buyer (Gunasekaran et al 2007). Moreover, the level of engagement of the buyer and supplier during different stages of supplier development has remained unexplored (Alinaghian, Kim & Srai 2020). This study is responding to this research gap, as one important aspect in this study is to investigate and analyze the buyer-supplier relationships all along from the beginning to the end of the supplier development program.

When it comes to performance measurement in supply chains, literature has found a lack in longitudinal studies on the implementation of performance measurements and continuous updating of them. (Gopal & Thakkar 2011). Additionally, the issues when measuring performance in supply chains have mostly been the lack of system thinking and lack of connection with the strategy (Chan 2003). Furthermore, most of the performance measures are quantitative rather than qualitative, and the majority of the studies are implemented on operational level (Cuthbertson &Piotrowicz 2008).

During past two decades, there has been a swift in performance management from a rational control towards cultural control and learning, and further towards an integrated approach of performance measurement (Bititci et al. 2012). This switch needs to be considered when

conducting this study. Finally, according to Gopal et al. (2011) further research should focus more on case study approaches in order to study the collaboration and information sharing when developing performance. This also supports the selection of a case study for this research.

1.2.1. Overview of the case study

This study is a case study of a supplier development program of an external supplier in a Finnish multinational company. This company, founded in 1910, operates in industrial engineering and service industry, having a turnover of more than 9 milliard euros, employing more than 57 000 people worldwide. This study focuses on one Finnish supplier serving both the company's supply operations. The supplier has a wide range of second-tier suppliers, that forms the supply chain and makes the management of the supplier more complex and challenging from the customer point of view, adding the international aspect into this study. Moreover, the volume in order intake for this supplier is one of the highest for the case company among all its external suppliers, which makes this supplier a crucial operator having a strong impact on the overall performance of the buyer company's supply line.

What explains the need for implementing a case study of one specific supplier, is the fact that it has a lot of challenges that have been recognized based on an analysis of the supplier's conditions. Therefore, this supplier provides a variety of improvement points that can be analyzed effectively and to provide value-adding information for future cases when facing challenges with other suppliers. This case study aims to analyze the service level and the reliability of the supplier, the collaboration between the supplier and its second-tier suppliers, the buyer-supplier relationships and finally, via conducting a supplier development program, to test whether the supplier's inbound punctuality percentage and delivery performance will increase a long-run.

The challenges with this supplier are related to delivery performance which are mainly caused by delivery and quality issues with the supplier's critical second-tier suppliers. The main second-tier suppliers come from Europe and China, which increases the complexity of the supply chain. According to the analysis of the supplier's condition, second-tier supplier's weak delivery performance and quality issues are the main reasons that have led to decreased

reliability on delivery performance and has affected on the supplier's inbound punctuality percentage; the target being 99%, the weekly inbound punctuality percentage at the beginning of the development program has been only around 76%. In addition to delivery delays caused by second-tier supplier's quality and delivery issues, also other factors influencing the delivery performance are found. These are logistic failures, production stops, and orders placed under the agreed lead time. These factors are not only linked to the poor performance of the supplier itself, however it is strongly related to the relationship and collaboration between the buyer company and supplier as well as to the performance of the buyer company, when it comes to engineering errors and scheduling errors, for instance. When developing the supplier's performance, these factors related to buyer company's own process improvement should not be neglected in order to succeed in the development activities.

Furthermore, some qualitative issues such as communication and the quality of information sharing between the parties have been found as a challenge with this selected supplier. In this study, these challenges having either a direct or indirect impact on the supplier's delivery performance, are analyzed, and based on the findings, development actions are set both to the supplier and the buyer company.

The stakeholders involved in this development project are the buyer company's supplier quality management and materials management team, and from the supplier's side, the quality management team and sales operations management team. The aim for this development project is to shape up the delivery performance, especially the inbound punctuality percentage as close to the target as possible. However, there are other development targets that indirectly have an impact on the inbound punctuality level and cannot be neglected or excluded from this study, such as relational factors and buyer-supplier relationships.

Based on the findings of the issues with the supplier and once the root causes for the poor delivery performance are identified, a variety of improvement actions are agreed between the supplier and the buyer, which are all presented in the analysis section of this paper. The scope of this study is one year, and by implementing a longitudinal study, there is the possibility to test the development actions and see, whether or not the actions resulted

improvement in supplier delivery performance, and finally, to come up with conclusions and improvement suggestions for the future.

1.3. Research question and delimitations

The objective of this study is to determine via a single case study the key challenges in supplier's inbound delivery punctuality, to find the key success factors that can increase the delivery punctuality level via performance measurement, to come up with development actions and based on the results of the study, to provide an applicable model for future development programs for supplier development. The research question is the following:

What are the success factors in managing a supplier performance development program in a multinational company?

To help answering the main research question, additional questions are set as followed:

- *What is the role of buyer-supplier relationship in improving supplier's delivery performance?*
- *What is the importance of performance measurement in a supplier development program?*

This study being a single case study from the case company's one external first-tier supplier, it provides a relatively subjective analysis of supplier-buyer relationship and behavior, therefore the findings of this study provide limited data excluding the differences in suppliers' nature such as supplier's background, complexity of the supply chain, or depth of partnership between the buyer and supplier. However, as supplier development is a relevant topic to all organizations, the findings from this study can be generalized to other suppliers and companies operating in a similar industry in an international environment. The decision behind choosing only one supplier in the scope instead of multiple suppliers, is due to the broadness of the selected supplier development program, having development actions in more than one area, which makes the study and database extensive enough.

Additionally, this supplier is one of the key external suppliers for the case buyer firm, and by including another, comparative key supplier, the scope for this study would remain too large.

The focus in this study leans on evaluating the performance of one key supplier that doesn't meet the inbound punctuality target, having low performance compared to other key suppliers and to the target performance level set by the buyer company. Moreover, one of the main reasons behind choosing this supplier among others, is that the challenges occur continuously, which makes it necessary to evaluate and develop the performance of the supplier.

1.4. Keywords of this study

In this section, the key words of the study are presented.

Supplier development (SD) refers to a firm's any effort to increase the capabilities and/or performance to meet the firm's both short-term and long-term supply needs. Supplier development helps the buyer company to increase its competitive advantage by improving its suppliers' performance and capabilities and increase operational efficiency. (Krause 1997).

Critical success factors for supplier development: Critical success factors are the criteria based on which the supplier is selected for the supplier development program (Bai et al 2014).

Buyer-supplier relationship: The mutual relationships between the buyer and the supplier. Goals, information sharing, relationship structure, coordination mechanisms, top management commitment, decision making process and compatibility are identified to be important dimensions in buyer-supplier relationship (Gullett et al 2009).

Supplier performance measurement: Supplier performance measurement is an enabler to supplier development. Supplier performance can be measured via indicators based on cost-, quality-, flexibility or time related metrics (Gould 2000; Kim & Ellegaard 2011).

Supplier key performance indicators refer to the indicators that measure the performance of a supplier. These measurements can be divided in time, quality, flexibility, sustainability factors (Bai et al 2014).

Supplier delivery performance: Supplier delivery performance refers to the supplier's performance measured with time-based metrics. It measures the level on how a supplier is

able to complete its deliveries based on the time targets set by the buyer company (Gunasekaran et al. 2007)

Inbound punctuality refers to the level of the supplier's on-time deliveries. It measures the percentage of the delivery punctuality, according to the service level agreement that has been agreed between the buyer and the supplier. Inbound punctuality indicates, in which extent the supplier is able to deliver according to the requested delivery date, in this case, as the delivery term is DAP, inbound punctuality can be measured by the requested DAP vs the supplier's confirmed DAP and the actual goods receipt (GR) date.

1.5. Structure of the thesis

This paper is structured with two separate chapters of theoretical framework, the first being supplier development and the second supplier performance measurement. In chapter 2, supplier development, the definition, benefits, criteria, activities and challenges of supplier development as well as buyer-supplier relationships are covered. In chapter 3, supplier performance measurement is defined, and the critical success factors as well as supplier performance metrics are discussed. The focus in this chapter is the time-based metrics and supplier delivery performance measurement. Chapter 4 covers the research methodology, whereas chapter 5 presents the data analysis and findings. Finally, chapter 6 consists of discussion and conclusions, with suggestions for future research.

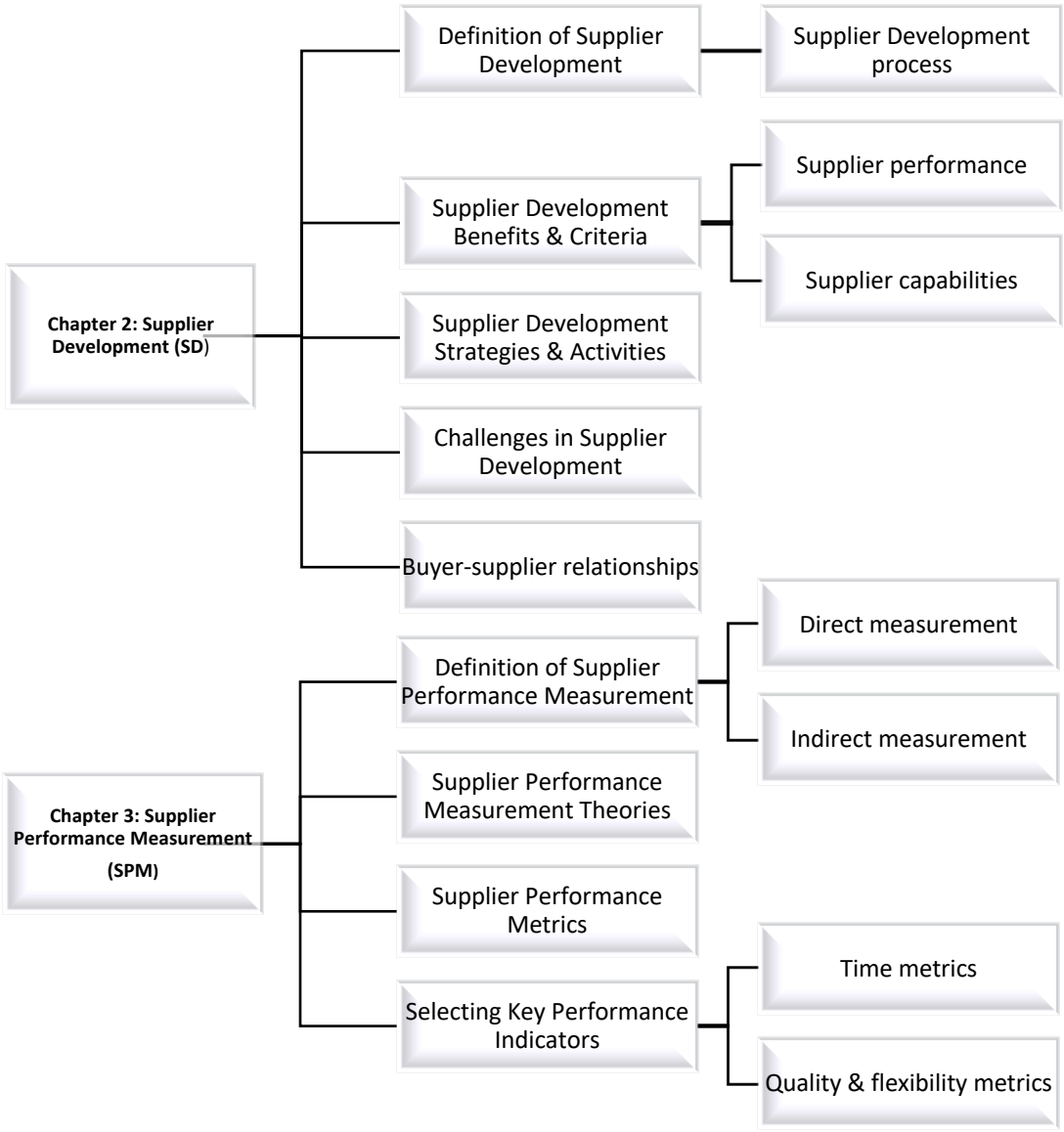


Figure 1: The theoretical framework of the study

2. Supplier development

This chapter presents the theoretical view of supplier development. First, supplier development as a concept is being defined, after which a model for supplier development process is presented. Reflecting to this model, the elements of the supplier development planning phase are discussed in the light of previous literature. The benefits and criteria of supplier development are discussed as well as the different supplier development strategies and activities are defined, and lastly, the challenges of supplier development are discussed. To conclude this chapter, the aspect of buyer-supplier relationship is discussed, linking it to the concept of supplier development and its practices.

2.1. Definition of Supplier Development

Supplier development has been studied extensively during past three decades, and it has resulted to be a successful activity for many companies in improving their business. Leenders and Blenkhorn (1988) define supplier development as “the creation of new source of supply by the purchaser, which could also be defined as “reverse marketing”. However, this perspective being relatively narrow, the definition of Krause (1997) of supplier development, “any effort of a firm to increase performance and/or capabilities to meet the firm’s short- and long-term supply needs” became more popular and is used as a base definition in most of the literature in supplier development.

Literature has divided supplier development in three categories: capability approach, performance approach and capability/performance approach. According to Watts, Hahn & Kim (1990), capability approach focuses on long-term cooperation between the buyer and supplier developing the suppliers’ technical, quality, delivery and cost capabilities. Here, the buyer can define specific capabilities that need to be developed. Capability can therefore be defined as the “supplier’s potential that can be leveraged to the buyer’s advantages in a long run”. These capability factors usually require qualitative measurement indicators (Sarkar et al 2006). The performance approach leans towards activities the buyer firm undertakes in order to make continuous improvement in supplier performance aiming to solve supplier’s production problems. (Krause et al 1998). According to Sarkar et al. (2006), performance can

be seen as supplier's ability to meet buyer's short-term requirements in terms of cost, quality, service and other short-term criteria. Performance factors can be easily measured with quantitative methods (Sarkar et al 2006).

Sarkar et al (2006) list supplier's capability factors to financial, technological, R&D capabilities, the existence of IT and communication system, performance history, profitability of the supplier, proximity of supplier, management and organization, supplier's ability to supply a number of items, contribution to productivity, conflict resolution and business volume of past business. These long-term factors can be measured qualitatively, whereas the short-term performance factors, such as price, quality, reliability of the product, ability to meet delivery promise and delivery lead time, providing consistent delivery, supplier's attitude towards complaints and the availability of after sales support, are easy to measure quantitatively. (Sarkar et al 2006.)

Moreover, Wagner (2006) identifies direct and indirect supplier development activities. Indirect activities include limited activities from buyer's side in order to improve supplier performance. Here, the buyer has more of a reactive approach towards supplier development where mostly ad hoc, formal, evaluative and communicative development tools are used. In direct supplier development on the other hand, the buyer focuses more on the investment of human and capital resources in a supplier (Wagner 2006).

According to Hartley and Jones (1997) supplier development has two main objectives; to make changes in supplier's operations by trying to reduce supplier's problems, and second, to increase supplier's capability so that the supplier can independently develop their performance. Further, Harley et al (1997) propose two models for supplier development programs: process-oriented supplier development and results-oriented supplier development. The results-oriented programs focus on supplier quality and cost improvement and are strongly focusing on improving some specific problems, whereas the process-oriented programs are all about increasing capabilities for continuous improvement. (Harley et al 1997.)

Result-oriented programs provide fast implementation and quick fix for some specific issues, however, does not require a lot of commitment or proactiveness from the supplier's side, especially when it comes to long-term improvements and development. (Hartley et al (1997) Also, other authors support the view of long-term strategic approach for supplier development being the key success factor in supplier development programs; Giannakis (2008) focuses on enhancing knowledge transfer in order to build long-term buyer-supplier relationships in order to develop supplier capabilities in long-term rather than only implementing short-term corrective actions. Furthermore, Wagner and Krause (2009) highlight the importance of mutual communication and goal setting as essential factors in supplier development, and Chen et al (2015) find that supplier development requires knowledge management activities.

Moreover, Wagner (2011) takes the relationship perspective further, and finds that not only the length of a relationship enhances the supplier development and performance improvements but building a partnership between buyer and supplier is the key determinant for success. Factors that form this partnership are trust, communication, information sharing and time and know-how investments (Wagner 2011). The relationship aspect is covered more in detailed at the end of this chapter, in section 2.5.

2.1.1. Supplier development process

Supplier development can be explained as a form of a process. According to Glock et al (2017) this process includes three phases: *preparation, development* and *monitoring* phase. In the preparation phase, first the development program is evaluated based on supplier development criteria, benefits and potential risks. Second, the supplier(s) are selected for the development program. (Bai et al 2011). In the development phase, the first step is to identify suitable metrics for the development program based on different attributes; cost, quality, capability, service level, finances and sustainability. These measures can further be divided in direct and indirect measures. After selecting the measures, they need to be implemented in the development phase. Lastly, the monitoring phase includes the evaluation of the implemented measures. (Glock et al 2017.)

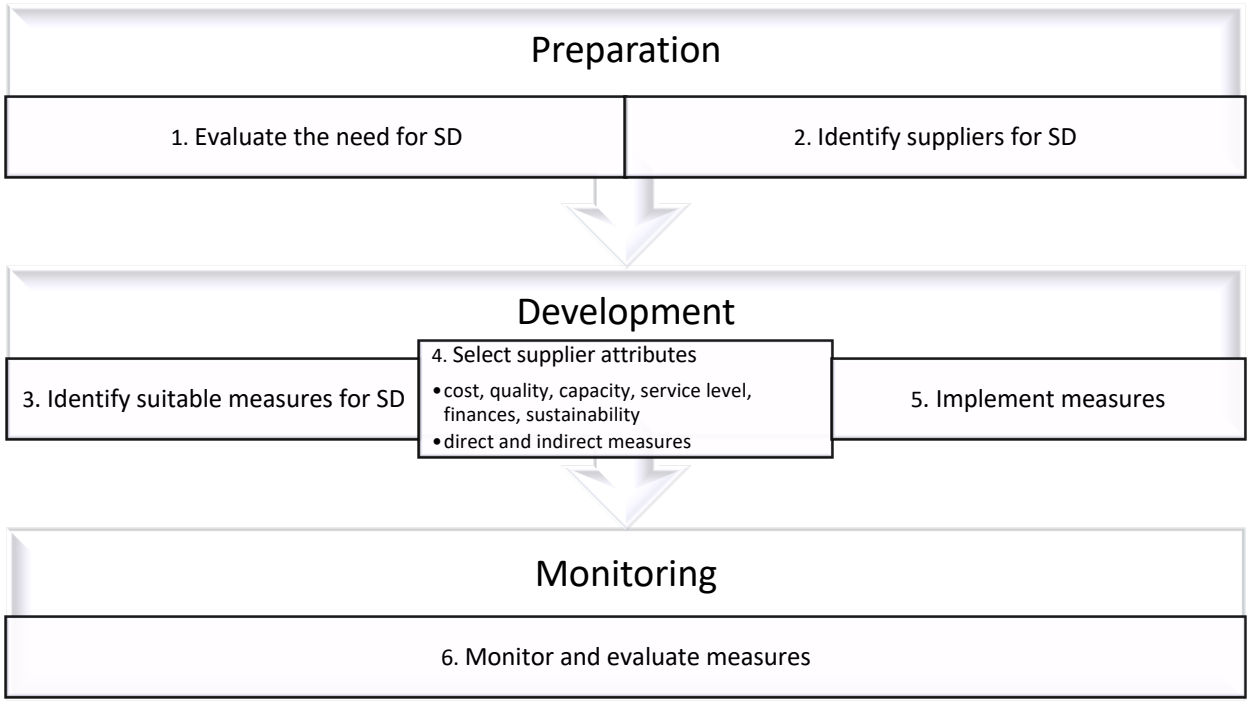


Figure 2: Supplier development process (Glock et al 2017).

Linking the structure of this study into the supplier development process, this chapter covers aspects on a theoretical level, that needs to be considered when *evaluating the need for a supplier development program* by covering supplier development benefits and criteria, supplier development activities and strategies and potential challenges in supplier development. Chapter three focuses on the *development phase* from a theoretic perspective, where the different supplier measurements are presented. Finally, the *monitoring phase* with evaluating the measures, will be discussed in the findings and discussion of the study, in chapters 5 and 6.

2.2. Supplier Development Benefits

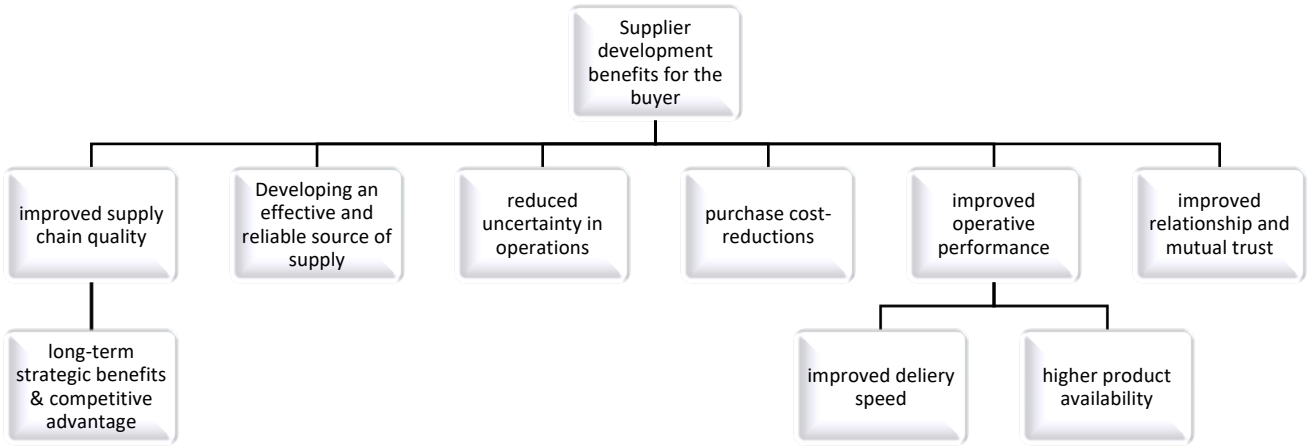
The need for supplier development has been recognized for many decades (Morgan 1993, Krause et al 1998). Supplier development is important for the buyer's perspective, as it has an impact on both the buying firm's performance and competitive strategy (Wagner et al. 2009). Supplier development ensures that the supplier meets the buyer firm's expectations and acts accordingly. In case a supplier does not meet the buyer firm's expectations, the buyer needs to reconsider to either develop the existing supplier's capabilities or to switch to a more

competitive supplier. Therefore, in the preparation stage of supplier development process, it is essential to identify the criteria and benefits for a supplier development. (Gunther & Wagner 2012.)

Various benefits of supplier development have been presented in literature. These benefits are found both from supplier's and buyer's perspectives. Supplier development results should not only be defined as competitive advantage by an improvement in supplier performance and supplier capabilities. Krause (2007) and Wagner (2006) find that supplier development is also beneficial for cost reduction, quality improvement, on-time delivery performance and profit increases. From buyer's perspective, it is crucial to develop a reliable and effective source of supply with a high level of responsiveness, which can be improved by supplier development activities (Krause & Ellram 1997). Moreover, supplier development can also result in improvement of supplier's capabilities to react on uncertain demand from buyer and better coordination with supplier (Deng & Elmaghraby 2005) and as reduction in buyer's uncertainty in operations (Liker & Choi 2004). Dalvi et al (2015) find that most literature in supplier development benefits are related to competitive advantage, improvement in supplier performance and long-term and strategic benefits, whereas the least attention in literature has been on the benefits of supplier's capability improvement.

From a relational and social capital perspective, according to Wagner (2011) supplier development helps to develop a long-term relationship between supplier and buyer. Wagner finds that supplier development and performance is most effective on the intermediate stages of the relationship lifecycle. Further, Krause (1997), also finds a relationship between building long-term buyer-supplier relationships and the extent of companies' willingness to invest in supplier development. Also, supplier development has been identified as an efficient way to enhance knowledge sharing and knowledge transfer between the supplier and buyer (Giannakis 2008). Finally, supplier development programs have been proved to facilitate learning and knowledge between supplier and buyer (Giannakis 2008) which further leads to mutual trust (Stuart, Verville & Taskin 2012).

The following figure summarizes the benefits of supplier development from the perspective of the buyer and the supplier. Some of the benefits are for both buyer and supplier.



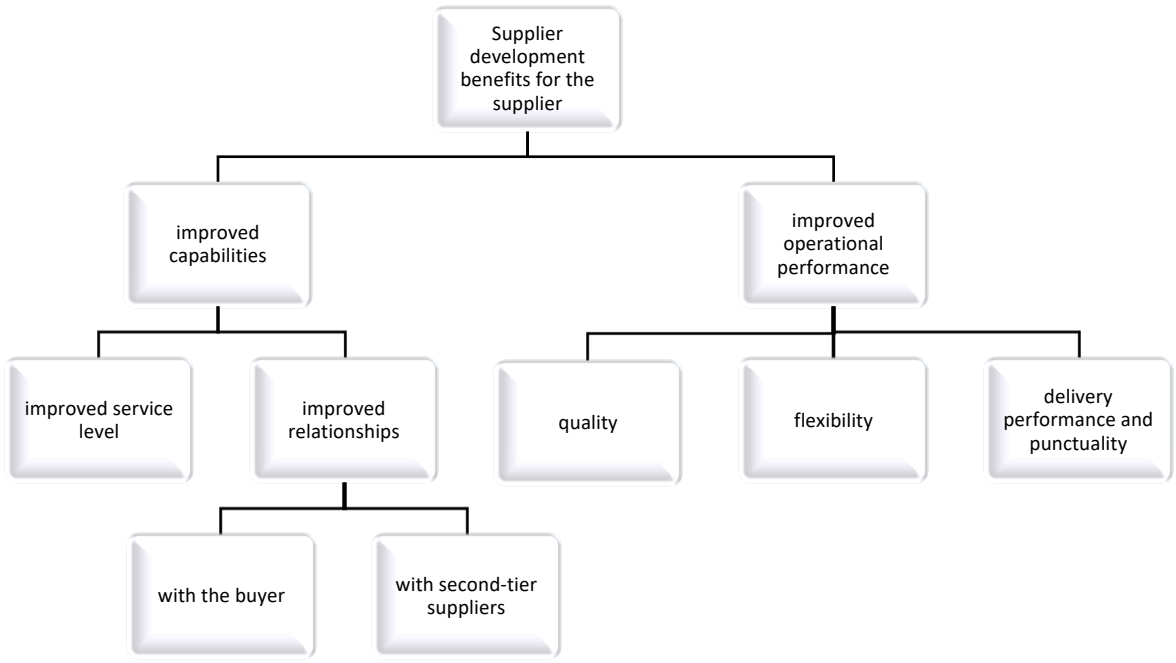


Figure 3: Benefits of supplier development for the buyer and supplier

2.3. Critical success factors of supplier development

After having recognized the benefits for supplier development, it is important to evaluate the different criteria for supplier development. It is evident that any supplier development activity carries not only benefits but also risks (Dalvi et al. 2015). Therefore, supplier performance should be evaluated against these criteria before making the decision of implementing a supplier development program. Selecting a supplier for supplier development implementation includes buyer's decision-making among both qualitative and quantitative criteria. These criteria can be also defined as critical success factors for supplier development. According to Bai & Sarkis (2014), critical success factors "identify the activities, functions and measures that will ensure successful competitive performance for the organization and the supply chain". The critical success factors should be analyzed before moving to implementing a supplier development program and before selecting the key performance indicators. In addition to only laying the attention to the critical success factors, the process and actions on how to achieve the targets need to be taken into consideration as well. In example, one of the most essential steps is to identify key performance indicators. (Bai et al 2014.)

Pradhan R. S. & K Sudeep (2013) analyze the supplier performance and indicate some critical success factors for supplier development. One of the main critical success factors identified is having long term strategic goal, which refers to mutual effort to enhance supplier capability from a strategic perspective. Both parties should recognize and agree on the long-term goals in order to effectively implement a supplier development program. Another long-term success factor is top management commitment (Pradhan et al 2013). The commitment is one of the main requirements when developing suppliers, as the long-term relationship between buyer and supplier requires investment from both parties. Another important factor found is supplier's supplier condition, referring to the second-tier supplier's capability to have the required technical capability, financial stability, on time-delivery, quality performance and flexibility. This is an essential factor when the supplier has a lot of components that they do not produce in-house, as a well-performing second-tier supplier effects on the capabilities of the supplier as well. Furthermore, information sharing is one key critical success factor in supplier development. Supplier and buyer need to have open communication in real time,

which enhances coordination of supply chain. Open information sharing also requires a high level of mutual trust between the buyer and supplier. (Pradhan et al 2013.)

Moreover, according to Talluri & Narasimhan (2004), one of the most important criteria is supplier potential, as it is impossible to develop a supplier without having any potential. Not only the potential but also the supplier's willingness to develop and attitude towards change are critical factors in supplier development (Krause et al. 1998). According to Wagner (2011), buyer-supplier relationship length and performance outcomes are critical criteria. Also, the difference between supplier's performance on a specific supplier development activity to the target performance can be an essential criterion for choosing suppliers to development programs (Bai & Sarkis 2011). Dalvi et al (2015) find that based on supplier development criteria literature, what has been studied the most are topics related to supplier's past performance, supplier's competitive advantage and long-term benefits.

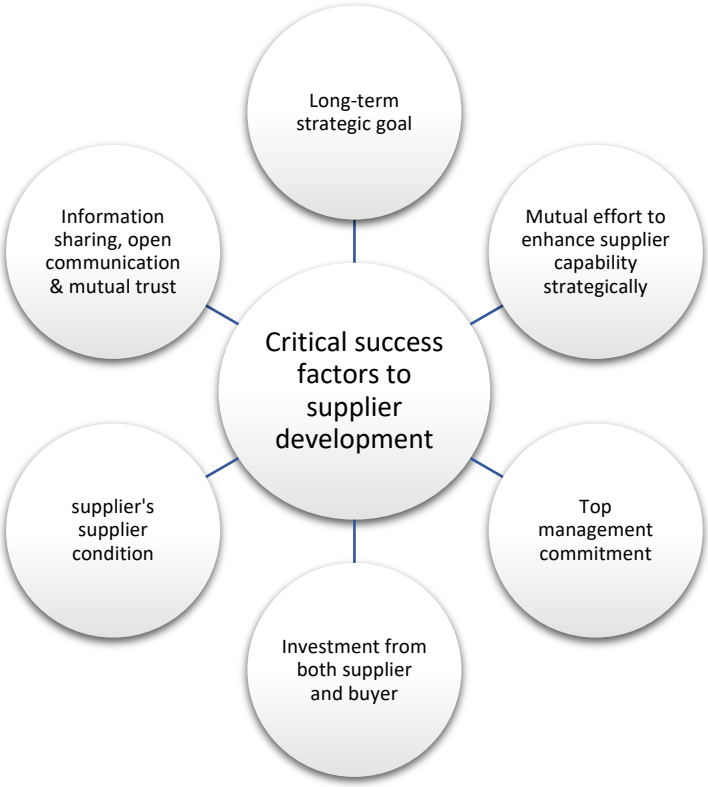


Figure 4: Critical success factors to supplier development

2.4. Supplier Development Strategies & Activities

Krause, Scannell & Calantone (2000) have studied the impact of supplier development strategies on supplier performance via two structural models and find that indirect involvement activities – such as supplier assessment and supplier incentives– have the strongest impact on supplier performance. Incentives help motivate suppliers by the fact that the development will be rewarded with increased business, whereas assessment enables the buyer to evaluate the supplier and can lead the supplier to the desired level of performance by improvement activities. Direct involvement activities, on the other hand consists of supplier visits, supplier audits and supplier personnel training, which all are extensively studied by literature (i.e. Joshi & Stump 1999; Sachin & Vincent 2007; Krause et al 2000).

Dalvi et al (2015) find that most literature in supplier development activities found are related to direct involvement activities, such as working together with suppliers for overall performance improvement and sharing experience, skills and knowledge, whereas indirect activities have gained less attention in the literature. Moreover, these different activities are proven to have different impacts. According to past literature, indirect development activities most probably lead to improvements in both supplier's capabilities and product and delivery performance, whereas direct development have the impact on only increased supplier capabilities. (Wagner 2010). Also, Wagner (2010) finds that implementing both indirect and direct activities simultaneously, is not the most effective way to run a supplier development program.

Furthermore, Krause et al (2000) categorize supplier development strategies in two categories: externalized and internalized supplier development strategy. In externalized supplier development strategy, the buyer improves its suppliers from the perspective of external market situation. Competitive pressure, supplier assessment and supplier incentives are considered as externalized supplier development activities. What defines these activities, is the buyer's lower level of involvement. Following this strategy, the buyer is not directly involved when it comes to supplier development. Internalized supplier development strategy requires direct involvement from the buyer firm towards the supplier. Internalized activities

consist of activities such as training, education, supplier visits (Krause et al 2000.) These two approaches can be easily linked into the direct and indirect activities.

Sanchez et al (2005) divide supplier development activities in three categories; basic, moderate and advanced development activities. The basic activities are the ones requiring the least effort and involvement from the buying firm's resources, and usually are the first steps in supplier development activities. Supplier evaluation and providing feedback to the supplier are examples of basic development activities. Moderate supplier development activities include moderate investment, requiring more resources from the buyer firm than basic activities. Activities such as supplier visits, reward and recognition of suppliers' improvement and supplier certification. The advanced supplier development requires high involvement from the buyer company, including activities such as training suppliers, involvement in product-design process and tight collaboration between the buyer company and the supplier. This collaboration can be achieved in example by sharing information intensively with the supplier.

The following figure summarizes and combines what has been presented in the past literature about supplier development activities.

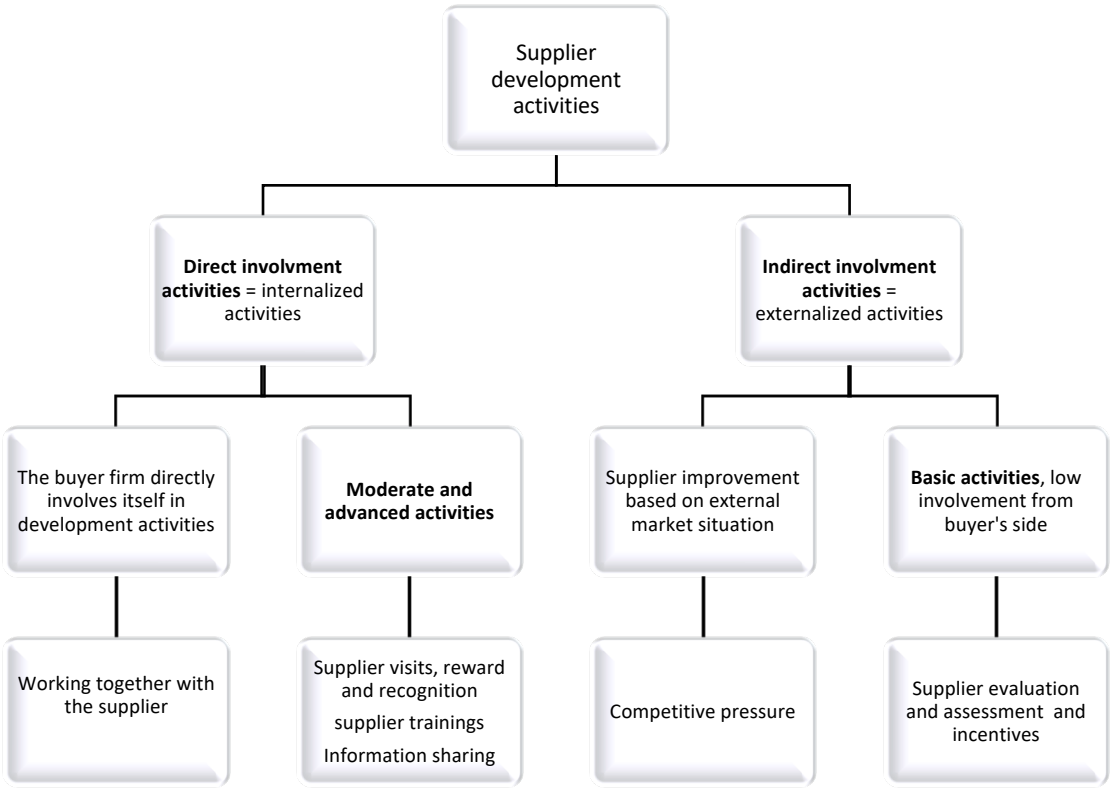


Figure 5: Types of supplier development activities

When it comes to the nature of supplier development practices themselves, Sarkis et al (2011) classify these practices into four categories based on a set of previous literature: knowledge transfer, investment and resource transfer, feedback and communication and management and organizational practices. The *knowledge transfer* category includes training suppliers, giving manufacturing, technical, product-development and quality related advice to suppliers, and site visits. *Investment and resource transfer* category consist of supplier cost reductions, supplier rewards and incentives, simplifying transaction processes, transferring own employees to supplier firm and vice versa, and investing in supplier capacity building. The third category, *feedback and communication* include providing supplier evaluation and feedback, developing an assessment program, setting improvement targets, auditing supplier, formal supplier evaluation, joint problem solving, regular joint meetings and ongoing communication with the supplier. The fourth category *management and organizational practices* refer to having long term contracts, introducing a cross-functional supply chain team, criteria established on when to enter a development program, and identification of high- performing critical suppliers for cost reduction and other improvement opportunities and building top

management commitment and support for buyer organization and supplier organization. (Sarkis et al. 2011.)

Moreover, Humphreys et al (2004) have studied the effects of supplier development for buyer-supplier performance. Here, supplier development is analyzed from the perspective of the buyer. The study divides supplier development activities into transaction-specific and infrastructure factors. Transaction specific is seen as the core practice of supplier development, requiring involvement from the buyer's side. This can be linked to the direct involvement activities covered above. Transaction-specific activities include performance expectation, human-asset specificity, physical-asset specificity and joint action. In transaction-specific activities, the buyer needs to "invest in assets specialized to the buyer's and suppliers' exchange" (i.e. customized equipment and tools), and also invest in transaction-specific know-how by providing training and other support to the supplier. This investment has been proved to result to increased supplier-buyer communication as well as increased willingness to make customized products for customer, further having a positive impact on product development cycle and cost-reductions. (Dyer 1996). Additionally, having higher performance expectations towards suppliers act as a motivator for supplier to develop their performance (Humphreys et al 2004).

The second supplier development activity recognized by Humphreys et al (2004) is infrastructure factors of supplier development. This includes strategic goals, top management support, effective communication, long-term commitment, supplier evaluation, supplier strategic objectives and trust. Having long term strategic goals has been proven to be effective on supplier development, as the focus is rather on developing supplier's future capabilities than on short term cost and quality benefits. Open communication between the supplier and buyer has been recognized to be the key motivator for suppliers to develop their performance, whereas top management support enables to run a supplier development program supporting the firm's competitive strategy. Finally, trust is seen as more effective way than contracts in order to secure transactions and enhancing the effect of buyer asset specificity. (Humphreys et al 2004.)

Moreover, what Humphreys et al (2004) study is the effects of both transaction-specific and infrastructure factors on buyer-supplier performance improvement. Buyer-supplier performance improvement includes supplier performance improvement, buyer competitive advantage improvement and buyer-supplier relationship improvement. Especially effective communication, mutual trust and supplier strategic objectives have the strongest effects on buyer-supplier performance improvement.

2.4.1. Direct involvement activities

In this section, the direct involvement activities are covered more in detailed. In direct involvement activities, the buyer firm is directly involved in the development activities. Additionally, these activities include moderate and advanced activities, such as supplier visits, reward and recognition, supplier trainings and information sharing. In the sub-sections, the communication methods related to information sharing are discussed, as well as direct involvement activities are covered in practice, to gain a deeper understanding of the implementation of supplier development activities.

2.4.1.1. Communication methods and information sharing in supplier development

Literature has defined relational competencies such as information sharing and communication as an important factor when it comes to buyer-supplier relationships and further, supplier development (Paulraj, Lado & Chen 2008). Moreover, literature find that a systematic and frequent information sharing both in operational and strategic level increases the cooperation and trust between the parties, similarly reducing conflicts (Anderson & Narus 1990; Kogut & Zander 1992). What Paulraj et al (2008) find, is that a long-term orientation on relationship is an enabler to collaborative communication and further encourages both the supplier and buyer to share crucial information leading to mutual goals.

Moreover, Carr & Kaynak (2007) study the relationship between communication methods and information sharing and supplier development. Communication methods can be divided into traditional and advanced communication methods. Traditional communication methods refer to the e-mail, phone, written and face-to-face contact, whereas advanced communication methods refer to computer-to-computer links, electronic data interchange (EDI), and

enterprise resource planning (ERP). An important finding from Carr et al (2007) is related to the relationships between the implementation of communication methods, information sharing within a firm and between firms, and supplier development support. Carr et al (2007) find that the usage of advanced communication methods is not seen more useful than traditional communication method, when it comes to the extent of which information is shared between supplier and buyer.

Also, Carr et al (2007) find that the usage of advanced communication methods is not a necessity when trying to influence on the extent of information sharing. Moreover, the same research indicates that not only the communication between the buyer and supplier is crucial, but also information sharing within the buyer firm has a positive impact on supplier development support. Additionally, studies link information sharing and coordination together; coordination has been proved to act as a facilitator to information sharing, and by practicing both coordination and information sharing, the best results can be achieved when it comes to supplier development. (Lee & Whang 2000; Sahin & Robinson 2005).

2.4.1.2. Buyer company's direct involvement actions

Buyer direct involvement in supplier development is one of the direct involvement actions in supplier development. A close cooperation between supplier and buyer, with the buyer being involved in the development, has been recognized to be effective when developing supplier's performance. These direct involvement activities include knowledge transfer to supplier, on-site visits and consultation, education and training efforts, or even personnel transfer. The knowledge-based view supports the theory of direct involvement activities; knowledge being the most significant resource from the strategic point of view for the firm, building competitive advantage. The buyer can directly transfer knowledge during the supplier development program, in example when it comes to processes and procedures; the buyer firm is in many cases larger than the supplier firms, having more efficient and structured processes. Transferring this knowledge to the supplier therefore helps the supplier to develop also their capabilities and performance. (Wagner 2010.)

2.4.2. Indirect involvement activities

In this section, the indirect involvement activities are presented. Indirect involvement activities include supplier development based on external market situation, and basic activities requiring only low involvement from buyer's side, such as supplier evaluation, assessment and incentives. The next section covers supplier evaluation more in detailed.

2.4.2.1. Supplier evaluation

Supplier evaluation is increasingly being used as a tool to ensure that the objectives of supplier performance are met. This is an essential activity when it comes to supplier development. Literature defines several supplier evaluation criteria. The main criteria are i.e. short-term performance, long-term capability, strategic partnership, delivery performance, service level, cost, quality and risk. (Lima-Junior & Carpinetti 2016.)

Prahinski & Benton (2002) study the effect on suppliers' perceptions on buyer firm's communication strategies when it comes to supplier evaluation and its impacts on supplier performance. Prahinski et al (2002) approach the topic of supplier evaluation via four communication strategies: indirect influence strategy, formality, feedback and collaborative communication. Indirect influence strategy refers to the activities as education, training and site visits. Formality refers to a formal communication towards the supplier in supplier evaluation, whereas feedback refers to the feedback shared between the buyer and supplier. Finally, collaborative communication refers to an open and cooperative way of communication, linked to commitment, coordination and satisfaction.

What Prahinski et al (2002) find is that indirect influence strategy positively impacts on buyer-supplier relationship, however it does not influence on supplier's performance. Additionally, the formality of communication has a positive impact on buyer-supplier relationship, but again, there is no positive effect on the supplier's performance with implementing formal communication. When it comes to feedback sharing in supplier evaluation, Prahinski et al (2002) find a strong positive impact on the supplier-buyer relationship, however again, any positive impact is not found directly in supplier's improved performance. Finally, what

Prahinski et al (2002) find is that collaborative communication also has a positive impact on buyer-supplier relationship and significantly impacts on supplier's perceptions on the relationship between the buyer and supplier, however, not directly impacting on supplier's performance.

Finally, what should also be considered in supplier evaluation, is the frequency of the evaluation. Prahinski & Fan (2007) includes this frequency aspect in their study and finds that a frequent evaluation of operational targets positively impacts on the quality of communication. Also, the quality of communication further is found to be positively impacting supplier commitment and performance (Prahinski et al 2007).

2.5. Buyer-supplier relationships in supplier development

An essential enabler for supplier development is cooperative buyer-supplier relationships (Choi & Wu 2009). In today's competitive business environment, in order to successfully develop a supplier, the target should not only be in focusing on improving supplier's capabilities and performance on a narrow perspective, but the focus should also be in long-term relationship development. (Forkmann et al 2016). Therefore, the relationship between the buyer and supplier is an important aspect to consider when developing a supplier. Past literature has identified that long-lasting and cooperative relationships can be built by conducting supplier development programs. However, Joshi et al (2017) study the topic that has not been extensively studied in past literature, about the linkage between supplier relationship practices and supplier development as factors improving buyer-supplier relationship.

The supplier development practices that are linked to buyer-supplier relationship improvement according to Joshi et al (2017), are supplier evaluation, effective communication, training and education, top management support, joint action, reward and asset specificity. The buyer-supplier relationship practices are trust, long-term commitment and supplier's perspective for buyer-supplier relationship. What Joshi et al (2017) find, is that

together both supplier development practices and buyer-supplier relationship practices impact on improved relationships between the buyer and supplier.

2.5.1. Buyer-supplier relationship dimensions

Literature has identified various dimensions for buyer-supplier relationship such as goals, information sharing, relationship structure, coordination mechanisms, top management commitment, decision making process and compatibility. (Gullett et al 2009). In byer-supplier relationship context, in an ideal setting goals should be shared, explicit and clear, being implemented both in strategic and operational level. When it comes to information sharing, the nature of information sharing should be open and transparent, two-way communication. Moreover, relationship structure should cover multiple levels that are in contact with each other, utilizing clear communication channels. The coordination mechanisms should be both formal and informal to manage the relationship. Additionally, the decision-making process should be clear, as well as top management should be supporting the relationship. Finally, both buyer and supplier should be compatible when it comes to organizational structure and management philosophy. (Koulikoff-Sourvrivon & Harrison 2006) In order to reach and maintain the desired levels of buyer-supplier relationship dimensions, a certain level of trust and long-term commitment need to be achieved. The next sub-section covers the aspect of trust more in detailed.

2.5.1.1. Trust in buyer-supplier relationships

Trust has been recognized to be one of the key elements when it comes to building and maintaining any relationship (Wilson 1995). However, there are various perspectives to trust that are worth to identify. Trust can be seen as an attitude or willingness to take a risk based on a social contract. Moreover, trust can also be described as a belief, intention and even a psychological state. However, what is important in trust, is the *behavior* demonstrating the level of willingness to act towards the party being trusted. The beliefs, attitudes and intentions further lead to this behavior. Literature has defined factors that measure the organizational level of trustworthiness: these factors are honest communication, task competence, quality assurance, interactional courtesy, legal compliance and financial balance. Based on these

factors, both the buyer and the supplier make the decision to either trust or distrust the other party. (Gullett et al 2009.)

Honest communication refers to the degree to which the communication is truthful, and it is interpreted based on persona assumptions and the history. In task competence, the trust arises from completing the key tasks, both technical and relational, flawlessly. In buyer-supplier relationships, a task is completed when the supplier delivers a product upon the agreed time, and in case the expectations cannot be met, the level of trust decreases. (Gullett et al 2009.)

When it comes to the quality assurance, the level of trust arises from the degree to which a product or service meets the quality requirements and standards. Moreover, the interactional courtesy refers to the nature of how the parties in the relationship treat each other. Treating the other respectfully and to view the relationship as a committed and long-term rather than transactional and short-term, increases the level of trust between the buyer and supplier. Additionally, the legal compliance refers to the acknowledgement of the formal contracts and respecting it in everyday business. Finally, the financial balance plays its role on the level of trust as a provider of the resources to implement what is expected from the other party. (Gullett et al 2009.)

Gullett et al (2009) conclude, that trust building depends on the ability of the parties to consistently behave to communicate their trustworthiness towards the other party. However, what is important to recognize, is that the other party might have differing goals, values or agenda for building a strong relationship. Therefore, open communication about the expectations, and working together as collaborative partners, are key aspects to achieve a trustworthy relationship between the buyer and supplier. (Gullett et al 2009.)

Finally, Marjolein et al (2010) discuss both supplier and buyer dependencies; in buyer-supplier relationships, it is often the case that one of the parties is more dependent on the other, meaning that the less dependent has a dominant position in the relationship. In these kinds of relationships, the importance of trust and commitment is extremely important, in order to keep both parties committed to continue and develop the relationship (Marjolein et al 2010).

2.6. Challenges in supplier development

Supplier development being a complex process to manage and involving collaboration between the buyer and supplier firm, it is clear that it has its challenges. Firstly, one of the most evident risks to be taken into consideration is the possible failure of the development program (Agrawal et al 2016). The most common reasons that can lead to the failure in a development program according to Dalvi & Kant (2015) is the opportunistic behavior of the supplier and from the buyer's perspective, having a low-cost target. Also, lack of mutual communication and support as well as having unrealistic expectations towards the development program are other failure reasons (Dalvi et al 2015). Furthermore, when the buyer firm invests in developing a supplier, it is likely that the increased supplier quality can spillover to the supplier's other customers (Agrawal et al 2016). This is a risk the buyer firm needs to take in order to develop their suppliers.

Supplier development programs require commitment, trust, information and technology sharing and engaging resources. In case either of the parties – supplier or buyer – are not willing to engage to this collaboration, the development program can end up to failure (Argawal et al. 2016). Moreover, the supplier needs to be motivated for engaging in a development program. In many cases, it can be challenging for the buyer firm to find ways to motivate its supplier to development programs. One of the main factors that can increase the supplier's motivation and commitment, is buyer's attractiveness. (Nagati & Rebolledo 2013) The more attractive a buyer is for the supplier, the more the supplier is engaged to the specific buyer, as the supplier sees benefits in collaborating with the buyer and expected and experienced business outcomes and the relationship between the buyer are attractive for the supplier (Makkonen, Vuori & Puranen 2016). Moreover, what attracts and motivates suppliers to develop and engage in a long-term relationship with a buyer, is having a secured long-term business collaboration with the buyer. (Mohanty et al. 2014) Without having a long-term relationship, the supplier will not benefit from the supplier development activities (Nagati et al. 2013).

Finally, one aspect that can be linked to the attractiveness of the buyer, is the strategic fit between the supplier and the buyer. This means the similarities in values, background,

strategy, attitudes and reputation between the parties. Being strategically compatible, increases the common understanding of the embedded value of the relationship. (Nagati et al 2013.)

2.7. Summary

This chapter has defined the concept of supplier development and the 3-stage process of supplier development, which includes preparation, development and monitoring. In order for a supplier development program to be successful, it is essential to first evaluate the need for supplier development. Therefore, supplier development criteria and benefits need to be recognized before choosing to implement a supplier development program. After having evaluated the benefits and the criteria, the supplier for the development program needs to be selected. According to past literature, supplier development activities can be divided into direct and indirect activities, requiring differing approach and investment from both supplier and buyer's side. It is important to recognize already in the planning phase, what kind of development activities are most suitable for the supplier in order to achieve the desired results. Moreover, what cannot be neglected in supplier development, is buyer-supplier relationship, as the level of partnership and i.e., mutual trust are factors that enables the supplier development to be successful. Finally, it is important to understand the challenges that any supplier development program need to overcome. The risk for failure needs to be considered, and the supplier's motivation needs to be on a high level in order a supplier development program to succeed.

3. Supplier performance measurement

The previous chapter discussed the supplier development process on a general level, based on the existing literature. This chapter aims to go deeper into the measurement phase of supplier development, covering the measurement of supplier performance. First in this chapter, supplier performance measurement is defined. Supplier measurement being an important enabler to supplier development (Leenders and Blenkhorn 1988; Krause 1997), it is essential to understand the definition of supplier performance measurement and the different metrics used when measuring supplier performance. After defining supplier performance, some commonly used performance measurement theories are presented in order to establish an understanding on the phenomenon in a theoretical level. Next in the chapter, supplier performance measurement metrics and types are discussed. Finally, this chapter focuses on improving supplier delivery performance, connecting together both supplier development program and the chosen performance measurement metrics relevant to this study.

Linking supplier performance measurement to supplier development, performance measurement can be seen as one of the supplier development process stages presented by (Glock et al. 2017); the *development* stage, where suitable metrics for supplier development are identified and the supplier attributes are defined. Elaborating the supplier development process even further, the last step in the development phase, *implementing the selected measures* is covered in the research methodology chapter.

3.1. Definition of supplier performance measurement

Performance measurement can be defined as “the process of quantifying the effectiveness and efficiency of action” (Neely et al 1995). Here, effectiveness refers to the extent of meeting customer’s requests whereas efficiency refers to the level of economic usage of firm’s resources when providing a specified level of customer satisfaction. Supplier performance measurement can also be interpreted from a *system* point of view; supplier performance measurement systems are defined as “a set of metrics used to quantify the efficiency and effectiveness of suppliers’ actions” (Hald & Ellegaard 2011). The main goal of a supplier

performance measurement system is to develop and manage the performance communication between the supplier and the buyer and to support the implementation of the strategy in various levels (Kaplan & Norton 1996).

The literature of supplier performance measurement can be divided to three categories; literature focusing on performance metrics on supplier capabilities (i.e. delivery, quality, innovation, sustainability), literature on supply chain performance measurement, where the focus is wider and takes into consideration not only the supplier's performance but also the whole supply chain and finally, literature focusing on measurement of buyer-supplier relationship management, including metrics such as the level of trust, commitment and integration. (Maestrini et al 2017.)

According to Gordon (2005), focusing on performance measurement both prevents problems and promotes improvement. Gordon defined seven steps to measure supplier performance: The first steps is related to aligning goals and determining evaluation approach, followed by developing a method to collect information about the supplier, and to develop a robust supplier performance assessment system, finally moving to providing feedback to the supplier on performance and providing results from measuring supplier performance (Gordon 2005).

Moreover, performance measurement system can be explained through a lifecycle approach, where performance measurement system consists of four phases; design, implementation, use and review phase (Bititici et al 2006). During the *design* phase, the key objectives and goals are set that are supporting the company's strategy, and a set of metrics is selected (Neely et al 1995). All the selected metrics should first quantify what is happening, second, the metrics should indicate the target – to recognize what is good and bad performance - and third, to identify, what are the consequences of being below, on or above the target (Melnyk et al 2014). Quality, delivery and cost performance are the most commonly measured dimensions (Kannan & Tan 2002). What is important to cover in the design phase, is the selection of performance metrics that measure the most critical dimensions of supplier performance (Kannan et al 2002), to involve all the relevant stakeholders to the process, and to align the performance measurement into the organization's strategy (Gutierrez et al 2015).

The second phase; *implementation,* consists of data collection and analysis with the selected metrics. In order to effectively implement the measurement, a proper information and communication technology infrastructure is required, which enables automation and reliability of the data (Bititci et al 2006). What can be challenging when implementing supplier performance measurement, is the "need to collect data from external sources and to manage it in inter-organizational reporting". Both design and implementation phases have gained a lot of attention in the past literature (Bititchi et al 2006).

In the third phase, *use,* the discussion regarding the measured performance begins. This phase includes for example managing communication and feedback and coming up with improvement plans (Gutierrez et al. 2015). Henri (2006) classifies the use phase in two categories: diagnostic and interactive. Diagnostic includes control mechanisms, and is based on formal, top-down reporting and control of target achievement. Interactive, on the other hand is characterized to support communication and open discussion on the reported performance. Here, the goal is to enhance collaboration between the buyer and supplier and gain continuous improvement. In the ideal situation, diagnostic and interactive approaches are combined and used in a set of complementary practices. (Henri 2006.) From the perspective of the buyer company, diagnostic approach is more efficient as it saves the firms cost and time resources, however using only this approach can negatively impact on the relationship and collaboration between the buyer and supplier. (Gutierrez et al 2015).

The last phase of the lifecycle, *review*, consists of target updating and introducing new performance measures. Here, the goal is to set new targets that are aligned to the buyer organization's strategy. Consistent review of performance measurement system can often be neglected by companies. However, this neglection can cause problems when the performance measurement system is not aligned once there are changes in the organization's strategies and goals. Especially in dynamic business environment, the review phase becomes more critical. (Gutierrez et al 2015).

Moreover, performance measurement can be approached from the perspective of performance management, performance measurement being one of the elements of performance management process (Forslund & Jonsson 2007). The performance

management process consists of five stages: selecting performance variables, defining metrics, setting targets, implementing measures and analysis. When selecting performance variables, the most common pitfall is that the strategy and measurements are not aligned. Therefore, the selection of performance variables should be reflected from the company's strategic choices (Lohman et al 2004). In the second stage *defining metrics*, what leads to successful performance measurement according to Bourne et al (2002), is by using validated, measurable and sufficiently detailed definitions of metrics. Defining metrics should be coordinated between the buyer and the supplier in order to achieve common definitions to the selected performance metrics (Bourne et al 2002).

The third stage of performance management process is target setting. Each performance metric needs to have a clear and specific target (Basu 2001). Having clear and specific targets improve the effectiveness of performance measurement. How supplier interpret target performance is not necessarily the same as what the buyer has defined as targets, or what are the real needs for the buyer. Therefore, in an ideal situation, the targets reflect real customer needs when they are set in a shared manner, in collaboration with the buyer. (Holmberg 2000.) The targets can either be set as an average level that are applicable for all suppliers or specified for one supplier. The more specified a target is, the more it requires integration in target setting activity. (Forslund et al. 2007).

The *measurement* stage can be conducted either jointly between the buyer and the supplier, or separately. The following aspects need to be considered in measurement stage; first, generating reports from measurements can be done either directly from the transaction system (i.e. ERP), or indirectly, by generating data from the system and create own reports based on the data. Further, the frequency of measurement can vary from daily measurement to monthly measures. Moreover, the performance outcomes can either be set average for all suppliers or targeted to only one supplier. Finally, feedback from the performance is most commonly conducted by the buyer and being commented and adjusted and finally agreed to have a common view about the actual performance outcome, before moving to the analysis stage. (Forslund et al 2007.)

Lastly, the main goal for the *analysis* phase is gaining continuous improvement over time. In this stage, the past performance is analyzed, based on which some reactive decisions are made. This analysis should "review the performance output in relation to the supply chain strategy" and to critically evaluate the metrics used, and to suggest selecting performance variables for future measurement. (Forslund et al 2007.)

3.2. Supplier performance measurement theories

Supplier performance measurement systems have been studied in past literature widely, from the perspective of different theories. These theories are explained in the following sub-sections in order to gain an understanding of different approaches to performance measurement and in order to identify those theories that are applicable for the chosen performance measurement metrics in this study.

3.2.1. Resource based view

The resource-based view is one of the main theories to explain the source of competitive advantage and the performance differences among organizations. In resource-based view, an organization's resources are the most important factors driving competitive advantage. The theory highlights firms' need to recognize their valuable, rare and inimitable resources that are enablers for gaining competitive advantage. Resources can either be internal; capabilities that are unique to the firm, or external: i.e. a firm's suppliers' resources. Hitt et al (2011.) Sirmon et al (2007), deepens the resource-based view with introducing resource orchestration theory, which supports the view that not only owning and recognizing the valuable resources, but by "orchestrating" these critical resources, organizations can achieve competitive advantage. Resource orchestration theory in the context of buyer-supplier means that the suppliers – resource providers – are coordinated by the buyer. With an effective orchestration, the buyer company can execute its strategy.

The resource orchestration theory complements the resource-based view, as it explains how resources can be transformed into capabilities. In resource orchestration, first, the firm's resources are *structured*, then, *bundled* into capabilities, after which the capabilities are *leveraged* with the goal to create value for customers. (Sirmon et al 2007.) Interpreting this to

the context of supplier management, the structuring phase refers to creating an aligned supplier portfolio, whereas bundling the resources of the suppliers refers to suppliers' efforts to access and develop their resources and capabilities, and finally, the buyer leverages these capabilities by selecting the right set of suppliers for achieving its goals. (Barney 2012.)

Furthermore, a link between long-term investments in manufacturing processes and competitive advantage has been studied by Schroeder, Bates & Junttila (2002), and they find that the resource-based view is an effective theoretical framework for identifying gaps in manufacturing strategy research, and that competitive advantage can be reached only when the resources and innovations cannot be duplicated by competitors.

3.2.2. Balanced Scorecard

Balanced Scorecard is widely adopted model in companies. Balanced Scorecard is introduced by Kaplan and Norton in 1992, as a measurement tool that enables to look business from four perspectives: customer perspective, internal perspective, innovation and learning perspective and financial perspective. In each of these perspectives, goals and measurements are set. This method aims to having only limited number of measures, which minimizes the information overload. Benefits recognized with this method are having one report which brings all the necessary elements of a company's competitive targets together. These targets can be customer orientation, shortening response time, improving quality, developing teamwork and long-term management. The balanced scorecard is an answer to the question *how* the results are achieved. (Kaplan & Norton 1992.)

The interpretation of Balanced Scorecard has developed a lot from its beginning from 1990s. From a multi-dimensional evaluation tool, it grew first into a top-down management tool linking strategic goals and cause-and effect linkages together (Kaplan & Norton 1996). In 2000s, the focus turned to vision and mission, which developed Balanced Scorecard into more of a strategic management tool (Lawrie & Cobbold 2004). In the fourth stage of development, Balanced Scorecard turned its focus on strategic planning and mission (Brown 2009).

3.2.3. Agency Theory

Agency theory, developed by Jensen & Meckling (1976), is based on explaining the relationship between business principals and their agents. In the context of supplier measurement, the buyer is defined as the principal and the supplier is the agent. Agency theory is essential in situations when the principal delegates responsibility i.e. in decision-making towards the agent. Recently, agency theory has been used in supply chain management to better understand the principal-agent relationships. Agency theory analyzes the challenges of the information asymmetry. This asymmetry is a typical starting point in a supplier-buyer relationship and can lead to opportunistic – self-interest seeking – behavior. Agency theory suggests possibilities to limit this opportunistic behavior and to enhance goal alignment. (Steinle et al. 2014.)

Literature presents two practices for supplier performance measurement, *monitorin*g and *incentives*. Monitoring refers to supplier performance measurement based on the metrics, whereas incentives refer to the factors that motivate supplier's behavior. Moreover, Maestrini et al (2018a), based on agency theory, examine how monitoring and incentives effect on goal congruence between buyer and supplier and supplier opportunism. This study finds that especially supplier opportunism can significantly be reduced by supplier monitoring, and further lead to increased supplier performance. On the other hand, supplier incentives might, in addition to increase supplier performance, also result to increased supplier opportunism (Maestrini et al. 2018a.) To conclude, agency theory should be considered in supplier performance measurement as a warning sign for the performance measurement paradox and the fact that the buyer and supplier might have conflicting objectives compared to the buyer.

3.2.4. Goal Setting Theory

Goal setting theory, founded in 1990s, is a theory of motivation, with the attention to increase performance standards through commitment. A goal refers to the desired level of performance and it consists of both *content* and *intensity*, where the content refers to the result to be attained, and in the perspective of supplier performance measurement, it refers to the target level (i.e. percentage) of supplier performance in a chosen metric. Goal intensity refers to the "effort needed to set a goal and to the extent of commitment to the goal by the

supplier". There are two main findings that led to the development of goal setting theory. First, a relationship between the degree of complexity of the goal and performance is found by Locke (1976). He found that the more complex the goal is, the higher the performance is compared to an easier goal. This trend is linear until the performing party reaches the limit of its abilities. The second finding is that specific goals lead to higher performance than having no goals at all, or having vague, unspecific goals. It can be concluded that complex and specific goals lead to best results and higher level of performance. (Locke & Latham 2012.)

Moreover, three mechanisms for goal setting are identified, all of them being motivational. The first one is *direction.* Having a specific goal leads to paying more attention and effort to the activities that enables getting to the right direction and finally attain the goal. Recognizing the direction activates knowledge, skills and enables to focus on the relevant activities that are required to reach the goal. The second mechanism is *effort*. Once the goal has been set and the required activities recognized, the level of effort is set depending on the complexity of the goal. The third mechanism is *persistence*. This can be measured by the time spent to reach the goal. The more specific and complex a goal is, the more it requires time investment. All these three mechanisms together help to reach the goal and achieve high performance standards. (Locke et al. 2012.)

3.2.5. Signaling Theory

Maestrini, Maccarone, Caniato & Luzzini (2018b) approach the topic of performance measurement via signaling theory, where the buyer company represents the *signaler*, and the supplier takes the role of the *receiver*. In signaling theory, information flows represent the signals, and these signals flow from the signaler to the receiver. Signaling theory is based on information exchange between supplier and buyer. Typically, the signaler - either being the buyer or the supplier - needs to consider what and how to communicate the information – signals – to the other party. Further, the receiver must then choose how to interpret these signals. The importance of the ways on how information is being exchanged between the buyer and supplier, has been neglected from almost all other theories, which tend to focus more on the targets of performance measurement from the point of view of supplier

coordination, reducing information asymmetry and to foster goal alignment. (Maestrini et al 2018b.)

Maestrini et al (2018b) find four levels for communicating performance measurement: *no sharing, synthetic sharing, performance sharing with explanation* and *joint design.* When there is no sharing, organizations are not willing to share information with the supplier, or do not see the supplier strategically significant. In this case, information is preferred to keep internal and once challenges occur, switching supplier might be the simplest option. When information sharing does not exist, signals are not sent towards the supplier. Synthetic sharing refers to shared signals that are only the results from the buyer company's analysis, i.e., in numeric form, being the only information reported to the supplier regarding the performance.

Further, in performance sharing with explanation, the buyer provides a complete list of metrics measured to the supplier, providing also qualitative feedback with improvement suggestions. This kind of sharing is usually implemented when dealing with strategically significant suppliers for the buyer firm. This approach increases the transparency between buyer and supplier and can help to gain more trust between the parties. Finally, *joint design* includes early involvement where the goal setting is done together with the buyer and agree on the key metrics. Here, the supplier is involved already in the early phase of supplier performance measurement system, not only in the latest – reporting- phase. Joint design can be seen as co-creation of signals. (Maestrini et al 2018b.)

In addition to only recognizing the different levels of sharing signals, Maestrini et al (2018) also study the reaction modes to the reported performance. Three reaction modes are found: *indifferent, passive* and *active interest.* In the case of indifference, the supplier does not consider the reported performance, the reason being either the poor way the information has been shared, or either the lack of interest. Passive interest means that the supplier accepts the performance evaluation, however passively and without any interaction with the buyer regarding the topic, and no specific improvement action plans are made. Finally, active interest refers to an active interaction from the supplier's side, where the supplier records the performance reported and actively responds to it via corrective actions, or in case the supplier rejects the evaluation, argue against it.

The core of signaling theory, is the relationship between the level of communication and the reaction modes. Maestrini et al (2018) find that in case the buyer company does not share information regarding supplier performance measurement, the supplier remains indifferent, whereas the joint action motivates the supplier for active interest. (Maestrini et al 2018.)

The following table summarizes the performance measurement theories and their benefits.

Table 1: Performance measurement theories

Theory	Description	Benefits of the theory
Resource based view	Recognizing valuable and inimitable resources Resource orchestration: buyer company coordinating the supplier	An effective theoretical framework for identifying gaps in manufacturing strategy research. Competitive advantage can be reached by the uniqueness of resources and innovations
Balanced Scorecard	A measurement tool approaching business from four perspectives: Customer perspective, internal perspective, innovation and learning perspective and financial perspective	Strategic management tool, focus on strategic planning and mission
Agency theory	Analyzes the challenges of the information asymmetry between business principal (buyer) and the agent (supplier)	A warning sign for performance measurement paradox, where the buyer and supplier might have conflicting objectives

Goal Setting theory	To increase performance standards through commitment. Direction, effort and persistence are the three motivational mechanisms to goal setting theory	Having complex and specific goals lead to best results and higher level of performance
Signaling theory	Information exchange between supplier and buyer. The signaler - either being the buyer or the supplier – considers what and how to communicate the signals (information) to the receiving party. The receiver must then choose how to interpret these signals.	High level of information sharing, and joint action motivates the supplier for active interest and improve performance

3.3. Metrics for Supplier Performance

A wide variety of supplier performance metrics have been recognized. Shepherd & Gunther (2003) and Bai & Sarkis (2014) have categorized the performance metrics, based on SCOR model (plan, source, deliver and return) into five categories: cost-based metrics, time-based metrics, quality-based metrics, flexibility-based metrics and finally, innovation-based metrics.

Supplier performance measurement metrics can be divided into direct and indirect performance measurement. Direct activities require direct interaction and input from the buyer's side in order to develop the supplier. Activities that measure performance directly are consultation, training, education, equipment and capital, whereas indirect performance measurement activities do not require active involvement from the buyer's side and are activities such as supplier incentives, improvement targets, performance goals and supplier awards. These activities are indirectly affecting to the performance and capabilities of the supplier. However, what is common to both measurement activities, both of the metrics can

be used in all areas of measurement: cost, time, delivery, quality, capacity, service level, finances and sustainability. (Glock et al 2017.)

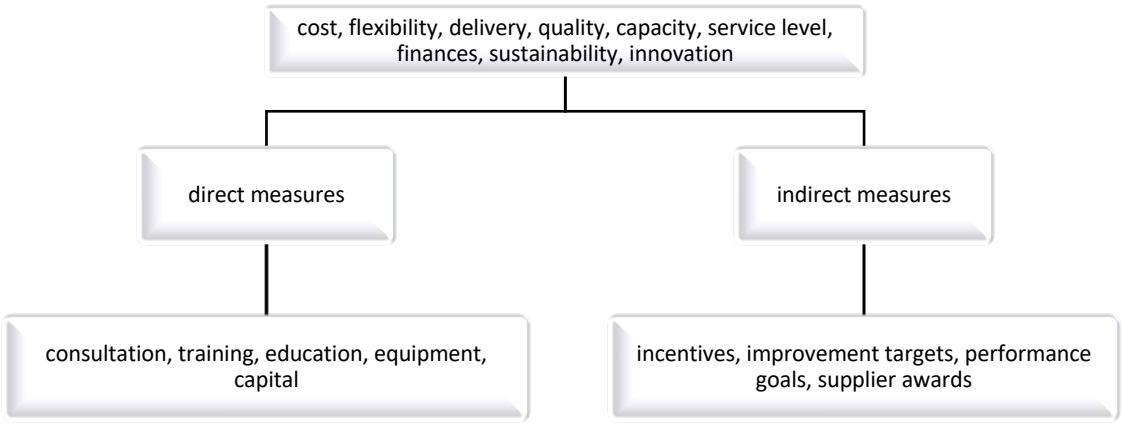


Figure 6: Direct and indirect supplier measures (Bai et al 2014; Glock et al 2017).

3.4. Selecting Key Performance Indicators

Key Performance Indicator (KPI) refers to the set of performance measurement indicators. A wide range of performance measurement systems exist, and therefore it becomes important to recognize and select the suitable key performance indicators for each case; in chapter 2 of this paper, the critical success factors for supplier development are presented. In performance measurement context, critical success factor theory aims to identify the activities and measures that can lead to successful competitive performance for the buyer organization. The critical success factors need to be properly aligned in order to select the key performance indicators and gain desirable results. Thus, it is important not only to focus on the critical success factors themselves, but also to concentrate on the process itself, one important step being selecting KPIs. (Bai & & Sarkis 2014.)

Key performance metrics can be either financial or non-financial, and the levels of performance metrics can be either strategic, tactical or operational. The financial metrics are important for supporting strategic decisions, whereas non-financial metrics are suitable for measuring daily control of operations (Maskell 1989). Based on the previous literature on performance metrics in supply chain management, time and productivity have been

significant components in measuring performance. Further, according to literature from 1995 until 2004, 85% of the used key performance metrics are quantitative, whereas only 19% are non-quantitative metrics. (Lambert & Cooper 2000).

A common challenge organizations face, is rather than having shortage of performance metrics, organizations are lacking knowledge on how to select the suitable metrics for measuring performance for the selected supply chain operations, and further how to apply these metrics into practice in everyday business leading to continuous improvement (Gunasekaran et al. 2007). At lower organizational level, simple and easily understandable performance measurement systems are suitable, enabling the execution of performance measurement in everyday business also in the lower level of the organization. Furthermore, it is essential to recognize that performance metrics are not necessarily selected for permanent implementation; as the business strategies change over time, the performance metrics should be revised and changed accordingly. (Gunasekaran et al. 2007.)

In the below table, the performance metrics related to delivery performance and supplier-buyer relationship factors are presented in operational, tactical and strategic level in both financial and non-financial aspects. (Gunasekaran et al 2007.)

Table 2: Financial and non-financial performance metrics

FINANCIAL	
Level	**Performance metric**
Strategic	Customer query time Buyer-supplier partnership level Delivery performance
Tactical	Delivery reliability
NON-FINANCIAL	
	Customer query time Order lead time

Strategic	Flexibility of service systems to meet particular customer needs Buyer-supplier partnership level Supplier lead time against industry norm Level of supplier's defect free deliveries Delivery lead time Delivery performance
Tactical	Accuracy of forecasting techniques Product development cycle time Order entry methods Purchase order cycle time Effectiveness of master production schedule Supplier assistance in solving technical problems Supplier ability to respond to quality problems Delivery reliability Responsiveness to urgent deliveries
Operational	Capacity utilization Efficiency of purchase order cycle time Frequency of delivery Driver reliability for performance Achievement of defect free deliveries

3.4.1. Time metrics

The time-based supplier performance metrics are related to supplier punctuality. What can be measured, are lead time against the industry norm, purchase order cycle time, the percentage of late deliveries and inbound punctuality, information timeliness and the efficiency of purchase order cycle time (Bai et al. 2014). These metrics can also be defined as delivery performance variables (Stock & Lambert 2001), which is one of the most critical performance variables in today's supply chains. According to past literature, on-time delivery is considered to be the most important performance metric (Stock et al 2001) despite new metrics have been introduced later. Furthermore, delivery performance is classified as a strategic performance measure, and as an essential factor of the Supply Chain Operations Reference (SCOR) model (Gunasekaran et al. 2001). A delivery window refers to the time within a delivery needs to be completed and received in the destination. What is considered as late or early delivery, is defined in supplier's and buyer's contracts, where the delivery terms are also defined. In case the supplier delivers outside the scope of the set on-time delivery window, the supplier needs to compensate this with penalty costs to the buyer. Furthermore, on-time deliveries can be measured by product lateness, average earliness and lateness of order and by the percentage of on-time deliveries (Beamon 1999).

Order cycle time, which is called order lead-time, refers to the time from which the purchase order has been received in supplier's side, until the goods are delivered. This cycle includes the following steps: order entry time (through forecasts or direct order from buyer), order planning time (design, communication and scheduling time), order sourcing, assembly and follow-up time and finally, finished goods delivery time. The following figure illustrates the order cycle time. Reducing the order cycle time has an impact on the supply chain response time, which further increases customer satisfaction. Moreover, the reliability and consistency of the order lead time are also essential factors for attaining customer satisfaction. (Gunasekaran et al. 2001.)

Defining delivery metrics is not a simple task, as several factors need to be considered. First, the measurement object of on-time delivery needs to be defined. The measurement object can either be the number of orders, order lines or individual items. Second, the time unit

needs to be defined, which can vary from the correct date to a specific time window (i.e. +/-1 day). The third factor is the measurement point, which refers to the point along the supply chain where the order is considered to be delivered. This point can be i.e. either customer goods receipt or quality control. Finally, what needs to be considered is the comparison date for an actual delivery date, which defines whether an order is on time or not. This date can be for instance a desired or requested delivery date. (Forslund 2007.)

Moreover, when deciding on the performance metrics chosen for developing supplier delivery performance, it is essential to take into consideration the shift from the traditional business to the modern business. This shift is mostly related to the fact that organizations cannot compete as individual and autonomous entities, but rather as supply chains. This perspective is crucial to take into consideration when choosing the suitable delivery performance metrics (Lambert & Cooper 2000.) Further, when selecting the key performance indicators for supplier delivery performance, it is important to recognize, whether the deliveries are based on make-to-order or make-to-stock. In case of make-to-order, the suitable KPI is lead time, however in a case of make-to-stock, inventory turnover should be the indicator. (Gunasekaran et al. 2007.)

Furthermore, one utilized approach to measure supplier development is Six Sigma (Wang, Du & Li 2004). Six Sigma is a "logical and systematic approach to achieve continuous process improvements", developed in 1980 in high a high-volume manufacturing environment (Wang et al. 2004). This approach is seen as a driver for process and service improvement and for cost reduction, and Six Sigma improvement can be divided in five phases that are strongly linked to the supplier performance measurement lifecycle approach; *define, measure, analyze, improve, control.* In the context of supplier performance development, the aim for Six Sigma is to evaluate supplier's performance in a regularly manner. Six Sigma being a data-based approach analyzing the root causes of performance issues and controlling the overall quality of the supply chain network, it requires a clear definition of a measurement system that enables monitoring and comparing the performance over time. (Wang et al. 2004.)

Paul et al (2013) supports the ideology of Wang et al (2004) and define two analytical models to measure supplier delivery performance: the first one being lean six sigma, and second one

capability maturity model (CMM). The ideology behind lean six sigma is cost effectiveness and waste reduction. This model has been an effective measurement tool when it comes to manufacturing or IT industries. This model consists of three factors; six sigma tools, values and leadership, and customer oriented, which all together ensure a good quality of service (Paul et al 2013.)

3.4.2. Quality and flexibility metrics

The quality-based performance metrics consist of measures such as delivery reliability, percentage of wrong supplier delivery, mutual trust, satisfaction with knowledge transfer, satisfaction with supplier relationship, information accuracy and information availability (Bai et al 2014). Quality metrics consist of those elements that cannot necessarily be easily measured quantitatively. In example, the level of mutual trust and the satisfaction tend to be subjective experiences, therefore difficult to convert into numbers.

In flexibility metrics, the focus is on the supplier's ability to respond to quality problems and product changes and schedule changes. Also, having materials variety and product volume variability capabilities and product development time are metrics measuring supplier's flexibility. (Bai et al. 2014.) Both quality- and flexibility metrics are linked to the time metrics, however the focus in this study relies mostly on time and quality metrics.

3.5. Summary

This chapter has presented the concept of performance measurement. When measuring performance, it is important to consider what and how to measure a certain selected performance metric. What also needs to be considered, is the selection of suitable metrics and reviewing the selected metrics over time. (Gutierrez et al 2015.) Moreover, there are various theories, which can be applied when measuring performance, all of them having differing targets and benefits. These theories provide possible frameworks, under which the performance can be measured. When measuring supplier's delivery performance, in addition to the traditional theories in performance measurement, the approach of Six Sigma has been

resulted to be a successful tool to measure especially supplier's delivery performance (Wang et al 2004).

Finally, the following figure summarizes the literature review both for supplier development and performance measurement, and presents, what is expected to be answered in the research question. Based on this literature review, the following factors are noted to be drivers to a successful supplier development.

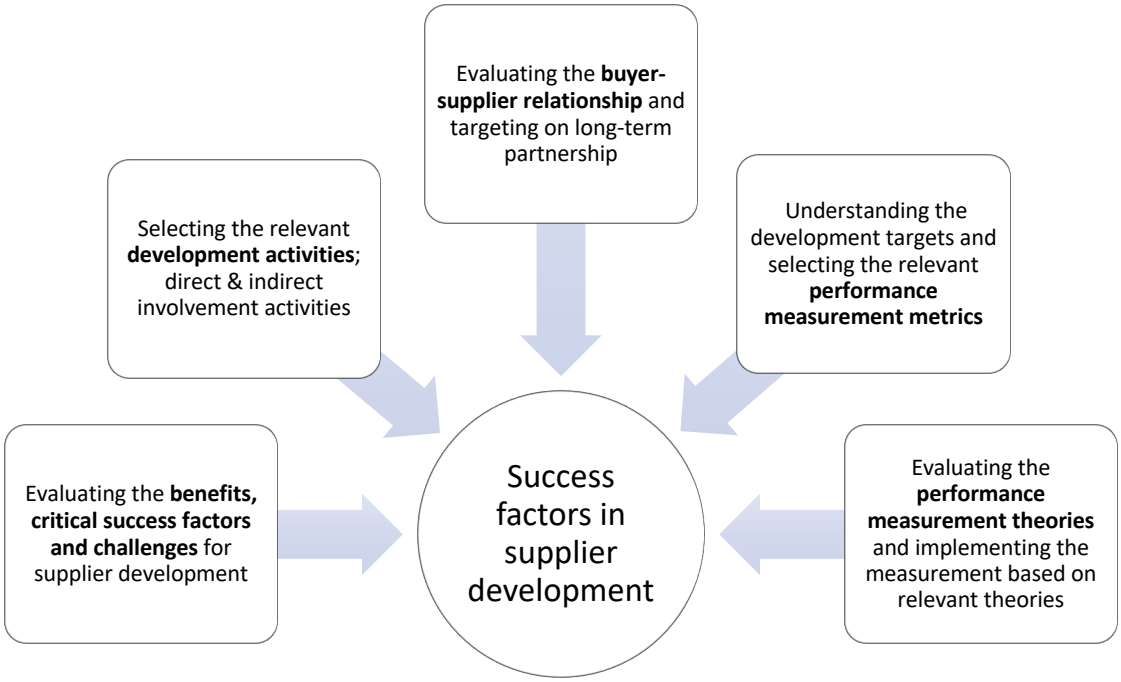


Figure 7: Summary of the literature review on the success factors in supplier development

This study aims to build a theory based on what has already been studied in the past and what is found via the findings of this single case study. The following chapter presents the research methodology of the case study.

4. Research methodology

This chapter introduces the research methodology of the study. First, the research methodology and approach are presented, after which the execution of the study as well as data collection methods are covered. Finally, this chapter includes discussion on the reliability and validity of the study.

4.1. Research method of the study

Research methodology refers to the method used to conduct a research. Research methodologies are usually divided to two categories: qualitative and quantitative research methods. These two methods differ from each other in the matter of what kind of phenomenon the method explains. Qualitative method is chosen, when the nature of the information is narrative, verbal and difficult to measure and convert into numbers, whereas quantitative method is chosen when the nature of the information is quantitative, in the form of numbers. The data collection with these two methodologies varies from each other; when using qualitative method, the data is mainly collected via interviews and observations. In quantitative method, the data is collected via interviews, surveys, content analysis and statistics. (Tucker, Powell & Meyer 1995.)

The research method chosen in this study is qualitative study. The reason behind choosing qualitative method to this study relies on the nature of the research question and the purpose of the study; this study aims to build a theory based on a single case study.

4.2. Research approach and design

In addition to choosing the valid research methodology, the research approach and design need to be defined. There are several research approaches to conduct a research, the most common ones being deductive and inductive approaches. The deductive approach refers to an approach moving from general to the particular, starting from the theory and testing the theory via research. The inductive approach is the opposite of deduction, which starts from the particular, moving towards the general. Here, the researcher is making observations about

a phenomenon and based on those come up with theories (Locke 2007.) This study is an inductive study, as based on a case study, a theory is developed. Moreover, what supports the choice of an inductive approach, is that induction is often selected in qualitative research, as the nature of the qualitative research creating new insights and theories (Bansal, Smith & Vaara 2018).

Moreover, a research can be divided into two main categories: exploratory and descriptive study. Exploratory research investigates little-understood phenomenon and seeks to understand more about it and to generate hypotheses for future research, whereas descriptive research aims to document and describe a phenomenon. (Locke 2007.) This case study is mostly an exploratory research, as it aims to find new insights via case study research and further build a theory based on the findings.

Case study is selected for this study, due to its various benefits both when it comes to the process and to the outcome. According to Schoch (2020), a case study enables to collect different kinds of data, in example in form of interviews, documents and observations, providing an in-depth set of data and comprehensive understanding of the phenomenon studied. Case studies are usually qualitative, answering to the questions that explain, explore, describe and understand. It is encouraged to use multiple sources over several time periods when conducting a case study. (Schoch 2020.)

The choice of selecting a single case study as the research methodology, can be explained relying on past literature on case studies, on the nature of the research question and on the goals for this study. In the field of supply management, based on past literature, case studies has experienced a shift; during the years 1996-1999 the studies were mainly single in-depth case studies, whereas in the recent past, multiple case studies became more popular among literature (Dubois & Araujo 2007). Additionally, during past years the case studies have focused more on a more specific aspect of supply management. Despite multiple case studies have gained a lot of attention in previous years, this method can have various challenges; using multiple case studies, the in-depth and the specific background of each case can be missed, the focus being more on the measurability of the cases. (Dubois et al 2007.) The purpose of this study is to gain in-depth data, and based on the evidence from past literature,

there is a greater potential to achieve most reliable results by conducting a single case study instead of a multiple case study. Finally, this case study is a longitudinal study, in other words this study is conducted over a selected period of time to investigate the changes that might occur over time for the selected variables.

4.3. Execution of the study

The theoretical framework regarding supplier development and performance measurement provides the base for this research. Next, the analysis and data collection from the case company and supplier company is executed. First, some preparative data is collected from the case company's ERP system in order to gain a base for gathering additional data for the study. This additional data is collected via observations from the supplier's performance that have been conducted throughout the data collection period, and via two in-depth interviews that are conducted for representatives of both the supplier company and the buyer company.

In the data collection phase, the most relevant key performance metrics are selected, after which the development areas are chosen. After the data is collected, the findings are explained, and success factors of the development program are evaluated. Based on this evaluation, a supplier development model is introduced.

4.3.1. Data collection

To answer the research question, qualitative data is collected. Referring to Schoch (2020), data is collected from various sources in order to gather an in-depth understanding of the case. The data is collected from one-year time period, in order to gather enough data for the analysis that enables to proceed with analyzing the results and formulate development actions. Therefore, to best acquire the benefits of this research, the chosen method is a longitudinal research. In this study, the time period is 12 months, as it gives an understanding of the performance of the supplier throughout the whole year, making the data more reliable than a shorter time period. In this study, the data is collected from the buyer company's ERP system and the analyses are implemented based on this data. The data is both primary and secondary. A part of the data is already available in the company's database, however primary

data collected by the author is also provided to support the secondary data, and to precise the data to the purposes of this study. This data is gathered in real-time.

Moreover, to support the codified data from the buyer company's database, qualitative data is collected in forms of interviews and observations, in order to analyze the soft skills such as communication and the level of trust and motivation towards collaboration between the parties as well as buyer-supplier relationships. These metrics are difficult yet impossible to conduct quantitatively, therefore qualitative method is chosen for this study.

4.3.1.1. Interviews

Two interviews are conducted in order to respond to the research question. The interviews represent both the supplier company and the buyer company. The selected representative for the buyer company has a role of supplier quality manager in the buyer company, which has closely collaborated with the case supplier company during the period of the development program, therefore having a good understanding on the development program and its results. The other interviewee is the sales operations manager of the supplier company. The choice to interview both buyer company and the supplier company enables to include the perspectives of both supplier and the buyer company in order to gain more reliable results on the research question on the qualitative topics.

The interviews are semi-structured, and the interview conducted to the supplier consists of 16 questions. The first questions are more general questions regarding collaboration, with the intention to warm up the interviewee before going deeper to the actual questions which can provide answers to the research question. Furthermore, the questions are structured in a way that leaves the interviewee to openly construct the replies and go deeper into the topic if needed. The interview for the buyer company's supplier quality manager is conducted in a similar manner, including 15 questions regarding the collaboration between the buyer and supplier, as well as the key learnings taken during the development of this supplier. The interviews are conducted virtually via Teams, as it is not possible to organize the interviews face-to-face. However, despite the interviews being conducted virtually, it does not impact on the quality of the communication; the author having been in systematic communication and

collaboration with the interviewees before conducting the interviews, making the atmosphere during the interviews very open.

Due to one of the interviews was conducted from the supplier company and the other from a representative of the buyer company, the questions are structured in a slightly differing manner, however majority of the questions were similar, in order to gain perspectives to the same questions from both the buyer company and the supplier company representatives. The following tables presents the interview structure.

Table 3: The structure of the interview for the supplier company representative (sales operation manager)

Topic	**Questions**
General questions on collaboration	How do you experience the communication and collaboration between the supplier and the buyer at this point? Looking at the previous year, have you received enough support from the buyer company? Has there been any changes during the past year? Is the communication between different stakeholders working and are all parties involved aware of what is going on? How do you see the buyer company's previous year outsourcing and changes? Has this released more time to the collaboration between the supplier and buyer company?
Information flow	How beneficial have you experienced the weekly operational meetings with the buyer company? Have they brought the wanted added value? What kind of development would you see on the daily/weekly operational communication between the buyer company?
Performance measurement	Has the quarterly measurement made by SQM about inbound punctuality impacted on the quality of communication and collaboration between the buyer and supplier? Does this kind of information sharing add transparency and trust between buyer and supplier? Has the performance measurement motivated you to develop the inbound punctuality and processes? Should the root cause analysis (performance measurement) be done also in future to support continuous improvement? Has the monitoring of the inbound punctuality and the measurement, on a form

	of a meeting and conversation been more beneficial than only going the data through i.e. via email?
Development actions for 2nd tier supplier	Have the weekly meetings between buyer-supplier and 2nd tier supplier improved the collaboration and partnership between you (the supplier) and the 2nd tier supplier? Was the buyer company's support in these meetings beneficial?
Summarizing questions	Have the development project positively impacted the collaboration between you (the supplier) and the buyer company during the past year? Are the expectations and targets aligned between the buyer and you (the supplier)? What are the biggest challenges when it comes to developing the inbound punctuality?

Table 4: The structure of the interview for the buyer company representative (supplier quality manager)

Topic	**Questions**
General questions on collaboration	How do you experience the collaboration between the buyer and supplier company before this development project took place? How the collaboration has been changed during this year, with the regular performance meetings and quarterly analysis?
Development program and suggestions for future	What explains the fact that the improvement in inbound punctuality was not seen despite the corrective actions and active cooperation, measurement and monitoring? What could have been done better? What would the buyer company do better in order to support the supplier best with developing their processes and improving the inbound punctuality? (on a daily, weekly, monthly and quarterly level)? What the supplier should do better in order for improvement to be achieved? Did the regular data analysis and open communication improve the collaboration between the buyer and supplier company and increase the motivation to improve the performance?
Information flow	Have the buyer company's stakeholders the same data and information available, and that the data can be interpreted correctly? Has there been issues with information flow in the buyer company's side? Has the supplier been transparent in its communication towards the buyer? Has the situation changed during this year? Has the buyer common targets with the supplier?

	Have the development actions been communicated to the correct people in the supplier end, not only to the managerial level?
Summarizing questions, future directions	What has been the biggest learning regarding the supplier and buyer collaboration during your supplier quality manager role? Where the buyer succeeded in the development program? Where the supplier succeeded in the development program? How should the collaboration between the buyer and this supplier continue in future?

4.3.1.2. Observations

In addition to the interviews, data for this study is collected via observations. Observations are used as a way to increase the validity of a research, as observations provide a more in-depth understanding of the context and phenomenon under study (Dewalt & Dewalt 2002). Moreover, the more complementary data collection methods are being implemented, - i.e. interviews, surveys, document analysis, questionnaires and other qualitative methods - the stronger the validity will become. Literature defines three types of observations: descriptive, focused and selective observations. Descriptive observations are observations implemented more in a general level, whereas focused observations are often supported by interviews, guiding what to observe, and finally, selective observations are focusing on different activities to help to identify the differences in those activities (Dewalt et al 2002). In this study, the observations do not follow the traditional setup of an observation, as the observations are not done face-to-face, but via remote communication tools such as phone calls, Teams calls and written communication. Also, the observations are done selectively during the interviews, and during other meetings throughout the data collection period.

Furthermore, observations can also be divided into categories based on the nature of coding and observing methods. First, in *controlled* observations, the purpose is to use codes that represent a specific type of behavior, and instead of writing a detailed report, the findings are codified into categories, making it easy to analyze. In *naturalistic* observations, the observation is done in natural surroundings, and taking notes that will be codified later on. Finally, in *participant* observation, the observer learns through involvement in the activities of the participants in the research settings. Participant observation can include also other

aspects than only observation, such as conversations, different kinds of interviews, checklists or questionnaires. In participant observations, the required approach is open and nonjudgmental, having the interest of learn from others and having good listener's skills and being open to unexpected in what is learned (Dewalt 1998). The level of participation and involvement can vary from being a complete participant, into a complete observer. (Dewalt et al. 2002). In this study, the nature of the observation is in the middle of these extremes, in *participant as an observer,* referring to a setup where the researcher is a member in the group, making the researcher's involvement and participation as a given.

When it comes to coding of observations, literature highlights the importance to use exact quotes when possible, to describe activities in the order they occur, to include relevant background information to situate the event and to separate one's thoughts and assumptions from the actual observations. It is also important to record the time, place and name of the researcher on each set of the notes. Moreover, in observations, what needs to be taken into consideration is that observations are not telling the full truth; it is always an interpretation of the observer, making the data slightly more subjective compared to other data collection methods. (Dewalt et al 2002.)

In this study, the purpose of the observations is to acquire knowledge on how the supplier behaves during the development program over time and in different group settings. The goal for the observations is to gain valuable information that is not possible to acquire only via interviews or daily conversations. Despite a part of the observations are related to daily communication in the form of conversations, email exchange and calls, the purpose is to take steps further via observing the supplier's behavior both on an operational level in more familiar and frequent settings (i.e. during weekly operational meetings) but also during less frequently occurring meetings including participants from the managerial level, where the approach is more strategic than operational. What is interesting in terms of this study, is to find the differences in behavior, communication methods, attitudes and motivations in these differing settings.

In practice, the operational level observations take place during weekly meetings between the supplier and the author of this study (buyer company's operational representative) as well as

via observing during the supplier and 2nd tier supplier weekly calls. What is important to notice, is that the observant is representing the buyer company, and having a significant responsibility in the case development program. Therefore, the observant is having an active role in most of the observation settings. One exception to this active involvement is the setting of weekly calls between the supplier and the 2nd tier Chinese supplier, where the role of the observer is purely to observe, however the participants being aware of the observation setting. Here, the observer does not participate in the meeting as a proactive member. The purpose of the observations when it comes to the weekly meetings with the supplier and 2nd tier supplier, is to see how the quality of communication, proactiveness of communication and information sharing between the supplier and 2nd tier supplier evolves over time, and to see how the relationship between these parties develop. The main observations are written down on a weekly basis, to gather reliable data for the study.

The following table summarizes the topics observed on the weekly operational meetings between the case supplier and the 2nd tier supplier. In these meetings, the areas under observation are mainly related to the quality of communication, the attitudes and motivation for proactive communication from the 2nd tier supplier. The topics covered in the weekly meetings are also related to issues such as order reconfirmations, risk/crisis management and target alignment. The coded observations can be found from the appendix, codified as notes and quotes from the supplier representatives.

Table 5: Observations from operational weekly meetings between the case supplier and 2nd tier supplier

Topic	**Observations**
Quality of communication, proactiveness of communication	How the quality of communication is at the beginning of the weekly meetings? How does the quality of communication improve over time? Has the proactiveness of the 2nd tier supplier communication improved over time?
Order reconfirmations	Is there improvement in 2nd tier supplier order reconfirmation over time? Are the confirmations reliable?

Quick-fix and risk /crisis management	How does the 2nd tier supplier manage risks? Is there improvement seen over time?
Target alignment and forecasting	Are the targets aligned between the supplier and 2nd tier supplier?
Overall development	In general level, has the development action gained results? Have the delivery punctuality improved over time, from the beginning of the development action?

In addition to the observations of the weekly meetings between the second-tier supplier and the supplier, observations are also being implemented regarding the overall communication between the buyer company and the supplier. Based on these overall observations, the level of the development of a partnership as well as the level of communication, reaction modes, efficiency and consistency of the communication was observed over the period of one-year time. The below table summarizes the topics observed:

Table 6: Observation on overall communication

Quality of daily communication	What is the nature of the daily communication? How transparent and open the level of communication is? How the supplier is communicating about challenging topics?
Weekly communication related to deliveries and delay risks (operational level)	How has the supplier prepared to the weekly calls? Is the supplier informing about the potential risks? Is the supplier willing to collaborate in order to find solutions to problems?

Communication related to monthly performance measurement (strategic level)	How does the supplier communicate on the challenges? How does the supplier communicate the status of the development actions?
Overall buyer-supplier relationship	
Quality of communication within the supplier organization (differences between the personnel)	Is the level of communication varying between different contact persons from the supplier company? Is the service level varying during the substitution periods?
Communication in challenging periods/when negative information needs to be given	How are the challenges communicated to the buyer? Are all potential risks communicated beforehand?
Willingness to take responsibility of own issues	How does the supplier act towards the problems under their responsibility?

4.3.2. Analysis of the data

When it comes to the data analysis of a case study, Schoch (2002) suggests the following steps to be followed; *describing, emerge of findings and comparing*. First, in the describing phase, questions “who”, “what”, “when” and “where” need to be understood. The collected data is extensively reviewed in order to come up with patterns and themes from the data. When emerging the findings, the data is coded into findings. The coding is done based on all the existing data gathered for the study. Finally, the comparing phase consists of making comparison across the topics that have emerged from the data. Comparison is easy to use when implementing a multiple case study, however in the context of this study, the comparing aspect derives from the longitudinal nature of the research, where comparison is done timely.

The data for this study is collected both via interviews and observations. After conducting the interviews, the records is transcribed into written format word-by-word, which enabled all the relevant data to be included in the analysis. The data for the observations is collected in

written form in real-time, taking notes from on a weekly basis. The advantage of this systematic observation is that data can be collected in real-time during a longer period of time. This enables to see changes in the persons' behaviors, patterns, and the development in the communication and collaboration during the development program.

4.4. Reliability and validity

In order the research to be a contributor to the academic literature, it needs to be both reliable and valid. Reliability refers to "the stability of findings", whereas validity refers to the "truthfulness of the findings" (Altheide & Johnson, 1994). Reliability in qualitative studies is more difficult to prove than in quantitative research, due to the unique nature of qualitative research.

When it comes to the validity of the study, the choice of collecting the data for this study from various sources - interviews, observations and databases - makes the study more valid, as there the different data collection methods complement each other, helping to gain a more in-depth analysis. Furthermore, the interview questions are aligned with the theoretical framework of the study, providing valid findings on the topic of supplier development success factors.

Morse et al (2002), state that the criteria for a reliable and valid data in a qualitative study are credibility, fittingness, auditability and confirmability. In order to test both reliability and validity of the data, verification strategies should be considered in terms of methodological coherence, sampling sufficiency, a dynamic relationship between sampling, data collection and analysis, theoretic thinking and developing of a theory. Moreover, what Morse et al (2002) suggest, is that these verification methods should be implemented proactively, before the study is being already conducted.

In order to verify the reliability and validity of the data in this study, the credibility and fittingness of the data are first evaluated. This study being a single case study, makes the reliability and validity more fragile than for example in a multiple case study, as the sample consists of only one case. However, in order to increase the validity of the data, different data

collection methods are chosen, in order to deepen the understanding of the studied phenomena, and to provide supportive and complementary data from various sources.

When linking the verification strategies introduced by Morse et al (2002) into this study, what first needs to be covered is the *methodological coherence,* referring to the fit between the research question and the method chosen to respond to the question. The choice of conducting a case study from the research question, relies on the nature of the research question. The research question of this study can be responded via a single case study, in order to gain in-depth data of the success factors of supplier development. To make a comparison, in case the selection of this study would have been quantitative, the success factors would only rely on the codifiable data, which does not provide valid data to answer the research question of this study.

When it comes to the *appropriate sample* (Morse et al 2002) in this study, the selected case study is evaluated before conducting the study. This case study represents a case that directly responds to the research question. The case study is a direct case of a supplier development program, which is conducted in a Finnish multinational company, which makes the supply chain complex, increasing the validity and reliability of the data. Next, *collecting and analyzing data concurrently* refers to the relationship between what is already known via the data and what is studied based on the data. In this study, the data is collected in a manner where first, the preliminary data of this case study is collected via the case study company's database, which further guided the study to the correct and required direction, which enabled to form the relevant questions to the interviews and observations. In other words, the validity and reliability of the data have been reviewed already before moving to conducting the interviews and observations by evaluating the validity of the interview questions to best support the findings of the preliminary data, further leading to respond to the research question.

Moreover, when it comes to *thinking theoretically,* the new insights that are emerged from the new, collected data, need to be verified with a data already collected, in order to build a solid foundation to the new insights and ideas. In this study, the findings from the data are linked to the theoretical framework of the study, which makes this study more reliable and founds a base of the findings. Finally, the *theory development* refers to moving from the data collection to building a theoretical understanding, being an outcome of a research process. In

this study, the theory is developed from the findings of the collected data, moving from data collection to the data analysis, and finally building a theory. (Morse et al 2002.)

5. Empirical research and results

In this chapter, the empirical research is conducted. The data analysis is conducted on the selected case company, and the data is collected in one-year scope. First, the content of the development program is presented and the results regarding the supplier's delivery performance on a quarterly data analysis are introduced, after which the results are analyzed on a deeper level, based on the findings from interviews and observations.

The structure of this chapter is following the model of supplier development presented on chapter 2, going through the results via all the phases from *preparation, development* to *monitoring* phases of supplier development. First, in the *preparation* phase, the need for implementing a supplier development program is reviewed, after which, in the *development* phase, results from the development program are presented based on the actions implemented to improve the supplier. Furthermore, this chapter presents the results that are acquired regarding phase of *monitoring* the supplier development and performance over time. Finally, based on the research and results obtained, chapter 6 will go through the main findings, providing concluding points and building a theoretical model based on the case study findings.

When linking the scope of this study to the performance metrics presented in the literature review in chapter 4, this study focuses on non-financial strategic, tactical and operational level metrics. In strategic level, the aim is to measures the flexibility of service systems to meet particular customer needs, the level of byer-supplier partnership and the delivery performance. On a tactical level, what is measured is supplier's ability to respond to quality problems, delivery reliability and responsiveness to urgent deliveries. Finally, moving to the operational level, the capacity utilization is studied. To conclude the main scope of the study is on *time-based* supplier delivery performance metrics.

This study takes into consideration elements from the presented performance measurement theories, especially focusing on the signaling theory, agency theory and goal setting theory. Furthermore, when it comes to the philosophy behind the measurement, the ideology of Six Sigma is being followed, having the aim to provide reliable data that enables monitoring and

comparing the performance over time. Finally, the metrics chosen are indirect performance metrics, as the performance is in this development program is measured via improvement targets and performance goals.

5.1. Analyzing the need to develop supplier's delivery performance

This section follows Melnyk et al (2014) findings regarding the selected metrics, that first should indicate the starting point – in this study the delivery performance in the starting point – moving to the recognition of what is good and bad performance, and finally to identify the consequences of being below the target. The supplier's level of performance is first being evaluated based on the selected metric of delivery performance.

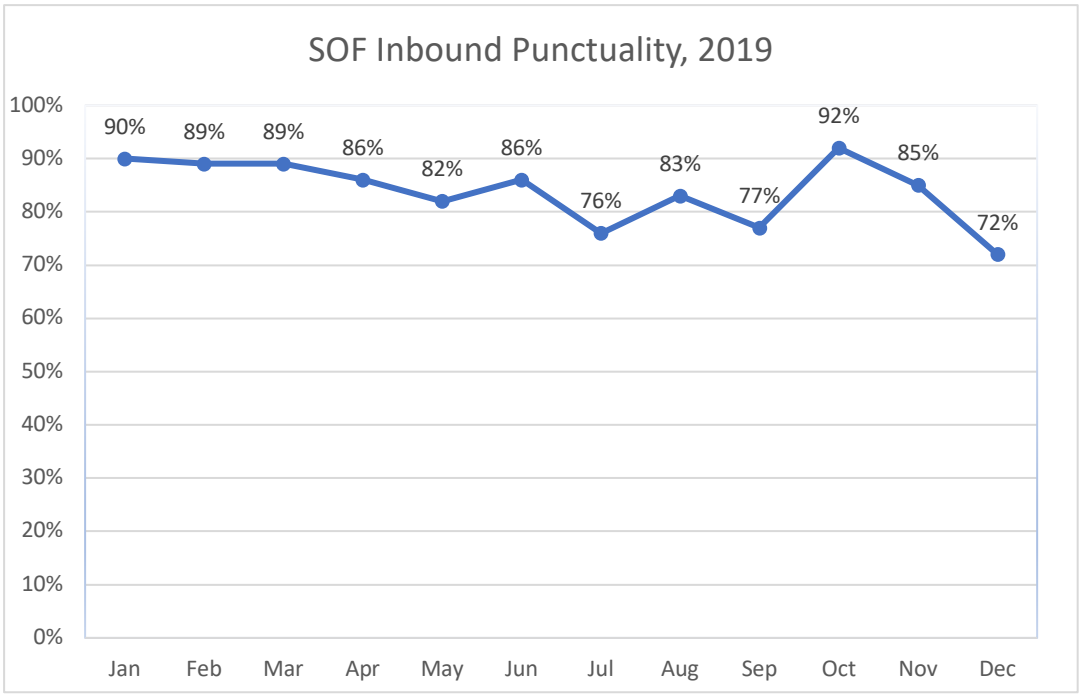
The selected supplier for this case study is a Finnish supplier that is one of the biggest external suppliers in terms of order quantities for the case buyer company. This supplier is critical in the supplier portfolio of the buyer company; therefore, the performance of this supplier has a strong impact on the overall performance of the buyer company. In the first analysis of the conditions of the supplier's performance, an alarming percentage of inbound delivery punctuality has been recognized. This inbound punctuality percentage has dropped from 90% to under 70% on a weekly level, the target being 99%. This rating is one of the lowest ones among all other external suppliers of the buyer company. This supplier being one of the most important suppliers to the buyer company and referring to Handfield et al (2000) stating that only 20% of suppliers are responsible for as much as 80% of the overall poor performance, selecting this case supplier into the development scope is well justified. Moreover, selecting delivery performance for the metric for this study is justified based on past literature, where i.e., Stock et al 2001; Keebler et al 1999 note that on-time delivery is considered to be the most important performance metric despite new metrics have been introduced later.

To measure the delivery performance of the supplier, the chosen metric is to measure the inbound punctuality. Inbound punctuality refers to an on-time delivery metric, which measures the percentage of inbound deliveries that is delivered to the distribution center on time, until the required delivery date. More specifically, inbound punctuality is measured based on the initial requested delivery date against the actual delivery (goods receipt) date at

the distribution center. What is essential to be clarified, is that the delivery is considered to be completed once it is received at the distribution center. Further, the concept of “delivery” in the context of this study refers only to the *inbound delivery* from supplier to the distribution center, excluding the outbound delivery from the distribution center to the final customer. Furthermore, as the delivery term is DAP for the case supplier, the supplier is fully responsible for the delivery until the orders are received at the distribution centers and having goods receipt.

Moreover, inbound punctuality considers all the reasons behind a delayed delivery, regardless of the reason of the delay and regardless of who is the responsible party of the delay. This metric is chosen due to the fact that it considers all the factors that are impacting the supplier’s delivery performance, which further enables to make corrective actions and develop the supplier in both short- and long-term, including efforts from both supplier’s and buyer’s side.

The below table illustrates the findings on delivery performance for the case supplier from beginning of year 2019 until the end of year 2020. The target of this metric is 99%, and the figure shows that the percentage has not reached the target level, and it has been only 70% on its lowest level. This has a strong effect on the overall inbound punctuality level of the whole unit of Supply Operations Finland (SOF) for the buyer company. The inbound punctuality is measured on a weekly basis in SOF unit, and this data is analyzed by the author, in the platform of the ERP system of the buyer company.



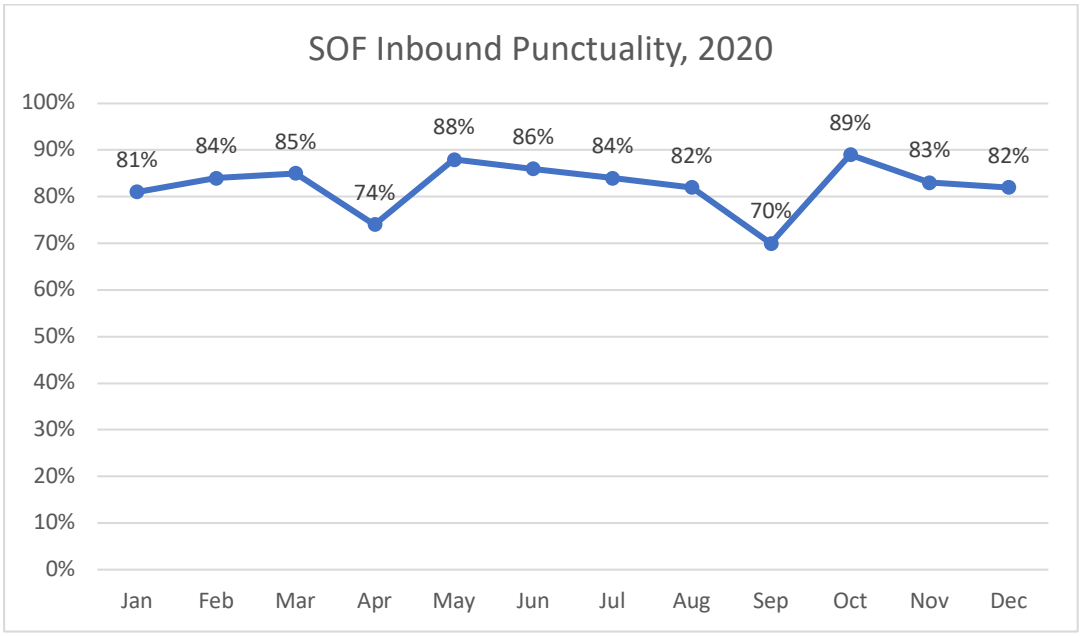


Figure 8: The case supplier's inbound punctuality percentage for supply operations Finland unit (2019-2020)

This table excludes the reasons behind the percentages, therefore an analysis and categorization of the root causes behind these low percentages need to be conducted. It is important to identify the real reasons behind these issues, in order to find the most effective

solutions to improve the supplier's performance. The next section presents the findings of the reasons behind the low delivery performance level in detailed.

5.2. Analysis of the delivery performance in the case company

After having recognized the low level of delivery performance with the selected case supplier, the next step is to analyze and understand, what has caused the low performance. In practice, this is done via a *root cause analysis* of the delivery delays, by collecting data from the buyer company's system and monitoring the performance on a quarterly frequency.

A root cause analysis is conducted to find the reasons behind the delays, implemented as a sample of one year starting from Q4 of 2019 until Q3 of year 2020. These analyses consist of secondary data acquired by the supplier quality manager of the buyer company, in collaboration with the author of this paper (the materials management specialist), being in close contact with this supplier on a daily basis in operational level. The root cause analysis of the inbound punctuality highlights the most critical and commonly appearing reasons for delays. Moreover, the purpose of making a longitudinal quarterly study is to better understand the occurrence of a specific delay reason and to acquire the needed knowledge to agree on the development actions both in supplier's and buyer's organization side.

The following figure illustrates that the main reasons behind delivery delays are distribution center delays when having a delay in generating the goods receipt, too short lead time - referring to all orders placed under the agreed lead times, quality and delivery issues of 2nd tier suppliers located either in China or elsewhere in Europe, transportation delays and production stops. The production stops refer to all unclarities with the content of the orders that cause the production to stop until the issue is solved in collaboration with the supplier and the buyer company's engineering department.

When analyzing the nature of the delay reasons, the data reveals already at this point, that the inbound punctuality is a metric not only revealing supplier's own issues, but also highlighting the buyer firm's issues that require involvement and improvement, in example the production stops, or orders placed under the agreed lead time. The production stops

indicate that there is something wrong or unclear in the specifications of an order, therefore making the responsible unit to be the buyer company instead of the supplier. Moreover, when it comes to orders placed under the agreed lead time, the supplier might not be able to fulfill the request to deliver in a shorter lead time, making the responsible unit for this delay reason to the buyer organization.

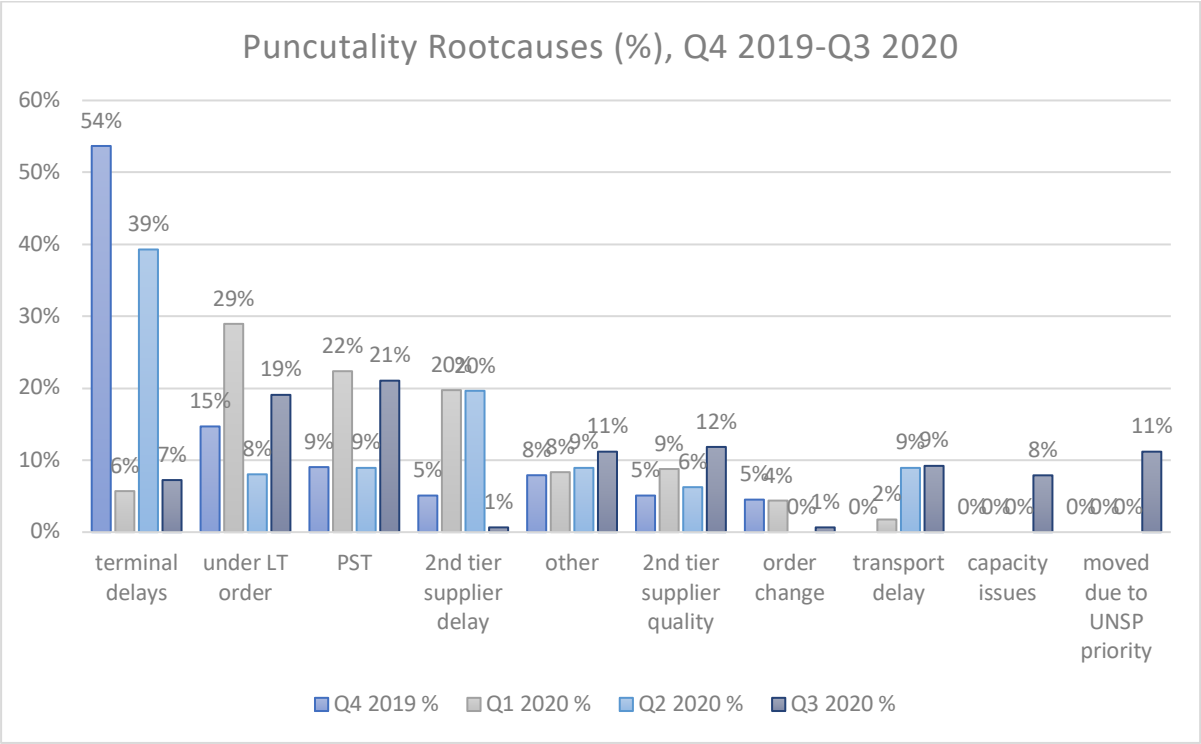


Figure 9: Punctuality rootcauses, quarterly data

Moreover, what this data shows, is that the reasons of the delays vary a lot quarterly, which leads to the conclusion that frequent and real-time performance measurement is required in order to keep track on the performance of the supplier.

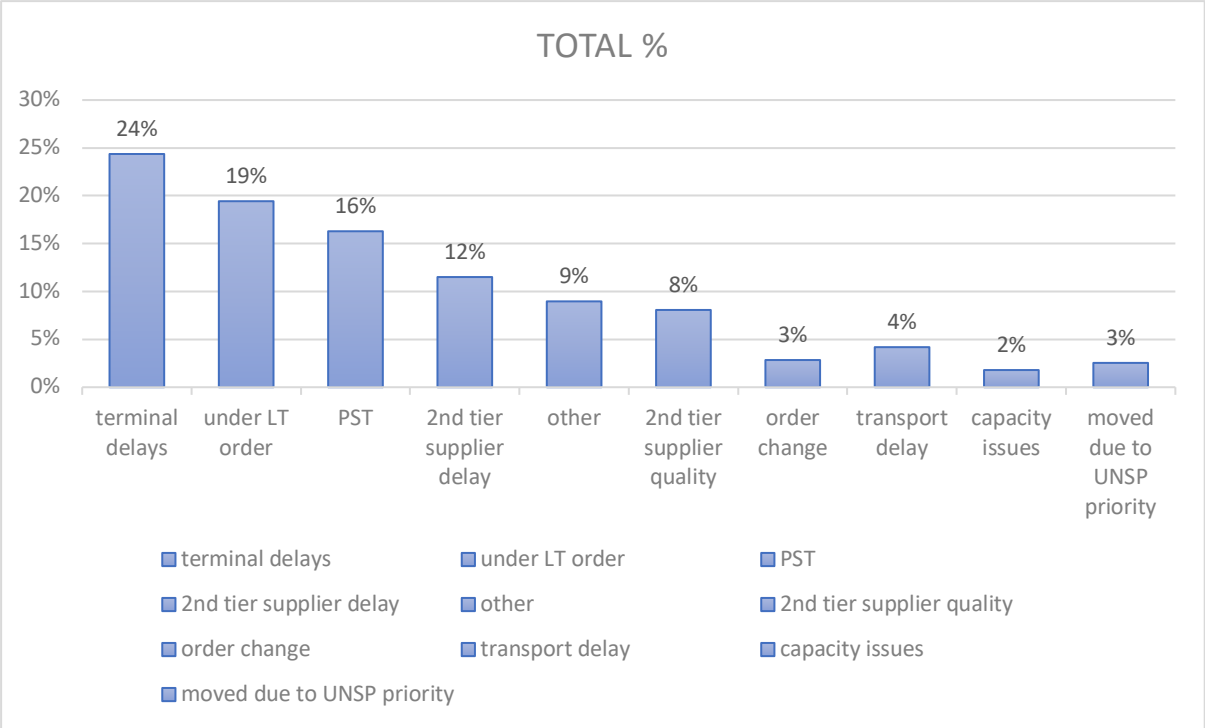


Figure 10: Punctuality root causes (total percentages)

The above table illustrates the total percentages of the delay reasons throughout the analysis period. The data shows that terminal delays are the main reasons behind delays. The high number is strongly linked to the bank holidays, that partly impacted on this, as well as terminal capacity issues during the busy times and before terminal closure times. This is a root cause that is not completely under the supplier's responsibility, as in these cases, the supplier has always sent the orders on time from their premises, however the problem only occurs in the distribution center's end. However, as the delivery term for this supplier is DAP, it means that the supplier is responsible of the delivery until the terminal has proceeded with the goods receipt.

The second largest reason for the delays is under lead time orders. Here, the delay from the requested delivery date is happening due to the orders are not placed according to the agreed lead times. During Q1, orders under lead time was the biggest reason for the delays, and it can be explained by various reasons, which will be covered later in this chapter. However, what can be concluded, is that the amount of under lead time orders was relatively high during the Q1 2020, whereas the numbers dropped drastically when entering the Q2 2020. The next delay reason, production stops has also been on the delay list having a relatively strong role

each quarter, the high peak being during Q1 2020 with the percentage of 22% of all reported delays.

To conclude, this root cause analysis revealed that the delay reasons vary a lot on a quarterly level, therefore making the analysis of the full year more reliable than taking a sample of only one or two quarters. This analysis gives a good understanding of the issues of the supplier, which enables to move further into the analysis and the actual development actions.

5.3. Delay length analysis

The previous section covered only the main reasons behind the delays, however it excluded the lengths of these delays. As an example, at first glance, looking only to the delay reason data, it seems that the terminal delays are the dominant and most problematic delay reasons, however, based on the analysis of the length of the delays, terminal delays result only in average one day delay from the initial requested delivery date. This one-day delay is still inside the buffers that the buyer company has set, making terminal delays not the most critical factor to improve. Therefore, when developing the supplier, it should not only be looked at the main delay reasons, but also the impacts and lengths of these delays to be able to choose the most relevant development actions for this supplier. Looking purely to the inbound punctuality number, there is not enough information for developing the supplier. The lack of this knowledge and without finding the root causes and performance gaps, the study would have led to the failure. This finding supports what Bai et al (2014) highlight regarding the importance of paying attention to identify the key performance indicators. This makes this preliminary analysis of the delay reasons critical in order to proceed with the development actions.

The following figure shows the length of the delays in workdays.

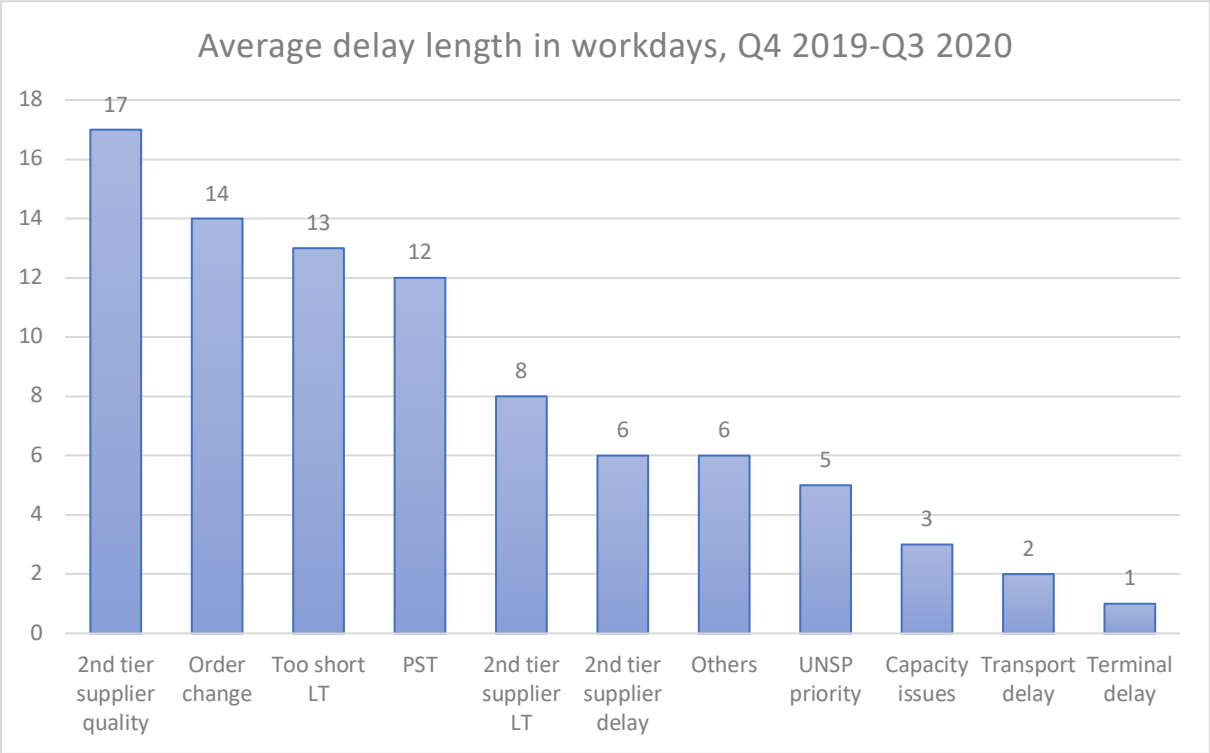


Figure 11: Average length of delays

What can be seen already at first glance, is that the *terminal delay* reason, which scored highest in the root cause analysis of reason for the delays, is now the smallest number in the delay lengths, representing only one working day average delay length. The longest delays were resulted by the second-tier supplier quality issues, with an average of 17 workdays delay during the whole time period. These quality issues represent 8% of the total cases of delays, which should be taken into account when developing the supplier.

The second longest delays are due to order changes, with an average of 14 days delays from the requested delivery date. However, as the number of delays due to order changes was only 3% of the total cases, this is something that might not need to be taken into the scope of supplier development. Furthermore, in many cases these order changes that are done, are customer requests that needs to be met and therefore agreeing on a development action on that area is out of the scope of this research. The third place on the delay length average is orders placed under the agreed lead time, with the average of 13-day delays from the requested delivery date. This is a significant finding, as this delay reason also represents 19% of the total delays. Therefore, this is something that should be focused on when developing the supplier. Orders placed under lead time is an issue that the buyer company needs to take

action on, as this is directly under the responsibility of the buyer company, as the agreed lead times are not respected when scheduling the orders. This issue will be covered more in depth in the following sections.

The production stops -reason ranks the fourth on the delay lengths, with the average of 12 days delay from the requested delivery date. This is also an important finding, as this delay reason represents 16% of the total cases of the delays. This issue should as well be taken into deeper analysis and to agree on the development actions that especially the buyer company can be done, but also to try to find solutions in the supplier's performance in order to decrease these delays. This will be discussed separately in following sections.

When it comes to second-tier supplier delays, the average days of delays is 8 and 6 working days from the requested delivery date. This reason represents 12% of the total amount of delays, and therefore needs to take into consideration when developing the supplier. The reason "others" represents all the reasons that were not categorized separately, as those appear only occasionally. The delay length of this category is only six working days, representing three percent of the delays, therefore it can be left out of the scope when developing the supplier.

Finally, the orders delayed due to an urgency on other orders, capacity issues, transportation and terminal delays result the shortest delays in working days. Capacity issues representing only an average of three working days and only two percent of the total delays, is not considered as an essential factor to take into consideration when developing the supplier. Moreover, the terminal delays are representing only one day delay in average, however those are the most dominant delay reasons. Terminal delays is a delay reason the supplier cannot directly impact on; therefore, it is also left outside the scope of this development program. The transportation delays rose to 9% during the last two quarters of the total delays, and represent only 2 day-delays in average, therefore this is a factor that needs to be in some extent considered when developing the supplier.

To conclude, the delay reasons that are chosen to be developed in this study in order to increase the level of inbound punctuality are second-tier supplier delays and quality issues, under lead time orders and production stops. The reason why terminal delays are left out of

the scope of this study, is due to the fact that supplier performance is not directly linked on the performance of the distribution center and is an issue that needs to be solved between the buyer organization and the distributor company. In addition to the above-mentioned focus points that are directly linked to the performance based on the data analysis, this study also aims to develop the supplier's delivery performance via increased level of communication, collaboration and buyer-supplier relationships.

The next sections cover the development actions agreed on each selected area of development and analyze the results obtained in each category.

5.4. Selecting the development actions

The below table describes the agreed development actions by categories based on the analysis of supplier's challenges resulting poor delivery performance. The following actions are all related to the delivery performance either directly or indirectly. The actions are categorized based on the nature of the development action, into direct and indirect development actions. Furthermore, the development actions are categorized based on Sanchez et al (2005) classification of basic, moderate and advanced development activities; the basic activities requiring the least involvement from the buyer company, whereas advanced activities requiring high involvement from the buyer company. Moreover, the below table describes the target the action is aiming for, both from the supplier's and buyer's perspective.

Table 7: Classification of the development actions

Level of action: basic, moderate, advanced /direct, indirect	**Description of the development action**	**Action taken**	**Target/Benefit to supplier**	**Target/Benefit to buyer**
	Improving the 2nd tier supplier		To take ownership of the	To *move the responsibility* of

Advanced/Direct	performance by working together (buyer, supplier and 2nd tier supplier)	Weekly calls between buyer-supplier-2nd tier supplier.	2nd tier suppliers, to improve the delivery performance of 2nd tier suppliers	managing 2nd tier supplier performance towards the supplier.
Advanced/Direct	Improving the communication regarding performance between the buyer and supplier	Quarterly analysis of inbound punctuality, systematic information sharing	To gain trust and motivation towards developing	To *motivate* the supplier to improve, to increase the transparency
Moderate/Direct	Buyer company's corrective actions	Corrective actions on under lead time orders and production stops	To eliminate the delay reasons that are not under supplier's responsibility	To *improve* internal processes enhancing the supplier to perform better
Moderate/Indirect	Supplier evaluation and target alignment	The buyer company systematically evaluates the supplier's performance	To gain more in-depth knowledge on how the performance targets are met	To *motivate* the supplier to develop. To help the supplier to recognize the improvement points
Basic/Indirect	Providing feedback systematically to the supplier	The buyer company providing both written and oral feedback systematically	To acquire new ways of working	To *develop* the supplier through providing feedback
Basic/Indirect	Monitoring the development of	Weekly analysis on the delivery punctuality and	To see the improvement, to motivate	To *monitor* the development of

	the delivery punctuality	delay root causes		the supplier over time

When it comes to the direct development actions, first action is set regarding the improvement of the second-tier supplier. One of the main challenges with this supplier is the performance of its main Chinese second-tier supplier, towards which a corrective action on weekly meetings have been implemented from January 2020 between representatives of the buyer company, supplier company and 2nd tier supplier company. This action has a goal to improve the performance of the 2nd tier supplier and to push the supplier to take more responsibility over its suppliers, not only the selected second tier supplier, but to implement this action on other second tier supplier as well. The second advanced and direct development action chosen is improvement in communication on performance measurement, which consists of sharing systematic performance data with the supplier.

Moving to moderate and direct development action chosen, this differs from the others in a way that the actions are fully taken by the buyer company; the selected actions are to eliminate the factors that lead to delays that are caused by the buyer company; based on the delay reason analysis, those factors are orders that are placed to the supplier with a shorter lead time than agreed, and production stops due to some unclarities in the order, errors in drawings or specifications. Next, moving to the basic and indirect development actions, first action is to provide systematic feedback to the supplier with the target to develop the supplier's capabilities that further leads to performance improvement. Finally, the last development action is monitoring the performance and the development of the supplier. This is also an indirect action with the goal to be as transparent as possible in the performance of the supplier, as well as to motivate the supplier to perform better.

5.5. Measuring the development of the selected actions

In this section, the results are gathered based on the selected development actions. The following table summarizes each development action and the data from which the results are

obtained. As the data is collected via the buyer company's database, observations and interviews, all this data is used when measuring the success of the development program.

Table 8: Data collection methods based on development actions

Action	Data to measure the results
2nd tier supplier: Weekly calls between buyer-supplier-second-tier supplier	• Company database (quarterly data on 2nd tier supplier delays) • Observations • Interviews
Quarterly analysis of the performance, systematic performance measurement	• Interviews • Observations
Corrective actions on production stops and under lead time orders	• Company database (quarterly data and data based on PSTs) • Observations • Interviews
Systematic evaluation on supplier delivery performance	• Observations • Interviews
Systematic feedback to supplier (written and oral)	• Observations • Interviews
Weekly analysis and monitoring of the delivery performance & information sharing	• Company database • Observations • Interviews
Overall development: Improvements in inbound punctuality	• Company database • Interviews
Overall development: byer-supplier relationships; collaboration, partnership building, trust	• Observations • Interviews

As the table illustrates, the majority of the development actions are measured by both interviews and observations. Additionally, the buyer company database is used in many of the selected development actions. This increases the reliability of the results and helps to gain

more in-depth data. The following sections go through the results for all the selected development actions, starting from 2nd tier supplier development, the success of quarterly analysis of the performance, the corrective actions on production stops and under lead time orders, systematic performance evaluation, systematic feedback, weekly monitoring, and finally, the overall development of the supplier.

5.5.1. 2nd tier supplier development

The supply chain of the materials the case supplier is supplying, is very complex. The materials are supplied all over Europe and China. Furthermore, the materials the buyer company purchases from this case supplier, are both standard products, that are simpler and having shorter lead times, and non-standard products with special requirements and longer lead times. Therefore, it is evident that the second-tier supplier performance is strongly impacting the performance of the supplier, especially when any problems along the supply chain occur. The second-tier supplier issues are visible in the delay reasons based on the preliminary quarterly analysis of the delay reason. Therefore, one of the improvement actions chosen for this development program is to improve the critical 2nd tier suppliers' performance in terms of delivery and quality. In this study, only one of the most challenging second-tier suppliers is chosen for the scope of this analysis, to test the success of the development action.

One of the main issues recognized is the amount of order reconfirmations; the 2nd tier supplier reconfirms a lot of orders and does not inform about possible delays beforehand. The responsibility behind this poor communication mainly belongs to the supplier itself, as the supplier should take ownership and responsibility to manage their own suppliers on an effective manner. Before the development action took place, there has been a lack of close monitoring and communication with this supplier.

The agreed development action has taken into action at the beginning of year 2020, when the performance of this specific 2nd tier supplier was impacting on the inbound punctuality level of the supplier. This selected 2nd tier supplier is Chinese, and the main problems recognized are related to raw material and tool quality, which resulted delays in production and further to delays in deliveries. Furthermore, the buyer company wanted to highlight the importance of the mutual communication between the 2nd tier supplier as well as taking more ownership

for the relationship towards the 2nd tier supplier. This development action is agreed to be conducted with the support of the buyer company.

The development action includes weekly follow-up calls with this critical 2nd tier supplier, more active monitoring of the performance, alignment of the expectations when it comes to the mutual communication as well as the target percentage level of orders completed on time. The buyer company sets goals and shares a proposed agenda to the supplier, in order to meet the requirements and gain results from the follow-up calls. Moreover, the buyer company is also taking part in these calls, in order to observe and monitor the weekly progress and to provide support to the supplier throughout the development process.

The expectations of this development action are to improve the quality and proactiveness of communication between the 1st and 2nd tier supplier, to find a solution in order to decrease the amount of order reconfirmations, to align the targets, and finally, to effectively manage risks in changing and uncertain situations due to force majeure issues.

5.5.1.1. Results obtained

Based on database of the buyer company, results started to be recognized after three to four-month time period from the beginning of the development action. The quarterly data analysis shows the improvement, as the delays due to second-tier supplier delays dropped 30% from Q1 2020 to Q2 2020. This is a significant improvement. In Q3 2020, this number dropped to only 1%. When it comes to the delays reported due to second-tier supplier quality, the trend is the same; from Q1 2020 to Q2 2020, the delays due to this issue dropped by 24%. However, what needs to be taken into account, is that the quarterly variation of the percentages does not necessarily mean improvement in the long run.

Furthermore, based on the observations, during the first month, the communication between the supplier and the 2nd tier supplier lacks transparency; communication about the possible delays and reasons for reconfirmations are not explained proactively by the 2nd tier supplier towards the supplier. The importance of regular updates from the possible delays needs to be highlighted systematically during the meetings, requiring the buyer company's representative support. However, after two to three months, the quality of the communication improves,

once the weekly meetings start to become more of a routine and the communication targets are set and highlighted. The interview with the supplier confirms this finding:

> *"We have found a good rhythm in the weekly meetings, and also the quality related issues are discussed on top of the delivery performance. This is both for us and them a beneficial meeting and we have already gained results."* (interviewee 1.)

During the weekly calls, the target of the mutual communication is highlighted systematically. The most important communication target is to obtain more regular and proactive information sharing about the deliveries, especially when the shipping date changes and delays occur. As an example, based on the observations, still after two months from the beginning of the meetings - taking a sample from 4.3.2020 - 362 order lines are late from the confirmed. During this same meeting on 4.3., the supplier needs to point out the importance of regular updates of delivery delays from the 2nd tier supplier towards the supplier. Furthermore, during this meeting, it comes up that double check about shipped orders were not done by the 2nd tier supplier; the cause for this is a tooling lead time issue. All these issues should have been communicated proactively towards the supplier, which is not the case.

Due to this communication challenge, the supplier is requesting more clear explanation for the reasons for the delays and the supplier proposes a coding system for communicating the delays in order to group them and have a systematic and codifiable way for communication. This coding system is in use with the supplier towards the buyer firm when the supplier is communicating about delays, therefore a unified system throughout the supply chain would make it more efficient to find and analyze the root causes of the delays from the 2nd tier supplier, and further to dig into the real problems and agree with development actions. Overall, what can be concluded in this finding, is that in order to gain a good level of communication within the supply chain, is firstly, to have clear view of the expectations, to have aligned, numerical targets, to be proactive and transparent in the communication in order to build the mutual trust between the parties and further to enhance the relationship between the parties.

Moreover, organizing the weekly calls with the 2nd tier supplier, is the first step for the supplier to act more proactively in monitoring their supplier, and by assigning this weekly development action towards the supplier, the purpose is to push the supplier to truly take proactive action in managing not only this specific supplier, but all their suppliers. This development action makes the supplier to understand the importance of taking ownership of all suppliers:

> *"This same method (weekly calls) is taken into use with another problematic 2nd tier supplier and will be taken to use for others as well if needed. As the material responsibility is under our scope, once any of our 2nd tier suppliers are appearing into the delivery delay lists, we are proactively going to react to those issues in our sourcing."* (interviewee 1.)

As this 2nd tier supplier is a nominated/assigned supplier from the buyer company, the supplier has not been taking enough responsibility to manage this supplier on its own, but rather assumes the buyer company to take action and responsibility of the problems of this 2nd tier supplier. Based on the interview with the supplier company's representative, this is due to the lack of knowledge regarding the requirements set towards the supplier:

> "*During this year, our responsibility towards managing 2nd tier suppliers was clarified, which made us to understand that improvement actions needed to be done. Based on these weekly meetings, this 2nd tier supplier has acquired a different way of focus and the first alert does not need to come from the buyer company towards the 2nd tier supplier - it is enough that we push the suppliers. Before this year, it was not so clear that we needed to take the full responsibility from the buyer nominated 2nd tier suppliers."* (interviewee 1.)

Once leading and supporting the supplier to take more ownership and responsibility to develop and manage their own suppliers, results have started to be shown over the development period; based on the observations, the attitude and confidence to push the 2nd tier supplier to meet the agreed requirements starts to develop. The results show that a systematic communication of the expectations is needed. This makes the 2nd tier supplier to be more aware of the expectations and to take action on the problems. In example, once the supplier systematically illustrates the problems via data and numbers, it made the 2nd tier

supplier to more clearly see where the issues are and to make the necessary actions to develop their own performance.

In the weekly follow-up meetings, recovery actions are set for both “quick-fix” purposes as well as long term development purposes. The quick fix actions are mostly needed to take for risk management purposes; starting from the beginning of year 2020, an unpredictable force majeure issue appeared in a form of global pandemic, which has an effect on the businesses globally, including the supply chain of the case supplier. Referring to the buyer company interviewee, this global pandemic has a strong effect on the success of this development action:

> *“The global pandemic messed the development program up at the beginning of the year 2020.”* (interviewee 2.)

One of the chosen quick-fix solutions in order to survive the effects of the global pandemic, are related to shipping; the second tier took action on increasing express deliveries and the frequency of shipments towards the supplier. The 2nd tier supplier communicates about their solutions in order to speed up the deliveries, and during the weekly meetings, the observations show that the second-tier supplier is making progress in order to provide a good level of crisis management. This crisis situation further shows the importance of systematic communication with the supplier, as the information sharing during crisis situation increases dramatically.

Another finding that comes out via this development action, is target alignment. The buyer company has the target of 99% of inbound punctuality towards its 1st tier suppliers. The same targets should be implemented throughout the supply chain, also to 2nd tier suppliers. In this case, the target is not communicated clearly enough and needs to be discussed again with this specific 2nd tier supplier. This helps the follow-up of the performance against the target. It is critical for the 2nd tier supplier to understand the importance of the target and take action in order to reach the targets. Based on the data, from the beginning of July, the delivery performance trends are shared during each meeting, which helps to visualize the weekly situation and to see, whether the on-time delivery trend were going up or down.

" At least now we have common targets. The one misunderstanding was related to the supplier's delivery chains, and who is responsible for those. Now also that is cleared out and the supplier knows they are responsible." (interviewee 2).

Furthermore, the support from the buyer company in order to get this development action started, is strong; the buyer company provides the suggested meeting memo for the supplier, as well as sets the targets for the results from the meetings. Additionally, at the starting point, these meeting are monitored and supported by two representatives from the buyer company. Furthermore, the buyer company's participant shares feedback and improvement suggestions after observing the meetings. The support results to be needed and improvement suggestions are taken into use after the feedback sharing. One of the main overall results for this development action is that direct feedback and systematic support has positive effects on the success of the development action. This is supported also via the interviewee 1:

"We are now on the process to find the best possible methods in each situation when it comes to managing our (2nd tier) suppliers. In some situations, we feel that the buyer company needs to be involved in a decision, and in these cases, collaboration is needed. We are still learning in which situations this involvement is needed. The view is, that first we try ourselves and then ask for your support." (interviewee 1.)

Finally, what is the most interesting result regarding this development action, is the success of developing the performance of the 2nd tier supplier. When it comes to the on-time delivery percentage, from the beginning of July until the end of June, the targets are met. (percentage being 99% or above), excluding one week in July where the result is 97%. Another interesting and yet predictable finding that should not be neglected, is the low level of on-time delivery percentage due to force majeure issues. Starting from January 2020 until March 2020, the global pandemic had a strong impact on the business in China, therefore impacting this 2nd tier supplier and its delivery punctuality. To conclude, the interviewee 2 summarizes the success of this development action as followed:

"The biggest improvement has been on how the supplier got its 2nd tier supplier under their responsibility and took action on it." (interviewee 2.)

5.5.2. Systematic performance measurement

The second improvement action is related to the systematic performance measurement of the case supplier's delivery. The aim of this development action is to improve the motivation of the supplier towards development efforts as well as build a collaborative and trustworthy relationship between the buyer and supplier companies. This development action consists of implementing quarterly database on the delays of the supplier, which is presented in this study. The initial purpose to gather data on a quarterly basis from one-year time scope, was to identify the challenges this supplier had. However, another purpose with this systematic performance measurement is to improve the transparency of communication towards the supplier, and to highlight the challenges based on data, not only assumptions.

The quarterly analysis is conducted by the buyer company's supplier quality manager, who is responsible of all quality related issues with the case supplier. Moreover, to deepen the analysis, the author of this study is supporting on the data collection, to cross check and provide more in-depth information once anything remains unclear regarding delay reasons.

5.5.2.1. Results obtained

Based on the results from the interviews as well as observations, the quarterly analysis of the delay root causes not only increased the awareness of the reasons behind the delays, but also the transparency of information sharing as well as he motivation of the supplier to improve. Both the supplier and buyer interviewee agree with the results obtained, however, the buyer interviewee suggesting some improvement points that could be considered once developing another supplier in future.

First, when it comes to raising the awareness of the challenges of the supplier's delivery performance, the interviewee 1 comments as followed:

"This way of measuring and analyzing delivery performance systematically has revealed the problems on a manner that was not done before, yet not visible. Before this period of development time, we were able to acquire the best possible performance level that was possible with the information available at that time. This new level has now been recognized based on performance measurement, and we want to go there." (interviewee 1.)

Also, both interviewee 1 and interviewee 2 agree with the fact that the systematic data sharing increases the collaboration and partnership building between the supplier and buyer:

"The quarterly analysis has positively impacted on the quality of communication and deepened the collaboration." (interviewee 1).

"Yes, this has truly improved the collaboration and conversations, and bringing the feeling towards the supplier that we care. Suppliers require time and effort in order to build a real partnership, we cannot only send orders and emails assuming that everything goes smoothly without any additional efforts or extra steps. It is all about partnership." (interviewee 2.)

Furthermore, based on the observations of the meetings when the data is shared to the supplier, one interesting finding is the variety of reasons behind the supplier's delivery performance by quarters; there is no clear consistency of the delay reasons, which increases the importance of a systematic and frequent measurement of the performance:

Overall observation (weeks 41-49 2020): "The delivery data shows the realistic situation, not only thoughts and assumptions are discussed during the meetings. The real topics of improvement are raised during the meetings which improved the quality and efficiency of the meetings."

"We are able to put the attention on the correct things. And via the data we could see that there are a lot of factors behind the delivery performance". (interviewee 1.)

Moreover, one of the problems with this supplier is that the management of the buyer company is not totally aware of the real reasons behind the delays, they only see the percentages, assuming the supplier is the responsible unit alone when it comes to the poor delivery performance. However, this quarterly data reveals the real reasons behind the delays, showing that there is improvement needed also from the buyer company in order to increase the overall delivery performance of the supplier.

> *"The open information sharing was the key here; to go through the facts via data, which showed clearly what was going on. The poor performance of this supplier was before the performance measurement only an assumption, relying on no data at all. It was needed to go deep to each and every delivery line, what are the real root causes behind. Now there is no need to guess what is there, as the information is very transparent." (interviewee 1).*

Additionally, the buyer company interviewee agrees with the view and highlights the importance of collaboration being one of the major success factors in supplier development and performance measurement.

> *"With this supplier, we made together the mutual understanding. We built it via collaboration. This is also highly related to the people that are working together. However, what should be clear to all parties, is how to validate the data systematically, what does the punctuality mean, and what COT means. By understanding these, we can get closer to the supplier" (interviewee 2).*

Furthermore, the systematic performance measurement requires input both from the supplier and the buyer. The weekly operational communication between the supplier and the buyer consists of weekly follow-up meetings, where the overall situation on deliveries and delay risks are covered. Based on the interview and observations, these meetings are beneficial in order to keep the transparency and openness of information sharing, as well as building a deeper relationship between the buyer and the supplier. However, preparing for these weekly meetings requires effort from both the supplier and the buyer, as the follow-up lists need to be updated and commented manually. In order to develop this process, the follow-up data should be more automized and providing more specific information regarding

the status of the orders and deliveries. This would be beneficial both for the supplier and buyer, saving time and making the time used in the data sharing more effective.

The supplier agrees on the meetings requiring a lot of effort, and based on this, has come up with improvement actions in order to minimize the manual work of updating and commenting the follow-up data. Despite the efforts required for the weekly follow-up meetings, the supplier states that the meetings result to be the best way to keep track on the delivery performance, in real-time.

> *"Yes, these are beneficial. Preparing for these meetings requires time and effort, however we have come up with solutions to improve the manual work (i.e. when sharing data via files). From these meetings, it is beneficial to have a general update of what is going on and this is also to ensure that there are no surprises on the way regarding the next week and deliveries." (interviewee 1).*

Finally, what can be concluded from the systematic performance measurement, is that the success factors for a beneficial and development-oriented sharing of performance, comes from the close collaboration and real-time data sharing. Additionally, what is a necessity for a successful performance sharing, is not only sharing the performance in the operational level between the buyer and supplier company, but rather include all the needed stakeholders to the same discussion regarding supplier's performance. In this way, all the stakeholders have the same understanding of what has been measured. Aligning and explaining the metrics to all the stakeholders is a necessity in order to be able to understand and discuss about the performance of the supplier in a constructive and open manner.

5.5.3. Buyer company's corrective actions on production stops and under lead time orders

Based on the quarterly data analysis of the delay root causes, three issues raise from the delay reasons, that are mainly caused by the buyer company; production stops, orders placed under agreed lead times and terminal delays. In this development program, the corrective actions are chosen to take in production stops and under lead time orders, based on the quarterly

analysis and the delay root cause analysis, taken into consideration both number and length of delays. Production stops refer to all the issues or errors related to the orders, which stops the production until clarifications and corrections are made in buyer company's side. The time spent for clarification in many cases lead to delivery delays. The main reasons behind production stops with this supplier are mismatches with the drawings and the order content, as well as unclear instructions. In many cases, the supplier needs to reassemble or in worst case, purchase new material from their supplier, which results longer delays. During Q1 2020 and Q3 2020, there was a high peak on the production stops, which enabled the buyer company to see the real impacts of this issue on delivery performance.

5.5.3.1. Results obtained

The engineering department of the buyer company starts to take part in the improvement of delivery performance and make corrective actions to eliminate the amount of the production stops. The corrective actions are conducted first via an analysis of the problematic production stops, and analysis of the main problematic reasons that caused production stops, after which a development program is planned to be implemented. The engineering team comes up with a development plan, which is followed-up on a monthly basis together with the buyer company's Material Management specialist, supplier quality manager and the supplier company representative. This development action is taken into deeper discussions during summer 2020, where the highest peak in production stops occurs. The observations show that the discussions last relatively long before real action are taken from the buyer company's side. Only at the end of 2020, progress is taken:

> *Overall observation weeks 49-52 2020: "During the monthly meeting of performance measurement, an engineering representative of the buyer company introduced the plan for the corrective actions on production stops. During the following months, updates would follow on the progress of the development. The supplier representatives felt impressed of the development plan and were motivated to also act themselves to support the process and play their role in order to open the production stops as early as possible."*

However, what the buyer company interviewee also highlights, and what can partially explain the reason why the development actions are not taken fast, is the targeted approach to which the buyer company should develop its processes. The interviewee 2 points out, that the development should not only be implemented on a project-based model, but rather to build a model for continuous improvement that is visible on the daily management:

> *"We (the buyer company) should build a model for continuous improvement, not only a project-based development model. The development should be brought also to the daily management, in order the supplier to think about the issues on a daily basis. In a nutshell, what is supporting the continuous improvement is the time window for performance measurement; it should be shorter, in order to gain the best benefits." (interviewee 2)*

Moreover, in order to eliminate the amount of production stops, also the supplier company makes corrective actions. The supplier has developed a model "special focus orders" that enable the supplier to recognize the orders that require special attention already in an early phase. One issue with the production stops with this supplier is that the production stops are opened in a very late stage, in worst cases only less than a week before the shipping should take place. This special focus order implementation responds to this issue, having the aim for the supplier to recognize the problems on an earlier stage and open the stops earlier. The results of this development action are not yet visible in the time scope of this development program, however the development plan and the evaluated benefits in special focus order project are promising, responding exactly to the issues that were recognized at the beginning of the development program.

The second development action from the buyer company's side is to decrease the orders placed under lead time. Based on the quarterly analysis of the delay reasons, under lead time ranks the second of the overall number of delays. In the buyer company, all the purchase orders are placed based on the scheduling that is requested by the customer, despite the fact whether or not the schedule meeting the agreed lead times. The main reasons behind orders placed under lead time, are scheduling errors, urgent requests from the customers i.e. in a form of sample orders that need to be delivered in a very short period of time. Also, which makes orders to be placed under the agreed lead times are price clarifications or other

clarifications regarding orders. Furthermore, engineering delays raise to be one of the reasons behind the delays before ordering, further leading to orders placed under lead time.

The development actions chosen to overcome this issue from the buyer company's side, is first to align the processes of the urgent orders; in cases where the orders are requested urgently, the orders should still be placed according to the agreed lead times, and then request for an advancement in the delivery afterwards. In this way, these orders do not fall into the inbound punctuality percentages as delayed orders, in case the supplier is not able to deliver under the agreed lead times. Additionally, a development action is to come up with a separate process for sample orders, which by default are urgent orders. By implementing this new process, the sample orders would not fall into the delays in orders placed under lead time.

Furthermore, the third development action in under lead time orders is to eliminate the engineering delays. This is linked to the development actions taken to decrease the amount of production stops; the engineering department of the buyer company analyzes the reasons behind delays in engineering and makes corrective actions in order to avoid these delays. Finally, when it comes to the pricing issues and other clarifications in orders placed under lead time, a development action relies on increasing the effectiveness of communication in pre-ordering phase between the stakeholders within the buyer company.

The buyer company interviewee agrees on the importance for the buyer company to improve the above-mentioned processes:

> *"Regarding the production stops and orders placed under lead time, it is a bigger problem and by solving it we can make the performance better and have a strong impact on the punctuality." (interviewee 2).*

To conclude, the development actions taken from the byer company play an essential role in the overall development of the supplier and cannot be neglected in order to achieve results in the overall delivery performance of the supplier. Additionally, the development actions

taken from the buyer company should always be supporting continuous improvement rather than only project related development actions and short-term quick-fix solutions.

5.5.4. Systematic feedback sharing

Another development action during this development program is to share feedback systematically to the supplier. What this means in practice, is that feedback should be given from several organizational levels; both in operational and managerial level. The goal for this development action is to increase the openness of the communication between the supplier and the buyer, and to build a stronger partnership along the way. The feedback is given in various manners along the development program. First, feedback is shared on the weekly operational delivery follow-up meetings, where feedback is shared mostly regarding the deliveries and reasons for delays. During these meetings, the feedback is communicated also from the supplier to the buyer company, and improvement suggestions are discussed both regarding the supplier's performance as well as regarding the communication and support coming from the buyer company. Based on the observations, these meetings increase the level of mutual understanding of what is going on a weekly basis, and what are the main challenges in a short term. This further improves the openness of communication and increases the efficiency of the risk management in a way that the potential challenges are communicated already proactively rather than in a reactive manner.

Moreover, feedback is shared related to the calls between the supplier and the second-tier supplier. The material management specialist of the buyer company shares written feedback and improvement suggestions on the communication between the supplier and the second-tier supplier based on the observations from the weekly follow-up calls in order to improve the openness of communication and in order to help building partnership. Based on the observations, sharing feedback plays a role in helping to align the targets and ways of communication within the supply chain.

Finally, feedback is shared on a monthly basis during the meetings between supplier quality manager of the buyer company and the supplier company, where the monthly delivery performance data was reviewed. This feedback is mainly related to more strategic issues, to the measurement of the data and to the development actions implemented by the supplier.

During these meetings, the buyer company highlights the targets and provides feedback on how the supplier has succeeds in their development actions over time.

5.5.4.1. Results obtained

Based on the findings, sharing feedback to the supplier is beneficial in order to develop the capabilities of the supplier. The systematic improvement suggestions and open and constructive feedback helps the supplier to know to which direction their development actions are going to, providing effective tools to go further with the development. Moreover, sharing feedback is essential in order to align the targets and mutual goals when it comes to the development. However, providing feedback does not directly impact on the supplier's performance on its own; feedback is not given separately from the other development actions, but it is rather included into the other development actions as one element. This results to be the most effective way to share feedback and gain results.

> *Overall observation weeks 1-10 2020: Feedback is given related to the weekly meetings between the supplier and 2nd tier supplier. The supplier receives the feedback openly, however the power of the impacts of the feedback cannot be seen directly, as there might be other factors impacting the development similarly. However, the positive feedback given still helped the supplier to boost their confidence towards improvement, as well as the constructive feedback was taken seriously."*

5.5.5. Weekly performance analysis and monitoring delivery performance

The next development action is related to the weekly performance measurement and monitoring of the delivery performance. Here, the main goal is to both motivate the supplier to develop their performance but also to keep track on the data in real-time, and to react to the challenges as effectively as possible. The development program is based on the quarterly data of the delays, and the analysis is shared on a quarterly basis both between the supplier and the buyer company's stakeholders. In addition to the quarterly analysis, a monthly analysis is conducted after each month, where the responsibilities of the delays are reviewed and the penalties due to the delays are assigned to the supplier. Here, the information sharing is very in-depth, going through all the late deliveries and finding their root causes, the focus being rather in the past than in the future.

5.5.5.1. Results obtained

The supplier sees real benefits already on the quarterly analysis and recognized that this is the correct direction:

> *"The quarterly analysis has brought a lot of good things and deepened the collaboration. This way of measuring and analyzing delivery performance systematically has revealed the problems on a manner that was not done before and or visible. Before this period of time, we were able to acquire the best possible level that was possible with the information available then. This new level has now been recognized and we want to go there. The open information sharing was the key here; to go through the facts via data, which showed clearly what was going on, that was before only an assumption, relying on no data at all. It was needed to go deep to each and every delivery line, what are the real root causes behind. Now there is no need to guess what is there, as the information is very transparent. We are able to put the attention on the correct things. And via the data we could see that there are a lot of factors behind the delivery performance". (interviewee 1).*

Once the need to measure the delivery performance on a systematic manner is recognized and the quarterly data analysis is conducted to pilot the systematic performance measurement, the next step is to decide on the frequency and manner of the monitoring to best support the targets. The main goal for the development action in monitoring the delivery performance is to increase the effectiveness of the monitoring. In practice, only minor but effective changes in the communication is made in order to come up with a systematic performance monitoring model.

The weekly follow-up meetings between the material management specialist and the supplier representative have already been implemented before this development program took place, however the content of the meetings is modified during the development program. Along the development program, the information shared during these meetings is structured in a more effective way, and some relevant information is added in the data shared on a weekly basis of the open orders, to best support the needs of the supplier when it comes to monitoring the deliveries and to enable to make delivery prioritization if needed. Moreover, what is added

into these operational meetings, is to include the inbound punctuality data from the previous full week, in order for the supplier to see in real-time, what are the challenges and root causes to the delays during the previous week. This enables to analyze the deliveries on a more frequent manner compared to the monthly and quarterly analysis. Additionally, this helps to see the data even more in-depth, and makes the root cause analysis more reliable with less errors, when the reasons for the delays are in fresh memory and easily to be found from the databases.

The observations from the end of year 2020 indicate this development:

> *Overall observation weeks (41-49 2020): "Better preparation both from the supplier and buyer end has made the meetings even more efficient than before. An additional member from supplier's side has joined the meetings to provide deeper insight on the overall situation, also to discuss the challenging topics on a weekly manner, bringing more perspective on the topics discussed."*

The benefits of the systematic performance sharing are recognized also by the supplier when it comes to motivation to develop processes and delivery performance:

> *" Yes, this has motivated to make new actions towards better performance. These issues were on the" dark area" before this year and before the performance measurement. We did not have these kinds of conversations before. The numbers were gone through, and the validation had been done on a monthly basis, but no additional communication and deeper conversations were conducted. The level of communication was more official." (interviewee 1).*

Moreover, based on the supplier interviewee, the transparency between the supplier and buyer increases especially in a personal level, and the interviewee also recognize the need to continue the systematic monitoring on a weekly basis also in the future:

> *" Yes, it (the information sharing) has increased the transparency for sure, and also improved the trust between the persons that are in contact on a daily basis, especially in a*

person-to-person level. In an organizational level, it is hard to say at this point." (interviewee 1).

" Yes, the monitoring of the performance should definitely be continued in the future, and now that we will also have this analysis on a weekly basis, it makes the reaction to the problems even more effective than before". (interviewee 1).

Finally, the supplier interviewee provides some improvement suggestions when it comes to the performance measurement in the future:

" Firstly, we would need some kind of updates to the follow-up data lists, so that the important information would be highlighted even more effectively in the data (urgent orders and order advancement requests). We have already come up with improvements that helps us to prioritize orders. Furthermore, special focus order *is a project that is ongoing with us and we will mark those in future in the data, in order for you to see the risks in a longer run and make actions in order to cope with potential risks. The goal is to bring more crucial information to the weekly data that is shared.". (interviewee 1).*

What can be concluded on the systematic monitoring of the performance of the supplier, the main finding based on both observations and interviews are that the frequency of the performance measurement is key to success. Moreover, to find the best ways to monitor the performance required collaboration and open communication between the supplier and the buyer, being a part of continuous improvement, once new ways of working were recognized.

5.5.6. Overall development in inbound punctuality

The main purpose of this study is to find the success factors in order to improve the delivery performance via a case supplier company, using the metric of inbound delivery punctuality. The tools used in this case study to achieve results, is highly linked to collaboration, communication, building a stronger partnership and building mutual trust between the buyer and supplier companies. However, the results show, that the inbound punctuality percentage does not raise despite the development activities taken during the development program, within the one-year time scope; the inbound punctuality percentage remains at the same level

during years 2019 and 2020. The buyer company interviewee comments that despite improvement are not seen in the numbers, major findings are recognized that can lead to success in future, enabling to improve the inbound punctuality over time. This finding is related to the importance of systematic and frequent performance measurement.

> "*Despite the inbound punctuality percentage did not increase during this period of time, the biggest finding in this development project was to realize the importance of a systematic performance measurement. What should have been done better from the beginning, is the faster and more real-time performance measurement." (interviewee 2).*

Moreover, what the buyer company interviewee sees as an important finding is the importance of collaboration and involvement of the buyer company of the development actions when targeting towards continuous improvement:

> *Another important finding is that we need to work together with the supplier, not only the supplier on its own. Also, the data analysis is the only way for winning in this, and by agreeing on tasks and improvement actions based on the data analysis and by monitoring the progress with the actions in both supplier and buyer side, continuous improvement can be achieved."* (interviewee 2).

Furthermore, what can be concluded based on the interviews and observations, unpredictable challenges occur during the period of the development program. First, during the Q1 and Q2 2020, a global pandemic affected on the delivery performance in a manner that was not predicted, and to which the case supplier could not fully react. Moreover, some errors in the data might have been detected especially at the beginning of the data analysis. Another issue that makes the formulating of development actions more challenging, is the fact that the reasons for delays vary a lot on a quarterly basis, and no clear trendlines in the occurrence on delay reasons are not yet found based on the one-year scope.

> *"The global pandemic messed almost everything up at the beginning of the year 2020. Also, there were some errors in the data, especially regarding the orders placed under lead time that might have not been detected in the data. Additionally, the reasons for delays*

varied by each quarter, which also made the development more challenging." (interviewee 2).

On the other hand, this misalignment of the delays can be turned into a positive finding, as it revealed that the data cannot be predictable, and the inbound punctuality needs to be monitored also in the future in a frequent manner, to keep track on the delays in real-time. The supplier company interviewee also sees the positive points of the delivery performance monitoring, however, provides suggestions for future. What is suggested, is to move the focus more towards managing the corrective development actions rather than only focusing on sharing and monitoring the performance:

" Due to the development project, we have achieved a lot via sharing the numbers of COT. Now, what could be done is to focus more on the biggest root causes that impacted on the delivery performance and more to the corrective actions. This kind of switch to the new perspective is very good. During this year, it has been understood what the numbers are and where they come from. Now we are focusing on the corrective actions based on the suggestion of the supplier quality manager. The key words for future would be wrapping up and the corrective actions. During the past year we have done a lot or work in order to improve our performance, however these actions have not been discussed in our monthly meetings enough." (interviewee 1).

To conclude the overall development in the delivery performance, the development project did not yet increase the delivery performance, however important findings are found related to the importance of systematic measurement and reviewing of performance metrics over time, as well as suggestions for future development.

5.5.7. Development of buyer-supplier relationship

One of the main development goals in the development project was to build and elaborate collaboration and partnership between the supplier and buyer. Building partnership is not an easy task and is not achieved in a short period of time. However, as the case supplier has a long history with the buyer company, the aim in this development program is rather to build

new ways of working that support building a stronger partnership over time, than building a new partnership from the scratch. This goal is achieved; based on the observations, the increased communication and information sharing helps to build more mutual trust between the supplier and buyer.

5.5.7.1. Results obtained

The observations show the starting point of the mutual communication, at the end of year 2019 when the development program started:

> *Overall observation (weeks 36-52 2019): "Weekly operational communication is ok, the orders in risk of delays are communicated from the supplier side, however no specific updates in addition to that. Updates from the capacity issues and other delays might come as a surprise and are not communicated proactively. Delay communication mainly via email, without pre-notices during calls. Partially lack of reliability on the confirmed delivery dates from the supplier".*

On contrary, when looking at the observations on the mutual communication and collaboration, the observations after one year look already better:

> *Overall observation (weeks 41-49 2020): "The weekly communication has improved with great extent via new ways of communication and new data shared during the weekly meetings. Supplier's willingness to share communication is improving, as all the relevant topics and also smallest risks are highlighted during the meetings. Especially during challenging times at the end of 2020 with supplier capacity issues, pre-information was shared to highlight these challenges, and solutions to overcome challenges are discussed together with the buyer."*

The above observation illustrates the development that has been made in the communication between the supplier and the buyer as well as the development in the partnership towards a collaborative relationship. The alignment in the targets, the systematic performance sharing as well as the open and frequent communication and support activities coming from the buyer, increase the trust and motivation for the supplier to improve their performance and to

share information. Additionally, the observations and interview reveal that the developments and corrective actions taken from the buyer company's side, increase the feeling in supplier end, that the buyer company cares of the supplier, and is also committed to building a strong, long-lasting partnership with the supplier.

However, despite the increased motivation towards improving their performance and the improvements in the mutual communication, the interviewee 1 still finds some challenges especially with mutual understanding between the partners, when communicating in managerial level.

> *" The daily, operational level communication has remained the same as before and even increased, so there is no problem with that. However, the upper-level communication is a bit different and has brought up some challenges, especially with mutual understanding. The goal for the communication is that each of the parties would understand what are the things that are discussed in order to gain better mutual understanding. The data speaks itself, and it should be considered as a fact, despite the person or position."(interviewee 1).*

The interviewee 1 highlights that they have the motivation and willingness to achieve the goal of having a mutual understanding. The interviewee 1 also suggests that the information sharing within the buyer company, especially regarding the inbound punctuality root causes would be essential to increase. Moreover, some improvement points regarding the communication during challenging times have been recognized by the buyer company based on the observations at the end of the data collection period:

> *Overall observation (weeks 49-52 2020): Improvements still need to be done in prioritization of orders and communicating about the overall delay impacts when challenges occur (i.e. capacity issues). Misunderstandings resulted regarding the extent of the delay impacts of capacity issues. The supplier had taken too much priority orders without informing the additional costs or extra shifts needed in order to cope with the situation"*

In addition to the above challenges, an interesting finding has also been made during the development when it comes to the level of communication. In the supplier company, the main contacts are limited to three persons, and the level of communication resulted to be dependent of these persons; once substitution period starts at the supplier company, the service level and response time decrease significantly.

Observation 27.1.2020: "During the substitution/holiday period in the supplier company, the main contact persons being out of office for 2 weeks, the level of communication and proactiveness dropped. Response time dropped as well as the level of communication about upcoming delays decreased."

5.5.8. Summary

The interviewee 2 summarizes the development process and the learnings taken from developing this case supplier during this one-year period of time. He highlights the importance of data sharing and the power it has. Further, the transparency in the data as well as the alignment of processes and measurement tools between the buyer and supplier company are essential in order to be able to discuss the performance and avoid any misunderstandings or misinterpretation of data. Moreover, the importance of aligning the performance measurement to the strategy of the company was an essential learning.

"The whole process was a learning. The greatest learning was that data has power. The fact that does people want to understand and believe in the data, is another topic. One learning was also the usage of lean six Sigma, which turned out to be a great approach and it requires transparency in everything. Our company (the buyer company) do not want to think about full chain too much, therefore we need to change the processes suitable for a non-full chain approach. If something is implemented in our side, it needs to be implemented further to the supplier. Audits should be done in order to check that the processes are under control. During this year, I learned a lot about data analysis. Also, I learnt how tuff the business world is towards suppliers. Also, one learning was business versus quality." (interviewee 2).

Moreover, the interviewee 2 highlights the greatest success for the supplier being the actions the supplier has taken in order to improve their challenging 2nd tier suppliers, and how the approach has been switched to proactive rather than reactive.

> *"The biggest change has been on how the supplier got its second-tier supplier under their responsibility and took action on it." (interviewee 2).*

To summarize the findings, it can be concluded that the direct involvement activities have gained the best results. The targets in improving 2nd tier supplier performance are met both for the supplier and the buyer. For the supplier, the target of *taking ownership* on the 2nd tier suppliers are met via weekly calls and improved collaboration, which further leads to delivery performance improvements for 2nd tier suppliers. For the buyer, the target of *moving the responsibility* of managing the 2nd tier suppliers' performance towards the supplier is also met. When it comes to the development action of increased communication regarding performance via the quarterly analysis, and systematic information sharing, the targets are also met both form the supplier's and the buyer's side: the increased level of communication regarding performance helped the supplier to motivate themselves to improve and perform better. Similarly, the target set for the buyer is met, as the buyer was able to motivate the supplier to improve and to increase the transparency via increased communication and data sharing.

The third direct involvement action chosen was buyer company's corrective actions in order to support the performance improvement for the supplier. The target for the buyer was to improve internal processes that enable the supplier to perform better. This target is partially met, as the results could not be seen during the data collection period. However, development actions were taken from the buyer company's side in order to eliminate the delays that are not under the supplier's responsibility; for the production stops, a development program was taken into implementation. The results are not yet seen in the inbound punctuality percentages during the data collection period, however the level of trust from the supplier towards the buyer increased already before results are shown.

When it comes to the indirect involvement actions, the first development action was systematic performance evaluation. For the supplier, the target was to gain more in-depth knowledge on how the performance targets were met. This target is met, as the supplier directly indicated that the data has shown all the relevant information about the targets and issues on real-time. The target for the buyer was to help the supplier to recognize the improvement points. This target is also met via the systematic performance evaluation. The second indirect action was to provide systematic feedback to the supplier. This was done in many levels and circumstances by the buyer company: during the daily communication, weekly operative calls and during monthly performance reviews. The target for the buyer was to develop the supplier through providing systematic feedback. This development action did not itself gain clear results. This is due to the fact that the development actions about supplier evaluation and systematic performance measurement already cover the supplier to gain new ways of working and to develop the supplier. However, providing feedback acted as a complementary action on the other development actions, such as the 2nd tier supplier development and performance evaluation.

Finally, the last indirect development action chosen was to monitor the development of the delivery punctuality. The targets here was to see the improvements and to motivate the supplier. For the buyer, the target was to monitor the supplier's development over time and to see, in what directions the delay reasons move, in order to update the development actions over time. Via this case study, it was found that there is relatively high variation in the delay reasons on a quarterly basis, which can make it difficult to agree on suitable development actions for a long run. Therefore, the performance measurement is important to implement on a frequent manner, in order to find the delay reasons in real-time, and to directly choose corrective actions on each issue recognized. When linking this to continuous improvement, it is important to measure the performance and delay reasons from all frequencies; weekly, monthly, quarterly and even yearly data. This data will then lead to the correct direction when choosing the development actions.

6. Discussion and conclusions

In this chapter, the key findings from the empirical research are discussed in the light of the theoretical background. Additionally, based on the discussion, a model of the success factors to conducting a successful supplier development program is presented.

This final chapter is structured in a way where first, the summary of the key findings is presented, after which the theoretical contributions and managerial implications are discussed, and finally, the limitations and future research suggestions are covered.

6.1. Summary of key findings

This section covers the summary of the key findings. The research question of this study is:

What are the success factors in managing a supplier performance development program in a multinational company?

The additional questions to help answer the research question:

- *What is the role of buyer-supplier relationship in improving supplier's delivery performance?*
- *What is the importance of performance measurement in a supplier development program?*

The following sub-sections reply to these questions.

6.1.1. The success factors for supplier performance development

This study aims to find the success factors for supplier performance development in a multinational company. Via conducting this single case study of a Finnish multinational company and by gathering in-depth data of one external supplier of the case company, valuable results are found to answer this research question. The success of the performance development has been studied via both direct and indirect involvement development activities, including development actions from both the supplier's and buyer's side. These

activities were improving 2nd tier supplier's performance, improving the buyer company's performance and processes via corrective actions and development projects, as well as monitoring and evaluating the supplier's performance and measuring the supplier's performance on a systematic manner. Moreover, one important development area was on buyer-supplier relationships, and the aim was to study, how the relationships impact on the success of supplier development.

First, an essential finding in this study is the importance of recognizing the real reasons behind the poor performance of the supplier before starting any development activities. In this study, an in-depth root cause analysis was conducted in order to be able to recognize the issues and based on them, to agree on the development actions. This root cause analysis resulted to be a critical success factor for supplier development, as it resulted that there had been information asymmetry within the buyer company regarding the reasons behind the poor performance of the supplier due to the lack of root cause analysis in the past. This had further resulted to misunderstandings and poor level of communication between the supplier and buyer company. In other words, basing the chosen development actions to the root cause analysis rather than subjective interpretations or feelings about the supplier's performance, was an enabler to the success of this development program. Moreover, the reasons behind supplier's poor performance resulted not always to depend on the poor performance of the supplier itself; there were also processes found that the buyer company needed to improve in order to support the delivery performance of the supplier. When starting the development program and before the systematic data analysis was taken into implementation, these issues in buyer company's side were not clearly recognized.

Another important finding of this study was that developing a poorly performing supplier is a challenging task, and it requires a lot of collaboration and investment both from the buyer's and supplier's side. The findings revealed that the one-year scope in supplier development program is rather a short period. In this case study, the initial development target of inbound punctuality percentage was not met during this time period despite many development actions took action. This finding can be interpreted as a failure of the supplier development program, on the other hand, this leads to another important finding, which is related to long-term commitment and continuous improvement. The fact that the development was not seen

after one year, in the context of this study, means that the development actions are chosen to support continuous improvement rather than quick-fix solutions. The purpose of the chosen development actions was to find the suitable methods that encourage to continuous improvement and building a long-lasting partnership.

Via the chosen development actions for this case study, processes both for buyer and supplier end were started to be reviewed and developed. Processes such as reducing the number of productions stops in buyer company end and improving the 2nd tier suppliers' delivery and quality issues in supplier end. Developing complex processes in multinational companies is not a short-term task, but rather time-consuming development project, where results cannot be seen after a short period of time. This finding is supported by i.e. Bai et al 2011; Dalvi et al 2015 and Pradhan et al 2013 who found that having long-term strategic goals and committed involvement from both buyer and supplier towards the development actions, are important success factors for supplier development.

Moreover, an important aspect needs to be considered when analyzing the findings of this study: despite this study aims to find the success factors when developing the supplier, the 2nd tier suppliers are not excluded of this study, and their performance have been taken into the development scope. According to Pradhan et al (2013), one critical success factor for supplier development is the 2nd tier suppliers' good condition and level of performance. With the case supplier, one of the delay reasons was 2nd tier supplier delivery and quality problems, which indicates that the 2nd tier suppliers' conditions were not on an ideal level. Despite the poor performance of 2nd tier suppliers, the supplier development program did not lead to failure; on the contrary, one of the main achievements in the case development program was improved performance of one of the most problematic 2nd tier suppliers.

Moreover, based on the findings, both the case supplier and buyer had set their expectations at the beginning of the development program on a very realistic level. The performance targets were set high to motivate the supplier to develop their capabilities, however the expectations to meet these targets were rather realistic and the possible failure of not being able to improve the delivery performance in one year period was recognized both from the supplier's and buyer's side. One factor that could potentially lead to development failure,

recognized by Dalvi et al (2015), is having unrealistic expectations towards the development. In this case, despite targets were rather unrealistic, the expectations were realistic. These expectations were built and developed based on the mutual communication and the increased level of trust between the supplier and buyer, which led to collaboration and mutual problem solving in challenging situations rather than punishing the supplier for not meeting the expectations.

Finally, one success factor for the supplier development was an existing, strong relationship between the case supplier and the buyer: the case supplier has been in the buyer's supplier portfolio for a longer period of time before starting the development program, therefore a solid relationship had been already established. However, as the case supplier was one of the worst performing ones among the supplier portfolio of the buyer, the reliability and trust towards the supplier has not been at an ideal level when starting the development program. However, one factor that led the case development successful, was the improved level of buyer-supplier relationship during the development program via close collaboration and frequent communication. This is supporting i.e. Anderson & Narus 1990; Kogut & Zander 1992 finding that an improved level of trust, communication and partnership can result from a successful development program. The following section covers the role of buyer-supplier relationships more in detailed.

6.1.2. The role of buyer-supplier relationships in supplier development

One of the purposes of this study was to analyze the role of buyer-supplier relationships in supplier development. Regarding this topic, two main findings were found via this case study: first, the collaboration and the level of information sharing on the daily, operational level increased over time. Moreover, improvement both from the buyer and supplier company increased when it comes to the ways how the information was shared as well as the extent of the information shared. This further increased the level of mutual trust and collaboration between the supplier and buyer. Linking this finding into the signaling theory presented by Maestrini et al (2018b), the signals provided by the buyer company towards the receiving supplier, developed from a synthetic sharing towards performance sharing with explanations. In other words, the findings support that the increased amount and quality of signals

improved the buyer-supplier relationships and further played an essential role in supplier development success.

However, the second finding regarding the buyer-supplier relationships, was rather negative; the supplier felt that the level of communication was not on the ideal level, as some misunderstandings on the supplier's performance, and especially the discussions on the issues causing the low delivery performance were not always open or value-adding. What the supplier suggested, was to further align the communication within the buyer company, increasing the knowledge from the operational to the managerial level, especially regarding the root causes and the efforts taken on operational level in order to improve the performance. This finding supports the literature, finding that relationships and communication within the buyer firm are beneficial in order to develop the supplier successfully (Koulikoff-Sourvrivon et al 2006).

Moreover, this finding supports what Koulikoff-Sourvrivon et al (2006) considered as important factors in buyer-supplier relationship, when it comes to information sharing, relationship structure and coordination mechanisms. The findings of this study highlight the cruciality of information sharing within the parties, as well as the involvement of multiple organizational levels being in contact with each other. The lack of these factors can lead to misinterpretations and further to decreased level of trust between the buyer and supplier.

Another important finding related to buyer-supplier relationships, was that the supplier's level of commitment and trust was linked to the buyer's actions and attitude towards the development program as well as the buyer's involvement to develop and review the buyer's own processes in order to improve the supplier's performance in a long-run. This supports what literature found important regarding how the supplier and buyer should treat each other. The more respectful and collaborative the relationship is, the more the supplier is willing to collaborate with the buyer, further leading to increased level of trust. (Gullett et al 2009.)

To summarize, the role of buyer-supplier relationship in the context of supplier development is essential. A frequent and close communication between the supplier and the buyer

company's all organizational levels plays an important role in supplier development success. Bringing the development discussions on a daily, operational level increases the motivation and willingness to improve, when all organizational levels are supporting and driving for development. What is important to consider, is to align the knowledge and communication within the buyer company in order to avoid misunderstandings. Finally, the buyer company's attitudes and own contributions towards the development actions has an important role in building a respectful and collaborative relationship, which further enables the supplier to consider itself as a valuable partner.

6.1.3. The importance of performance measurement in supplier development success

When it comes to the importance of performance measurement, the findings of this study support the past literature on the importance of performance measurement, especially in the *frequency* of performance measurement. Before of the development program, performance measurement was done on a monthly basis with the supplier quality manager of the buyer company. At that point, the performance measurement was rather discussed on a managerial level, and the operational level was not included in the discussion and the overall situation with the supplier when it came to the delivery performance.

However, during the development program, the measurement of performance started to be implemented also in an operational level, first via collaboration with the supplier quality manager of the buyer company, moving into a more frequent and consistent performance measurement and monitoring. At the end of the data collection period, the delivery performance was shared on a weekly basis in real-time with the supplier, which enabled the supplier to recognize the current challenges in real-time. In addition to that, the delivery delay reasons were overviewed on a monthly and quarterly basis, in order to see, where the trends go regarding the delivery performance, and whether the delay reasons vary from each other.

The importance of the performance measurement goes hand in hand with monitoring and information sharing activities. One important finding of this study was the extent of which data has power when it comes to development, collaboration as well as mutual trust. First, the data revealed the issues, which enabled a constructive and beneficial discussion and conclusions on the development actions from both supplier's and buyer's side. Moreover, the

willingness to collaborate increased for both parties, as now the data clearly indicated what and who needs to act in order to improve, making the mutual communication more effective, and leaving no space for misunderstandings or own interpretations. Additionally, the trust between parties has indirectly improved due to the frequent data sharing and open discussions and transparency of the information. To conclude, finding supports the past literature of performance measurement in a way that the collaboration and open discussion between the buyer and supplier increased when switching from a diagnostic and formal control mechanism into an interactive approach on performance measurement (Henri 2006; Gutierrez et al 2015).

6.1.4. Summary – a model for success factors in supplier development

Based on the findings of this single case study, the following table summarizes the findings and responds to the research question of the success factors of supplier development in a multinational company. This model is built based on the findings of this single case study and provides a framework for implementing a successful supplier development program on a multinational company in today's business environment.

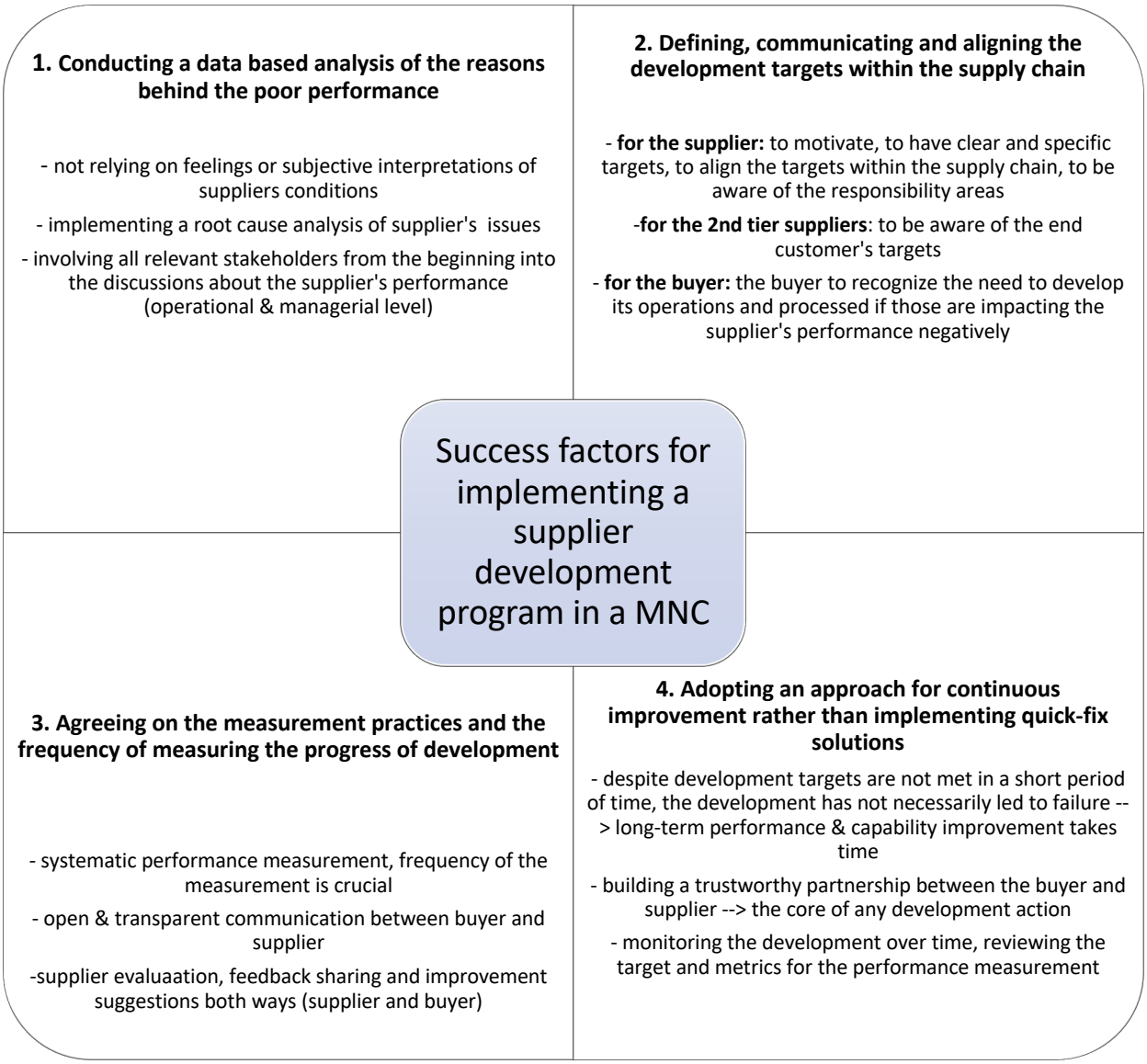


Figure 12: Success factors for implementing a supplier development program in a MNC

6.2. Theoretical contributions

This study contributes to an understanding of the success factors in supplier development and the importance of systematic performance measurement in supplier development in a multinational company. An important finding of this study is related to the frequency of the performance measurement, which is a relatively uncovered area in the existing supplier development literature. This study finds that the more frequent the performance measurement and the more open the communication of the performance towards the supplier is, the more the supplier is motivated to perform better and to collaborate with the

buyer. Moreover, this study highly supports the involvement of both operative and managerial organizational level into the discussions about performance and having all stakeholders aware on how the supplier is performing. In this manner, the buyer company can best support the supplier in the development.

Furthermore, this study justifies the importance of having a good level of buyer-supplier relationships as an enabler to a successful development program as well as the importance of the buyer company's involvement via continuous support, feedback giving and open discussions with the supplier. Additionally, this study focuses on the fact that supplier performance is not always systematic and straightforward, and the reasons behind poor performance can vary a lot over time, both in a short-term and long-term. This topic needs more attention in supplier development literature. The varying reasons for poor performance lead to the importance of implementing performance measurement in real-time, and the buyer company's willingness to review and change the performance metrics and development actions over time, to ensure the development in a long run and further support continuous improvement.

Finally, the study finds that a low level of supplier's performance is not always fully related to supplier's own issues; this study provides evidence that the reasons for delayed deliveries can result from the buyer company's challenges in their own processes. In this study, via selecting a performance metric that revealed also the buyer company's issues, it was found that production stops was one of the main challenges that resulted supplier delays, and the responsibility to solve these stops is under the buyer company's engineering department.

6.3. Managerial implications

Managerial implications of this study are related to the success factors of a supplier development program on a multinational company. Despite supplier development has been studied extensively in past literature from various perspectives, this study provides valuable insight on why companies should pay more attention and invest on supplier development in long-run in order to gain continuous improvement. The communication methods, information

sharing and the extent and frequency to which the performance is measured, are important drivers to succeed in a supplier development program.

Furthermore, what companies should take into consideration when developing its suppliers, is the variety of the reasons behind suppliers' poor performance. The reasons behind the poor performance first need to be investigated in-depth, before agreeing on any development actions, as misinterpretations of the true root causes of the delays might lead to failure of the development. Moreover, by only focusing on supplier's poor performance when developing the supplier, can also lead to failure; the buyer company should also pay attention and review its own processes and operations simultaneously, in order to be able to provide all the necessary support to the supplier to reach the mutual goal and improve the performance of the supplier. As an example, if there are any challenges in the buyer's operations, it can either directly or indirectly impact on the supplier's performance. These factors should not be neglected when running a supplier development program. Furthermore, companies should remember to provide enough support to their suppliers by motivating them, by discussing together with the targets and to openly share feedback on their performance, which further enables the supplier to feel appreciated and valued.

This leads to an important factor for organizations to consider, which is buyer-supplier relationships. In today's hectic business environment, the buyer company's efforts towards developing poorly performing suppliers might be relatively limited, and the development programs are targeted to be done as effectively as possible. However, the extra efforts taken by the buyer supplier company might result to be the crucial success factors to succeed in a development program. In practice, the buyer company should consider supplier development to be more than only improving supplier's performance on a reactive manner. Instead, taking the extra steps to truly focus on developing the mutual relationship between the buyer and supplier, to communicate on a frequent manner and to consider the development as a win-win opportunity rather than a forced responsibility.

6.4. Limitations and future research suggestions

This study has also its limitations. First, considering the theoretical background, the theoretical limitation of the study is related to the broadness of the theory; as the topic of supplier development as well as performance measurement are wide topics, in this study, theories covered in this thesis are the most relevant ones related to this study. Moreover, another limitation is related to the research method chosen; this study being a single case study, it provides rather subjective findings that might not be easily generalized or comparable to other contexts. On the other hand, a single case study provides a deeper understanding of the case, which therefore can lead to valuable findings which could not be concluded from other types of research methods.

This study has analyzed the success factors for a supplier development program, concentrating strongly on performance measurement and the relationships between the supplier and buyer via a single case study. The findings emphasize the importance of a systematic and frequent information sharing and open communication between the parties, as enablers to maximize the benefits from the supplier development program, leading to developments in supplier performance and supporting continuous improvement. The other important finding is related to the involvement of the buyer in the development program, not only via quick-fix solutions, but rather to improve the processes in a long-term. When it comes to future research, what could be studied further is the buyer involvement.

Moreover, some limitations of this study are related to the chosen research methodology and data collection methods. The chosen research methodology, a single case study, provides insight only on one particular case, providing less basis for generalization of the results, and also making the study more difficult to replicate when comparing to other research methodologies. On the other hand, a single case study provides more in-depth data of a particular case and can therefore help to gain valuable results of a specific topic. Furthermore, the chosen data collection method, participant observations, has its limitations. The author of this study being one of the participants in the observations and is one of the employees of the buyer company of this case study, most likely makes the approach slightly subjective when it comes to the results and analysis of the results of this study. However, the observations only played a role of a supportive and complementary data, in addition to the interviews and the buyer company’s database.

When it comes to future research suggestions, what could be studied further in the topic of supplier development success factors, is the extent of buyer involvement in order to support supplier development programs. Especially, what could be studied is the concept where both buyer and supplier develop their capabilities and practices that support each other and brings both parties closer to the desired development results. Past literature has covered buyer involvement in supplier development programs, however, it has not directly pointed the importance of buyer development actions as a supporting factor in supplier development.

Finally, what could also be studied in the future, is the importance of information sharing within the buyer company when developing the supplier. Based on the findings of this study, in future research it would be essential to align strategies based on which the buyer company could align the information and work together in order to improve the supplier with the same intentions and goals. More specifically, the collaboration between the buyer company's operative and managerial level is important, and how to effectively involve of all organizational levels and essential parties in each stage of supplier development program would need further investigation in order to succeed in supplier development in a large multinational company.

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Appendices

Appendix 1: Table of observations of daily communication

Daily communication via email, phone and Teams-app:
themes observed:

- the proactiveness of the supplier on delay information
- the flexibility on order changes and schedule changes
- the response time on queries
- the reliability of the systems when it comes to order confirmations (price and day) → confirmations reliability
- the attitude and motivation towards proactive communication

Date	Observations
23.7.2019	lack of proactive information regarding some specific delays, due to 2nd tier supplier delay
25.7.2019	no proactiveness on finding out what are the reasons for delays from 2nd tier supplier
25.7.2019	weekend shift arranged due to capacity issues, no flexibility in production →
31.7.2019	challenging 2nd tier suppliers is lacking, taking the delays from 2nd tier suppliers as they are
5.8.2019	long e-mail communication regarding delays describing the issues rather than finding solutions → moving the responsibility of finding solutions towards the buyer
7.8.2019	capacity issues ongoing, however not clear communication on the exact overall situation, updates coming day by day
7.1.2020	supplier system error → supplier taking proactive action on improving and investigating the issues
27.1.2020	substitution period in the supplier company → main contact person out of office for 2 weeks, the level of communication and proactiveness dropped
12.2.2020	supplier approached with informal conversation, shared some positive

	thoughts for the day → is a message of improved mutual trust and level of openness
15.2.2020	The communication between MM, supplier and SQM
21.2.2020	crisis time: COVID impacted orders → the transparency of what orders were delayed due to the pandemic and what were under supplier's responsibility
25.2.2020	supplier sharing the COVID impacts on their 2nd suppliers actively
5.3.2020 6.3.2020	last minute delay communication information related the COVID with Italy

Appendix 2: Table of observations on weekly communication

Weekly communication on Teams on delivery status and delay risks
themes observed:

- the accuracy of information shared during the meetings
- the attitude and approach towards meeting buyer company's requirements
- the feeling of mutual understanding
- the level of information sharing → the willingness to share information
- the level of trust
- the openness on the overall situation i.e., when communicating on challenges

Date	Observations
15.7.2019-31.12.2019	weekly communication ok, the orders in risk of delays are communicated, however no specific updates in addition to that → updates from the capacity issues and other delays might come as a surprise and not communicated proactively, prepared to each call. delay communication mainly via email, without pre-notices. → partially lack of trust reliability on the confirmed delivery dates

01.01.2020-15.08.2020	the quality of weekly communication slightly improving, the content of the meetings becoming richer, and current topics, especially regarding the crisis management on global pandemic makes it even more crucial to increase the trust and transparency between the parties Additional data shared in the meetings, helping the supplier to prioritize
weeks 41-49 2020	weekly communication improved drastically, as new ways of communication, new data is shared during the meetings. the willingness to share communication improving, and all the relevant topics and also smallest risks highlighted during the meetings. The delivery data showed the realistic situation, not only thoughts and assumptions were discussed. → the real topics of improvement could be raised during the meetings which improved the quality and efficiency of the meetings. Also, better preparation both from the supplier and buyer end made the meetings even more efficient. an additional member joined the meetings to provide deeper insight on the overall situation, also to discuss the challenging topics on a weekly manner.
weeks 49-52 2020	capacity issues with the supplier, the information is not being shared Improvements still need to be done in order prioritization and communicating about the overall impacts of i.e. capacity issues. Misunderstandings resulted regarding the extent of the delay impacts of capacity issues. The supplier had taken too much priority orders without informing the additional costs or extra shifts needed in order to cope with the situation”

Appendix 3: Observations on monthly communication

Monthly communication on performance measurement and performance evaluation

themes observed:
- how does the supplier and buyer communicate on the delays?
- is there mutual understanding on the delay reasons
- how does the supplier and buyer react on this situation?
- how is the atmosphere during the meetings?

Date	Observations
28.2.2020	- supplier having weekly meetings with its 2nd tier suppliers → the approach from the supplier beginning to move towards more of a proactive approach - system errors decreased → proactive actions form supplier side - challenges due to the global pandemic with the 2nd tier supplier
7.2.2020	- supplier planning to implement advanced performance metrics for selected 2nd tier suppliers, including monitoring, alarms and actions triggered for 2nd tier suppliers - order confirmation leadtime - requested vs. actual date deviations - re-confirmation count this will help the supplier to take action towards the 2nd tier supplier sooner and prevent the problems, when issues are still minor the swift from supplier's reactive approach is now encouraged to be turned into more of a proactive approach. supplier is not yet comfortable with taking ownership in their supplier, however the mindset is beginning to change → the attitude of taking more responsibility