

LUT School of Business and Management
Supply Management

Master's thesis

Operational management model for strategic supplier

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ABSTRACT

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Master's thesis. Lappeenranta University of Technology, School of Business and Management. 55 pages, 18 figures, 6 tables and 3 appendices Inspectors: Professor Petri Niemi, Professor Janne Huiskonen	
Keywords: Supplier Management, Operations Management, Key Performance Indicators	
<p>The main objective of this study was to create operational management model for strategic supplier in the case company. Thesis proposes also outlines how case company can develop and maintain successful collaboration with its strategic suppliers.</p> <p>Literature part of the thesis concentrates why companies should focus on supply chain management overall. Outsourcing risks and opportunities were pointed out, and successful strategic supplier collaboration and measurement clarified. Kraljic's purchasing portfolio model were defined to categorize supply base. Thesis process operations management based on the system approach and highlights how to make it as a competitive advantage. Operations management measurement and risks were also covered.</p> <p>Empirical study was composed based on the interviews in the case company and strategic supplier. Purchasing spend data was gathered from the case company, and used to create purchasing portfolio. Empirical study stated that case company had a space for improvement in strategic supplier collaboration and measurement. Overlapping in huge company is self-evident and can complicate interaction and decelerate decision making process with supplier.</p> <p>Thesis proposes nominated strategic suppliers based on the purchasing spend and business criticality. Supplier account representative could have a key role to steer monthly business meetings in order to improve customer responsiveness. The supplier evaluation indicators could be more allocated into the development part which could generate more innovations. Dashboard assessed to EMS management needs could be enlarged with flexibility, order intake, testing quality, development and forecasting metrics.</p>	

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Diplomityön keskeisin tavoite oli luoda operatiivinen johtamismalli case-yrityksen strategiselle toimittajalle. Diplomityö kuvaa myös millä tavoin yritys voi luoda sekä ylläpitää menestyksellistä yhteistyötä strategisten toimittajien kanssa.

Työn kirjallinen osuus kertoo toimitusketjun johtamisen tärkeydestä, sekä ulkoistaminen riskeistä ja mahdollisuuksista. Kirjallisessa osuudessa käsitellään myös, kuinka strategiset toimittajat voidaan määritellä Kraljicin mallia käyttäen. Lisäksi strategisten toimittajien tuloksellinen johtaminen, yhteistyön riskit sekä yhteistyön mittaaminen muodostavat osan kirjallisesta osuudesta. Operaatioiden johtamista käsitellään systeemijattelun näkökulmasta. Kirjallisuuden jälkimmäinen osuus sisältää operaatioiden johtamisen mittaamista ja riskejä.

Työn empiirinen osuus koostuu haastattelujen perusteella luodusta nykytilanteen kuvauksesta. Empiirisessä osuudessa ilmenee case-yrityksen tarve strategisten toimittajien yhteistyön sekä mittaamisen kehittämiseksi. Kvartaalittaisella toimittajan suorituskyky arvioinnilla on vaikea reagoida nopeammin muuttuvaan toimintaympäristöön. Toimittajien yhteistyössä on mukana useita funktioita. Täten sisäiset päällekkäisyydet ovat joskus väistämättömiä ja kokonaiskuva toimittajan johtamisesta vaarassa kadota.

Jatkuvasti muuttuviin markkinavaatimuksiin vastaaminen vaatii strategisten toimittajien kuukausittaista johtamista. Toimittaja vastuullisella on ratkaiseva rooli toimittajan johtamisessa yhdessä sidosryhmien avustuksella. Nykyistä korostetumpi kehityksen mittaaminen mahdollistaa innovaatiot, jotka parantavat toimitusketjun kannattavuutta. Sopimusvalmistuksen johtamiseen ehdotetussa mittaristossa kannattaa mitata myös joustavuutta, saatuja tilauksia, testauslaitteistojen laatua sekä kehitystä ja ennustetarkkuutta.

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Espoo, May 2018

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GLOSSARY

CCC	Customer configuration center
EMS	Electronics manufacturing services
ERP	Enterprise Resource Planning
KPI	Key Performance Indicator
NPD	New Product Development
OUTSOURCE	Transfer part of company's internal operations to another company
PE	Product Engineering
RDC	Regional distribution center
ROI	Return of Investment
R&D	Research & Development
TCO	Total cost of ownership
VMI	Vendor-Managed inventory
VOC	Voice of the Customer

1 INTRODUCTION

Company can achieve remarkable competitive advantage with well-organized and managed Supply Chain. Nowadays companies focus more on their core businesses and outsource the operations from the side. Outsourcing creates more interfaces between the companies, functions, tools and put more pressure and value to Supply Chain Management. Some of the suppliers are more critical than the other ones. Strategy supplier management and collaboration is necessary for the company's success. Therefore, most of the company's Supply Chain Management resources should be allocated to the strategy supplier management. Relationship with strategic suppliers needs to be collaborative and run continuously. Real time visibility for supplier's operations can be built upon the trust and commitment in a relationship.

1.1 Background

Background of the study was that, at the time, the case company did not have common way to manage strategic suppliers. It was already understood that Electronics manufacturing service companies had their strategic role in company's large supplier base, based on the remarkable share of purchasing spend and business criticality. Organisationally company had its own functions related to commercial supplier collaboration (Global & Local category management), R&D related supplier collaboration (NPD sourcing management), service business related supplier collaboration (Service Category Management) and operational supplier collaboration (Purchasing). In addition to this company established its own organisation to manage EMS and regional distribution center operations just before the study was kicked-off in late 2017. This study is addressed for EMS and R&D operations management needs, focusing to create an operational management model for strategic supplier management.

1.2 Scope and targets

According to above needs, company wants to have a systematic way to collaborate and measure strategic supplier collaboration. Based on the thesis results, company wants also to reallocate its supply chain and EMS management resources according to supplier's business

criticality. At the same time, case company wants to understand risks and benefits in strategy supplier collaboration.

This thesis main research problem question is:

How case company can establish successful operational collaboration with its strategic suppliers?

And the main research question can be divided into several sub-questions:

1. What are the measurable benefits of supplier collaboration?
2. What risks exists in outsourcing and strategic supplier collaboration?
3. With whom supplier case company should proceed into the collaboration?
4. What kind of operational dashboard case company should create with its strategic suppliers?

Research is done according to case company operational needs, therefore it doesn't handle the supplier sourcing or negotiations, neither subjects related the terms of agreements. This research deals the strategic supplier collaboration in the same context as a strategic partnership management.

1.3 Methods

Thesis is called as a build-up project based on the case company's EMS management needs. Methods used are based on data gathered from the case company, several interviews in case company and from the meeting with one strategic supplier key contact persons. Case company's purchasing spend data is used to create a suggestion with whom supplier case company should proceed into collaboration. The suppliers' business criticality is defined based on the interviews in the case company. Suggestions for the collaboration development is gathered from the literature, meeting with the strategic supplier as well as from the interviews in the case company. Those were also the main sources to define operational dashboard for strategic supplier management. Research included also one external company e-mail interview as a benchmark, related to their strategic supplier collaboration.

1.4 Research execution and structure of the thesis

The research can be divided into five steps (see Figure 1). The target of the thesis was defined in December 2017. Thesis theoretical and empirical study was prepared from January to April 2018. All interviews in case company, with strategic supplier and another external company was held due March. Therefore, theoretical study was finalised in March and empirical study due mid-April. After the conclusions and summary, the thesis was finished in the beginning of May 2018.

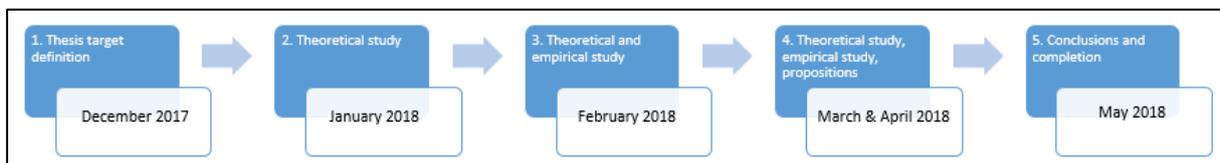


Figure 1. Research execution steps and schedule

First chapter of the study covers backgrounds, scope, targets, methods, research execution and structure of the thesis. Chapters from two to four are literature parts of the study. The second chapter starts with the theory of supply chain management and continues why supply chain management should have the priority. Risks in outsourcing are also theoretically covered in this chapter.

Third chapter focuses the theory of strategic supplier management from different approaches. It starts with the introduction of Kraljic's purchasing portfolio. Therefore, it continues identifying the main risks and keys to success in strategy supplier management and collaboration, as well as the basis of collaboration measurement. Main target of the chapter is to understand how to define strategic supplier, and what is essential when collaborating with them.

The fourth chapter starts with the system approach definition of operations management. Measurement with key performance indicators are followed with risks and elements to success in operations management. Main target of the operations management literature part



is to understand system approach for operations management, what key performance indicators are used and how company can successfully manage them.

Fifth chapter introduces the case company and its supply chain environment. It covers the current supplier management model in case company with its key performance indicators.

Sixth chapter suggest the list of suppliers with whom case company should proceed into the collaboration. It covers the updated meeting and collaboration model as well as the proposal for readjusted evaluation model. The chapter lists actions to improve supplier relationship management based on the literature, meeting with strategic supplier and external company interview. Finally, proposition part suggests dashboard for strategic supplier operational management.

2 SUPPLY CHAIN MANAGEMENT

"Supply chain management is a set of approaches used to efficiently integrate suppliers, manufacturers, warehouses, and stores so that merchandise is produced and distributed at the right quantities, to the right locations, and at the right time in order to minimize system wide costs while satisfying service-level requirements (Simchi-Levi et al. 2004, p. 2)."

Successful supply chain strategy is to manage dynamically network of suppliers and customers. This network should be demand driven based and consist the whole network instead of old style buyer-supplier relationship. Remarkable part of the successful supply chain strategy is the co-operation with suppliers and customers. Relationship in the past were more adversarial than co-operative and caused part-optimization in the chain. This raised the level and number of risks in co-operation and supply chain. Nowadays the world-class companies manages and control the risks from the whole supply chain point of view. Competitive advantage can be achieved by managing the supply chain more efficiently and with lower costs than the competitors. (Christopher 1998, p. 15-18)

"Supply chain management is a network of connected and independent organizations mutually and co-operatively working together to control, manage and improve the flow of materials and information from suppliers to end users (Christopher 1998, p. 19)."

Unexpectedly changing market requirements increase the value for the supply chain agility and adaptability. Agility means that company has the ability to move promptly when environment requires it. Adaptability tells how company has been able to meet the new market requirements. This requires flexibility in supplier collaboration and is opposite to traditional cost cut driven procurement. (Mena et al 2014, p. 148-149)

2.1 Why supply chain management is important?

Rapidly changing markets requires company's flexibility in operations as well as in financial management. Pay-back time requirements are tight and cash flow is one of the key metrics for management. Logistics and supply chain management has a remarkable role in companies

Return of Investment (ROI) calculations (see Figure 2). The more efficient logistics and less inventory you have, the better ROI you are able to achieve. (Christopher 1998, p. 77-79)

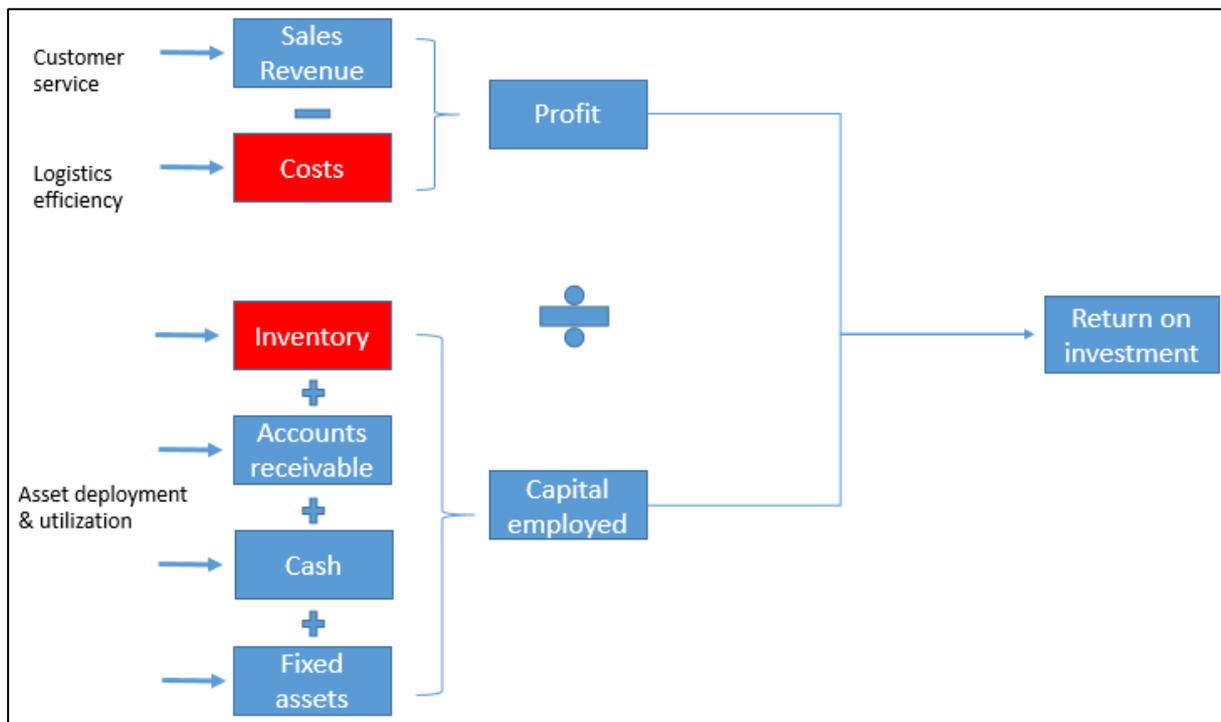


Figure 2. Logistics impact on ROI. (Christopher 1998, p. 79)

2.2 How procurement can be a competitive advantage?

Procurement is used to have a side role in the organisations. According to CAPS Research 2012 companies spend by external services and goods are around 50 percent of the sales revenue. Some companies can even have bigger share and therefore gives procurement a remarkable role in business. According to CAP Research 2012 procurement has biggest role in Chemical Manufacturing, in Engineering/Construction and in Pharmaceuticals (see Appendix 1). (Mena, Van Hoek, Cristopher 2014, p. 3-4)

Usually company's competitive advantage has been build-up upon the internal resources. There is huge potential of innovation and process improvement ideas outside the company premises. And in these days' companies can gain remarkable competitive advantage from the external relationships in supply base. By being curious, interested and humble the external

potential can be realized. According to Mena et al 2014 procurement can increase the competitive advantage with following steps (see Table 1.).

Table 1. How to increase value add in procurement? (Mena et al, p. 4-8)

What to do?	How to do it?	What is the value add?
Invest in relationship specific assets	Provide safeguards and volume commitments	Confidence to supplier invest on those assets
Share the knowledge	Co-create products and services. Create ability to learn from the others	More innovations by collaborating and learning from the supplier
Find the complementarity	Rate suppliers based on their ability in complimentary and create mechanisms	Two or more organisations can achieve something together what they could not achieve on their own
Establish effective governance structures	Create contracts or self-enforcing agreements – rely on trust and goodwill	Decrease risks in the supply base and reduce transactional costs

Therefore procurement can enlarge its role as a strategic function by sustaining and developing company’s competitive advantage. And furthermore, to do it way which is difficult for the competitors (Mena et al 2014, p. 5, 8).

“The new DNA of procurement talent include: openness to learn from suppliers; the ability to creatively develop (alternative) solutions for business problems; the ability to sell and represent, as an ambassador, the enterprise in the supply base; the ability to envision ways to competitively differentiate the company and connect supply-base market intelligence to customer opportunities and strategic goals, relationship and engagement skills.” (Mena et al 2014, p. 36)

2.3 Outsourcing risks and benefits

One of the drivers for companies to increase outsourcing is to transfer demand uncertainty to the supplier. This means that the suppliers need to build-up more flexibility in their manufacturing process than the buyer company would be able or is willing to do. There is no unlimited flexibility in the supply chains, so risk can become real if buyer won’t take care of the forecast and planning process development. (Simchi-Levi et al 2004, p. 142)

End user cost will rise remarkable if companies will just transfer costs upstream or downstream without increasing the value in the supply chain. (Christopher 1998, p. 15-16)

Companies wants to focus more on core competency. The critical is how to define what core competency is and what is not? It would mean the loss of competitive knowledge and therefore challenges in the markets, if company outsources critical components to suppliers that may create business opportunities for competitors. When market demand increases and the buyers has challenges to source and negotiate materials for market needs, there is willingness and needs to create commitments for longer periods. This can be also a very risky commitment for the buyer when market demand decrease. (Simchi-Levi et al 2004, p. 143-144).

Table 2. A Framework for Make/Buy Decisions. (Simchi-Levi & Kaminsky 2004, p. 146)

Product	Dependent on Knowledge and Capacity	Independent of Knowledge, Dependent of Capacity	Independent of Knowledge and Capacity
Modular	Outsourcing is risky	Outsourcing is an opportunity	Opportunity to reduce cost through outsourcing
Integral	Outsourcing is very risky	Outsourcing is an option	Keep production internal

Modular purpose components mean they can be used by in different products. In fact, product varies by combining the components. Integral products components are designed to be much related to each other. There is a considerable risk in outsourcing when company is dependent on the knowledge and capacity. (Simchi-Levi et al 2004, p. 144-147)

3 STRATEGIC SUPPLIER MANAGEMENT

Successful strategic collaboration contains integrated scheduling of production and deliveries, improved quality, shared innovations and reduced costs. This collaboration usually means longer relationship with the supplier but can make it difficult business entry for the competitors. (Christopher 1998, p. 264)

Companies starts strategic partnership with the main supplier(s) to control and minimize risks in the supply chain. In strategical partnership companies can implement for example vendor-managed inventory where supplier(s) themselves decides when to refill stocks in customer premises. This would also reduce the bullwhip effect in the supply chain. (Simchi-Levi et al. 2004, p. 25-27)

Strategical supplier partnership parties contain integrations and includes commonly shared information related to targets, R&D projects, designs and future plans. The trust and commitment are important elements in the collaboration. The supply chain integration, technology sharing and joint planning are keys for collaboration (see Figure 3). The traditional role of cost driven purchasing becomes less critical as the relationship remains longer and non-financial metrics become more valuable. (Tyndall et al. 1998, p. 248-249)

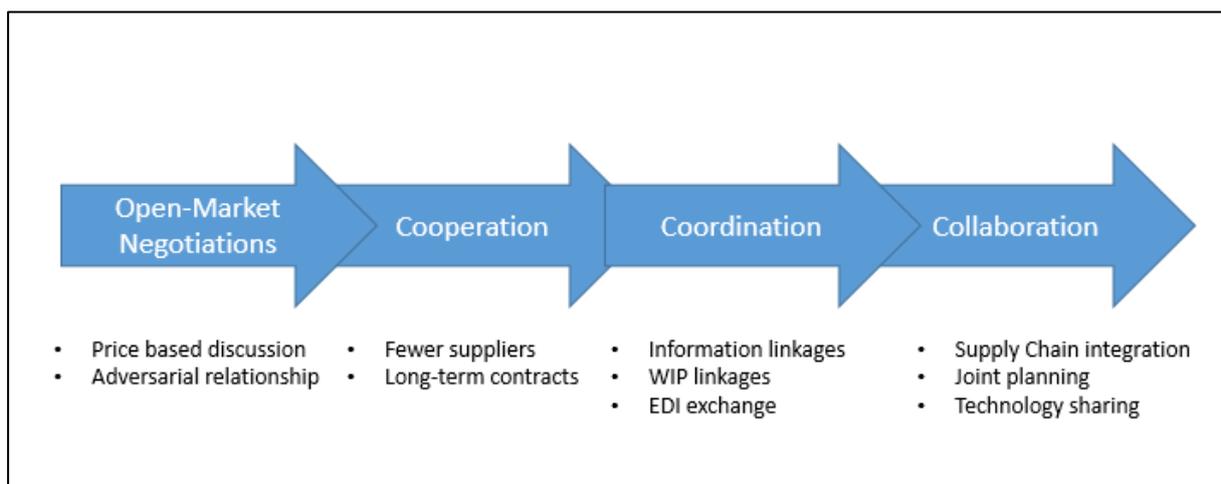


Figure 3. The key transition from open-market negotiations to collaboration. (Tyndall et al. 1998, p. 249).

The most significant driver in business are growth and profit to the owners, nobody doesn't want to do unprofitable investments. Deciding suppliers for company is a risk like any other kind of business-critical decisions, and selection is coming more as a strategic decision. (Östring 2004, p.3)

Supply strategy for product components have to be in line with business strategy to achieve competitive advantage, and have to be managed by understanding products and needed components to reach level of the of strategic supply. (Drake et al. 2013, p.3)

Strategic sourcing is the process of developing channels of supply, although strategic sourcing focuses primarily on reducing costs, its foundation is to build long-term, win-win relationships with key suppliers to increase buyer's competitive advantage. (Parniangtong 2016, p.5)

3.1 Kraljic's purchasing portfolio model

Supply portfolio models has got good attention when proper strategy has been arranged. Models are established to give a useful and systematic way to handle and evaluate purchasing items in strategically and criticality observations. Kraljic's model categories purchasing items by two key variables (Importance of the purchase and complexity of the supply market) into the four different fields. Fields are divided by different kind of supply strategies. Literature consists also several similar types of two variable models. This kind of models has become very popular and have been implemented in many industries. (Drake et al. 2013, p.3-4)

Kraljic classifies only product and service groups, not suppliers. Similar kind of practice can be done to classify suppliers, but then dimensions needs to redefine. (Iloranta 2015, p.115-116)

According to Mena et al 2014 Kraljic's model has been used as a tool to create supplier segmentation. Then variables should be as followed:

- The strategic importance of purchasing: in terms of value added by product group, percentage of category in total costs and impact of category on profitability and growth.
- The complexity of the market: in terms of availability, number of suppliers, rate of technological change, entry barriers and logistical complexity

STRATEGIC IMPORTANCE TO PURCHASING	HIGH	<p>LEVERAGE ITEMS</p> <ul style="list-style-type: none"> • Obtained from various suppliers • Represent a large share of the product cost • Small changes in price have a strong effect on the product <p>Competitive Bidding</p>	<p>STRATEGIC ITEMS</p> <ul style="list-style-type: none"> • Obtained from one supplier • Product for which supply is not guaranteed • Represent considerable value <p>Partnership</p>
	LOW	<p>ROUTINE ITEMS</p> <ul style="list-style-type: none"> • Usually have a small value per unit • There are many alternative suppliers <p>Systems Contracting</p>	<p>BOTTLENECK ITEMS</p> <ul style="list-style-type: none"> • Represent relatively limited value in terms of money • Vulnerable in regard to their supply <p>Secure continuity of supply</p>
		LOW	HIGH
		COMPLEXITY OF THE MARKET	

Figure 4. Supplier segmentation Kraljic's Matrix (Mena et al 2014, p. 68)

According to Mena strategic supplier needs more focus than the other variables. Strategic suppliers do not have second source, which needs to be considered in risk management. They have also remarkable spend share from buyer's total procurement value. There is need to focus on supplier partnership with strategic suppliers. Company is very dependent with strategic suppliers, and most of the resources needs to be allocated to collaborate with them. Leverage suppliers has also strong impact to product cost but other sources exist which decrease the business risk in availability. Continuous competitive bidding can keep the leverage suppliers in control. Bottleneck suppliers may have affect to business from supply availability point of view. It is vital to use resources to ensure availability from the bottleneck

suppliers. Routine suppliers have tiny value and many second sources. (Mena et al 2014, p. 68-69)

O'Brien 2014 classifies suppliers into three sections:

1. Transactional suppliers; they are suppliers with whom the minimum and immediate communication is adequate
2. Important suppliers: some additional communication and management is needed to have as it can increase the value for the chain
3. Strategic suppliers: very few nominated suppliers who are carrying remarkable business risk but successful collaboration with them holds potential to increase number of innovations and the value of business. (O'Brien 2014, p. 52-53)

In this research we use Kraljic's supplier segmentation model to consider with whom supplier case company should proceed into the collaboration.

3.2 Strategic supplier collaboration

Many markets have unpredictable volatility which increase the value of supply chain risk and resilience management. There are several ways to decrease supply chain resilience if operating with centralized distribution centres, lean manufacturing and low-cost country sourcing. Supplier management, 2nd tier supplier management and sometimes even 3rd tier supplier management are part of the company supply chain mapping (see figure 5) and risk management. The map assists company to navigate upstream the chain, realise connections between the suppliers and proactively manage potential hidden disruptions. (Mena et al 2014, p. 146-147)

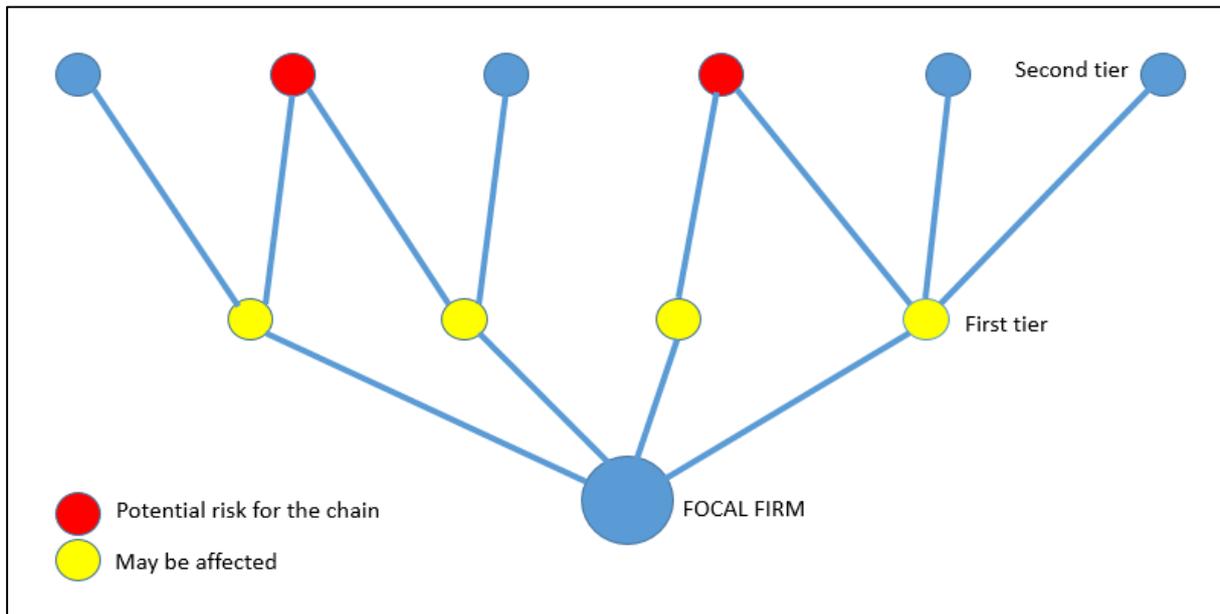


Figure 5. Looking upstream for critical suppliers. (Modified from Mena et al 2014, p. 146)

Transactional purchasing can be called as a “classical purchasing philosophy” and longer supplier collaboration with strategical approach can be called more like a “modern purchasing philosophy”. The way of managing the supplier relationship differs depending the philosophies are used. Supplier collaboration needs to be measured with the financial and non-financial metrics. The challenge can appear when deciding whether the supplier relationship can be treated as a longer or shorter one. Usually non-financial metrics will become more critical in longer relationships. Closer collaboration with supplier can be considered as a strategic purchasing. This relationship consists the close cooperation with some other internal key functions (e.g. PE and R&D) in addition to purchasing function. (Jääskeläinen et al. 2017, p. 11-12)

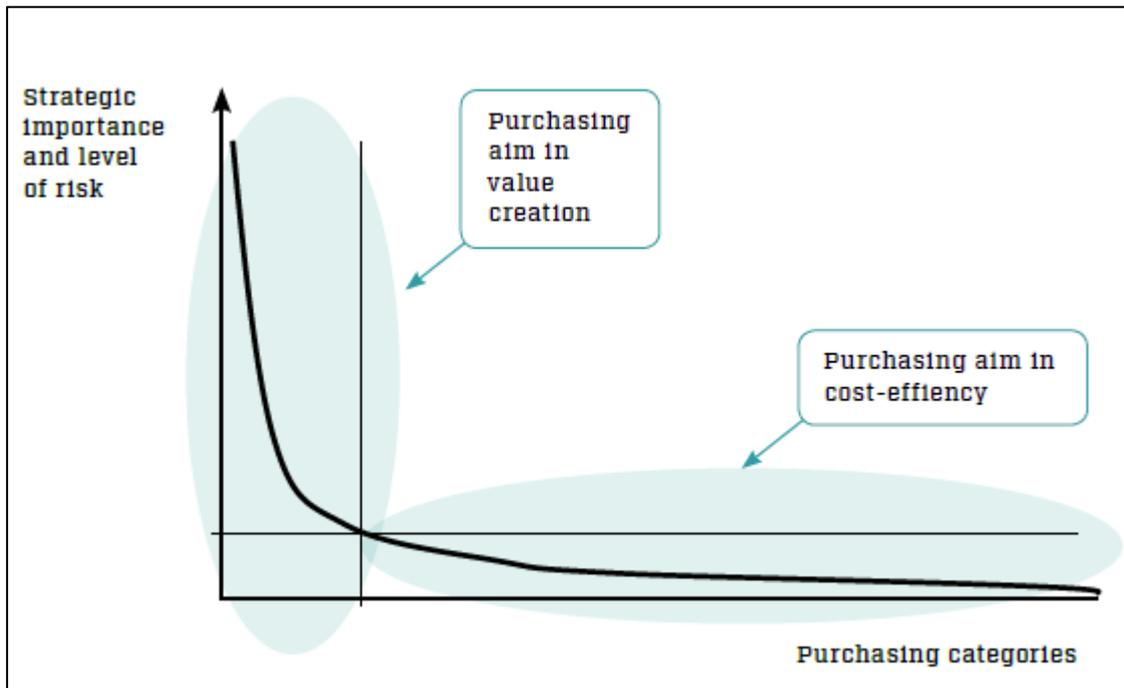


Figure 6. Two perspectives of purchasing. (Jääskeläinen et al. 2017, p. 12)

The buyer-supplier relationship can be considered from the value creation point of view (see Figure 6); the more strategical relationship is the more value for the customer can be created. There are several reasons to move into the strategic partnership depending the industry:

In process industry

- if suppliers role increase the profitability of buyer-company and boost new product development and process efficiency
- if high capacity flexibility is needed
- if we have common sustainability target

In project industry

- if we are targeting together technological innovations
- if flexibility needed to react changing market demands
- if we have common sustainability target

According to Jääskeläinen et al. 2017 that being an attractive customer the supplier would be more active to provide new tools and technologies into the products and collaboration. Main notified risk in strategical partnership is to develop a relationship where other suppliers are not able to compete. (Jääskeläinen et al. 2017, p. 12; 26-27)

3.2.1 Successful collaboration and collaboration risks

In collaboration it is crucial to understand which business is critical for the byer and which one for the supplier. Supplier needs to have their advantage in payment terms and conditions. Competition can be harmful for the relationship, and collaboration can create new business for both. (Tyndall et al. 1998, p. 132-133)

One-directional communication in supplier measurement can be a risk. Continues interaction is needed to sustain successful buyer-supplier collaboration. Balance between financial and non-financial metrics is important, and specially the metrics from supplier proactiveness. Openness and common targets in collaboration means that the way of measure and the metrics would be defined together with suppliers. (Jääskeläinen et al. 2017, p. 37-39)

Buyers needs to listen carefully the Voice of the Customer (VOC) but eagerly the supply base as well. Occasionally suppliers might have a better information about end customer needs than the buyers have. This requires integration with the parties but enables streamed supply chain, gives visibility to suppliers to perform towards changing customer needs and generate innovations into collaboration. (O'Brien 2014, p. 314-315)

Whether business is growing or decreasing it is essential to evaluate (see Appendix 2) supplier's performance continuously. In strategical collaboration there is a number of signs to be followed in terms of collaboration risk management. They are called as a warning signs and they can be divided into the 4 sections:

1. Environment (politics, markets, customers, suppliers, competition)
2. Company (size, core business, management and its depth, ownership, company structure, acquisitions, mergers, technology)
3. Financial figures (reliability and accuracy, delays to share, operational losses, equity, current ratio, assets)
4. Other (payment terms, share value, significant asset selling, downward in credit rating, restructuring and organizational changes)

All signs is good to note and consider immediate action in collaboration if some of them appear in the same time. Otherwise it can be a challenge for the supplier's performance. To understand and proactively react in each sign, the collaboration performance can remain steady. (Östring 2004, p. 9-12)

Risks in collaboration can be evaluated by creating the analysis depending the level of risks (see Table 3). Suppliers can be divided in different risks categories based on the possibility and size of the company losses in case of undesired occurrence. Key suppliers might have the biggest role in supplier base risk management if they are difficult to change. Therefore, corporate analysis (see Appendix 3) could be used to control high level risks. The corporate analyse is an extensive analysis of supplier's future performance with current operational and financial strengths, including the qualitative and quantitative approach. (Östring 2004, p. 25-27; 37-38)

Table 3. Risk level and analysis. (Östring 2004, p. 25)

Risk level	Nature of relationship	Type of analysis
Low	Easy to change a supplier	No analysis, just a short credit report
Middle	Relatively easy to change	Short analysis
High	Difficult to change a supplier	Corporate analysis

Suppliers can be divided also by the number of sources. The biggest risk exists with the sole source companies as they have only one site in one location, especially if they carry lots of potential monetary loss. Collaboration with single source companies have lower risk as they have factories in different locations. Single source company can be also assessed as a high-risk supplier if their financial performance is remarkable negative. Suppliers bankrupt can shut down all its factories. The lowest risk exists usually with the multiple sources when there is two or more suppliers in different locations. (Östring 2004, p. 26-27)

3.2.2 Collaboration measurement

A good start for the strategy supplier measurement could be to collect buyer's and supplier's expectations for the partnership. This would support every partnership as they do can have differences. Based on the expectations the metrics can be evaluated together. Targets could be set based on the previous results with gradual improvement percentage. The examination period needs to be assessed and new targets set when needed. (Jääskeläinen et al. 2017, p. 39-40)

Table 4. Supplier partnership benefits. (Jääskeläinen et al 2017, p. 40)

Benefit to be measured	More precisely defined object for measurement	Formula
Utilization of supplier expertise	A. Innovations - new business, products and services B. Process improvements - unit costs and total cost of ownership (TCO) C. Optimization of fixed costs	A. Increased sales B. Decreased operative costs C. Decreased operative costs, flexible cost structure
Optimized quality	A. Unit cost B. Customer promise, delivery performance	A. Same as below B. KPI delivery performance, timeliness, number of deficiencies in comparison of total production volume
Direct purchasing costs	A. Unit cost B. TCO C. Overall value of the agreement is more than the sum of its components	A&B current (TCO) cost vs. new (TCO) cost*volume C. Costs of the entire object of agreement

Benefits of the partnership can be divided into three sections (see Table 4):

1. Supplier expertise; main thing to measure number of innovations created by supplier
2. Quality; main thing to measure from the customer's point of view
3. Purchasing costs; main thing to measure total cost of ownership (TCO)

In trustful collaboration buyer and supplier understand that they have more ability to achieve together than by themselves. Successful collaboration can even contain that key staff would exchange between the companies. This would mean that the supplier would be always available and the information sharing would be open and rapid. (Wallace et. al. 2015, p. 84-85)

The robust supplier base makes companies stronger and the chain more flexible. When concentrating continuously auditing and evaluating suppliers, the supplier's performance can be controlled. Company can extend the positive impact on supplier's performance by requiring that the 2nd tier suppliers would be also audited. (Östring P. 2004, p. 116)

4 OPERATIONS MANAGEMENT

“Operations management is decision making involving the design, planning, and control of the many factors that affect operations. Decision include which products to produce, how large a facility to build, how many people to hire on first shift, and what methods to use to control quality. Operations managers apply ideas and knowledge to increase productivity and reduce costs, improve flexibility to meet rapidly changing customer needs, enhance product quality, and improve customer service. An organization than can achieve these advantages through operations will gain a competitive edge.” (Vonderembse et. al. 1988, p. 5)

Organisations add value to products and/ or services in their operations. Operations needs inputs to the transformation process, which creates outputs like goods or services. Operations is one of the key functions of all organisations. It causes major part of the company’s cost, but offer a remarkable potential to increase company’s profitability. Marketing and finance can be called as other key functions. Marketing picks the customer order and finance control the business healthiness of organisation. (Heizer et. al. 2008, p. 4-5)

4.1 System approach

Meredith et. al. 2007 states that system approach to operations management means that we consider the process from the inputs, transformation system, outputs, environment and the ways of monitor and control point of view.

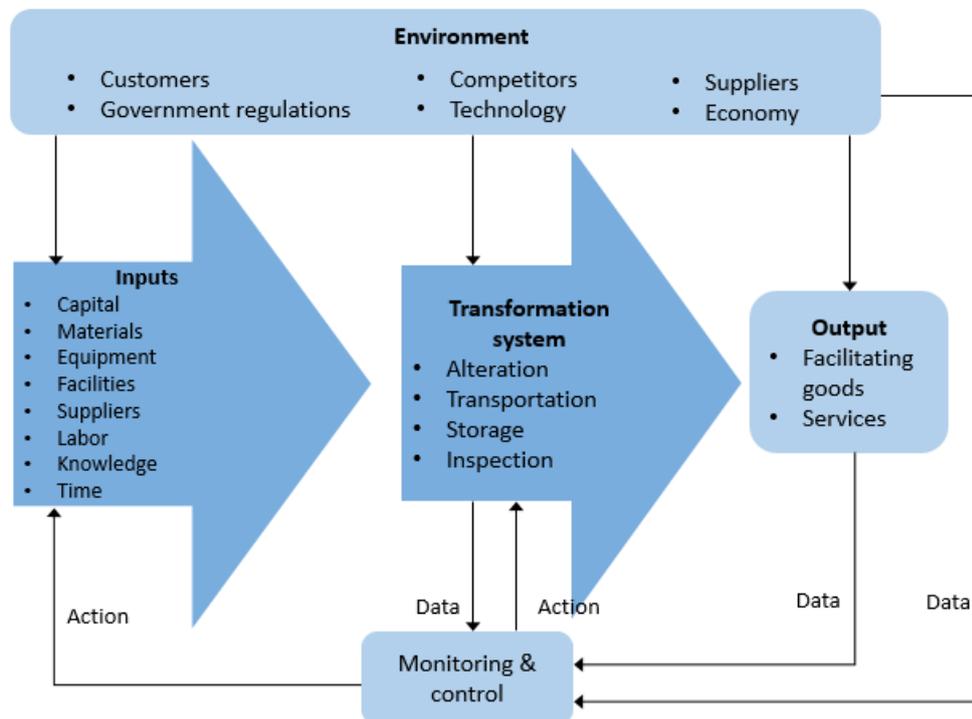


Figure 7. System approach to operations management (Meredith et. al. 2007, p 5)

Remarkable part of the inputs to the system comes from the environment. Customer's needs can change rapidly, competitor's new product launch, instability in supply base or technological breakthrough can have significant effect to transformation system and afterwards to output. Government can also have outstanding effect when adjusting new rules and regulations to health, safety and pollution in work environment. Inputs are usually more complex than assumed as there could be the functions like purchasing, engineering, marketing, human resources, shipping and finance as well. Inputs are differed from the raw materials as they are not part of output. Usually purchasing, production, shipping and distribution are mostly classified as part of the supply chain management. But organisational structures varies depending the company and industry, and more important is to recognize the subject areas related to operations. Subject areas are covered more detailed in the chapter of measurement and success in operations management. (Meredith et. al. 2007, p. 6, 13)

People have the knowledge of transformation process, which is a critical part how to transform inputs into the outputs. Another key part of transformation is the time used into the tasks. Activities in transformation system needs to be completed in time. Transformation phase adds value to the inputs.

Four most known ways to add value are:

1. **Altering** where something will be changed structurally. For example, you go to shop and buy some clothes or go to barber to have a haircut. Instead of physical alteration you can have it sensually like in cultural event or psychologically by the feeling of friendship in some occasions.
2. **Transporting** when something needs to be transferred to some another location than it currently appears. Something can be delivered to us, like magazines and picked up from us, like garbage.
3. **Storing** when you need a hotel in vacation or to storage some of your belongings for a time in safety box.
4. **Inspecting** like medical exams or elevator certifications.

There is companies that combines the ways of increase value. For example, storing and transportation services are usually combined. (Meredith et. al. 2007, p. 7-8)

Generally, outputs are divided into services and products. We assume products more like tangible and services intangible outputs. Visiting to doctor is more service based output but purchasing the flour or magazine is more product based output. Often outputs are also combined; Car repair and tailor-made suit services are in between the service and product output. (Meredith et.al. 2007, p 8-10)

System approach to operations management (see Figure 7) needs controlling and monitoring. Monitoring process needs to verify the whole system, but giving individual information from each component of the system. Management is ability to make corrective actions based on the data and analysis gathered from the process. System needs to have its targets from the different metrics point of view. Targets needs to be considered continuously and system restructuring done when needed. (Meredith et. al. 2007, p. 6, 10, 13)

4.2 Measurement and success

One way to consider companies operations excellence is to put on eye on their operations performance objectives. And more accurately to do it from the different stakeholder's point of

view. Stakeholders can be divided into internal and external ones. Internal stakeholder can be called for example employees in operations and external stakeholder the customers, suppliers and company's shareholders. Operations can be defined from five objectives point of view: speed, quality, flexibility, dependability and cost. (Slack et. al. 2001, p 43-44)

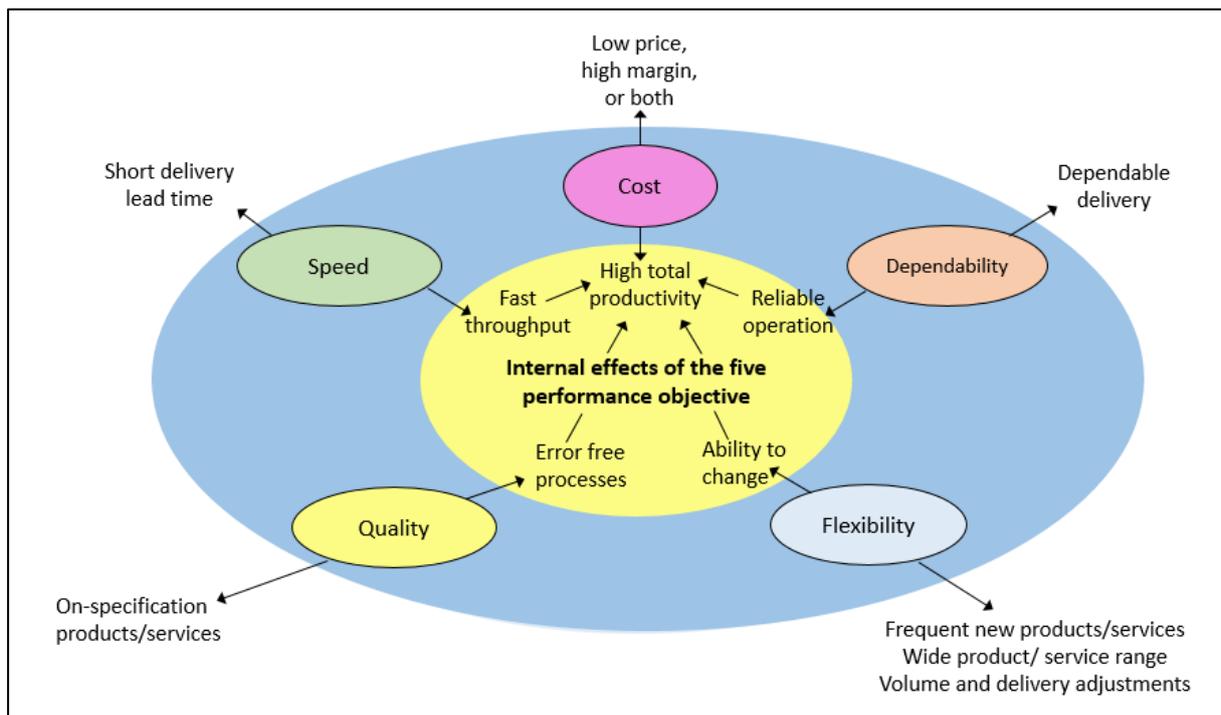


Figure 8. Performance objectives with its effects. (Slack et. al. 2001, p. 57)

Quality can be considered whether internally or externally. Excellent internal process quality will increase the external stakeholder satisfaction when internal processes are addressed according to external stakeholder needs. Better quality reduces costs and makes operations more reliable.

Speed is usually understood how long the delivery will take until customer will receive it. Internally speed can be considered also from the inventory turnover rate or risk management point of view. Speed reduces the inventories if the entire supply chain will operate according to end customer needs. Speed in forecasting process is crucial. Long term forecasting is usually unreliable because of continuously changing markets and environment.

Dependability can mean that bus company operates constantly in time and all passengers will have always space enough. It means that product or service provided by the supplier is predictable. Usually dependability is the most valuable objective, and it can be seen above all the other customer values like quality, price or flexibility. Dependent operations are well planned and organized which saves time, money and means stable working environment.

Flexibility means operations ability to change their current plans and running activities. The change can be considered from the time, method and content point of view. The flexibility can be assessed from four different approach:

- Product/service flexibility: how operations can launch new products and services?
- Mix flexibility: which variety of products operations can produce?
- Volume flexibility: how operations can adjust its production volume according to changing customer needs?
- Delivery flexibility: how operations can reschedule its plans according to updated delivery dates?

Usually operations can build upon reliability based on the high process flexibility. Flexible operations can save time and decrease the response time in unpredictable occurrences.

Cost is the fifth operation performance objective. Every company is interested in its operations costs. Some of them competes the product or service price, another one just want to minimize costs to maximize profitability. Operation costs can be divided in three parts:

- Personnel costs: how much money spent for employees in operations?
- Facilities, technology and tools costs: how much money spent for the operations premises, technology and tools used in operations?
- Material costs: what is the purchasing spend for materials consumed in operations?

Operations cost control comes through other objectives: speed, quality, flexibility and dependability. (Slack et. al. 2001, p 45-57)

According to Meredith et. al. 2007 organizations established based on business needs can be considered from the operation subject areas point of view. Each subject area has its own notified role in the entire business and therefore can improve the customer satisfaction (see

Table 5). Assessment based on subject areas release to categorize activities into operations or non-operations.

Table 5. Actions to improve operations subject areas. (modified from Meredith et. al. 2007, p. 13)

Subject area	Key to success
1. Strategy	Decide the most valuable functions and how those will support the business mission
2. Output planning	Choose and design the attractive service and product offering
3. Transformation process design	Decide the process flow for transformation activities
4. Facility layout	Decide efficient material flow for transformation activities
5. Quality control	Decide how quality standards are to be maintained and developed
6. Reliability and maintenance	Decide how the performance of transformation system and output are maintained
7. Process improvement	Approve new process design techniques to improve flow and efficiency in production
8. Capacity planning	Decide the facility, equipment and labour timing and quantities
9. Facility location	Decide where to locate production, storage and other facilities
10. Schedule planning	Forecast the yearly need for labour, material and facilities by month, week or day within the year
11. Supply Chain Management	Organize the activities from the customer's order through final delivery for speed, quality, efficiency, flexibility and cost
12. Inventory Management	Decide the amount of material are work-in-process and finished goods to be hold
13. Enterprise and material requirements planning	Use ERP system to coordinate activities, specially ordering or producing materials to meet a master delivery schedule
14. Lean Management	Use Lean techniques and tools to minimize waste and nonvalue-added activities
15. Project management	Learn how to plan and control project activities to meet specifications for performance, schedule and cost

4.3 Risks

Meredith et.al. 2007 identified three major risks in operations management from system approach point of view:

1. **Sub optimization;** all system components needs to be smoothly connected to each other, supporting the entire system targets. This needs to be clarified specially in decision making processes, where risk of sub optimization is self-evident.
2. **System boundary definition;** Decision makers needs to understand at which part of system they can affect and what consequences will follow. Too wide boundary increase costs, takes more time and makes the changes more complicated.
3. **Lean on only tangible outputs;** company should always ask from themselves how they can “improve customer satisfaction”. If they are only measuring internal operations they would forget to concentrate developing operations based on the customer needs and improved ability to serve customers. (Meredith et. al. 2007, p. 6-7, 9-10)

Operations management consists many challenges as the business environment is ever-changing. Following challenges needs to be considered in operations management:

1. **Globalization:** Markets, resources, capital people and facilities has become global. The cost of transportation is mostly minor part of the unit cost and therefore customers can be reached anywhere. Time frame of decision making process is short which can move the factory location promptly.
2. **Just-in-time:** Net working capital is vital to company’s success. Entire supply chain management needs to have a same pace to secure just-in-time deliveries but minimize inventories in the chain.
3. **Partnering:** Suppliers needs to increase awareness from end customer needs. This can be done to build up by partnering with strategic suppliers.
4. **Agile product development:** Generally, product life cycles are shorter than in the past. Product development needs to be dynamically managed to respond rapidly changing product and service requirements.



5. **Mass customization:** Processes need to be designed to enable massive volumes but simultaneously customer specific requirements are increasing. That sets several requirements to optimize production strategy.
6. **Empowered employees:** The development and decision process is more trusted to individual workers, to people who are working in related area. Manager's role is more to facilitate and enable this to happen.
7. **Sustainability:** Products, processes and facilities should need to be developed in a sustained way. Business growth is not allowed to happen with environmental destruction.
8. **Ethics:** Ethical practices have an increasing valuable role for the company reputation and neglects can even demolish the business. (Heizer et. al. 2008, p. 13-14)

5 CASE COMPANY'S ENVIRONMENT

In this chapter the research will describe the case company and its environment. Then research will shortly introduce the case company's supplier base and its current supplier meeting and collaboration model. It is followed with the current supplier evaluation model and key performance indicators.

5.1 The company with its products and environment

ABB is a global industrial technology company which serves customers by offering innovative products and systems with services and software. ABB's history starts more than 130 years backward. ABB has around 136 000 people working around the world, in more than 100 countries. ABB's operations are globally located in 4 divisions, which are Electrification Products, Robotics and Motion, Industrial Automation and Power Grids. All divisions has its particular business units in specific industries and product categories.

Robotics and Motion division has 3 different business units called Drives, Motors and Generators and Robotics. This research is done to ABB Drives business unit. ABB Drives business unit offers products and applications to several different industries. ABB Drives has manufacturing sites in Europe, Asia, North America and South America.

Drives are designed to improve customer's process efficiency by adjusting the electrical frequency and voltage fed to the motor. Therefore, the motor would use only the energy which is necessary to sustain process (see figure 9 & 10). (ABB Group 2018)

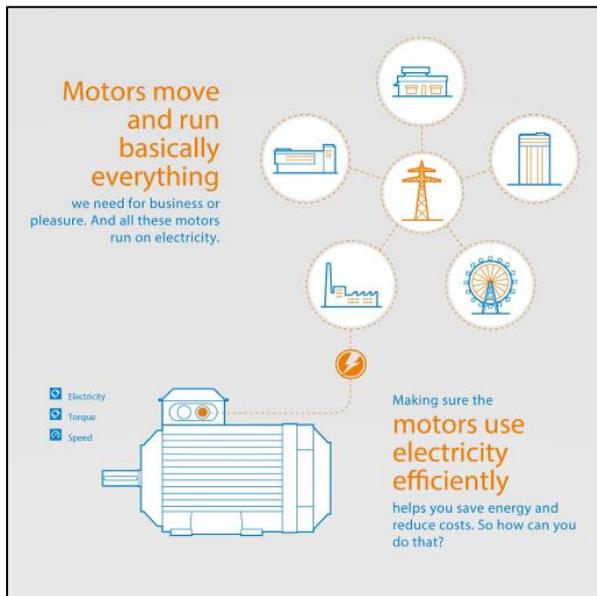


Figure 9. Basis need of Drives

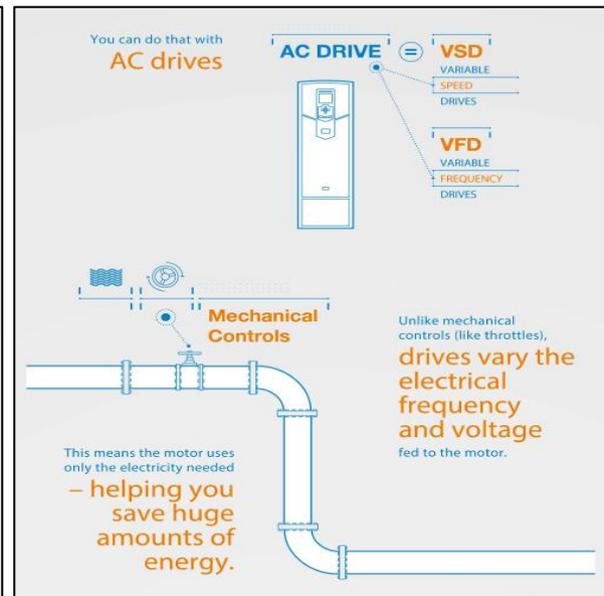


Figure 10. Drives functionality and benefits

5.2 The company's Supply Chain Management with its supplier base

In 2017 ABB Drives had more than 600 active supplies globally and total purchasing spend was hundreds of million dollars. Therefore, ABB Drives has six Electronics manufacturing service suppliers. Basically, EMS suppliers are defined as strategical suppliers, based on high purchasing spend and depth of collaboration. Some other suppliers would be also treated as strategic ones based on their criticality to ABB Drives business. But so far there is no official classification to strategic suppliers. (Interviews)

EMS operations deliver products either to regional distribution center (RDC) or ABB Drives factories where the final customer configuration will be done. RDCs has also the customer configuration center (CCC), in where the latest software update will be done. Therefore, customer shipments can be send out from ABB Drives site or RDC. ABB Drives has several own manufacturing sites globally, and they have their own site-specific supply chain management with the suppliers. The global material availability and supplier (including critical 2nd tier suppliers) contracts are coordinated by the Helsinki factory Global Supply Chain Management organization.

5.3 Supplier meetings and collaboration

Currently company does not identify commonly approved model for the strategic supplier management. Supply Chain Management organization coordinates the supply base and have the major responsibility into it. In addition to SCM organization also R&D, PE, management and nowadays EMS and RDC organisation has continuously activities with the strategic suppliers. Therefore, there is need to create common management model covered by all functions. (Interviews)



Figure 11. Current strategic supplier relationship meeting model

ABB Drives held bi-annually key supplier conference where all key suppliers are invited. That includes information related to business strategy and collaboration with future focus areas. SCM management have meetings with the strategic suppliers, sometimes together with the operations management or another function representatives. Sourcing category management has annually or bi-annually price negotiations. New product development sourcing team focuses new product costs and technology by the design and material decision.

Seasonal meetings are organised by purchasing and category managers quarterly or when needed. Operational meeting is held according to need from purchasing. This is the framework for current strategic supplier relationship model (see Figure 11). Many functions and people are included into the supplier collaboration and therefore the “big picture” of supplier management can be sometimes get lost. In addition, the way of working and meetings frequency can differ between the functions and depending the persons. (Interviews)

5.3.1 Supplier evaluation

Case company evaluates the strategic supplier performance in a quarterly basis. This is done in face to face or in video meetings. Evaluation has been prepared by the purchasing and category sourcing, added with other functions feedback when needed. Strategy supplier audits should be held at least bi-annually, but practise could be better followed. Quarterly meeting frequency does not meet nowadays changing business environment requirements. Although more frequently organised meetings could be shortened with proper preparations. (Interviews)

Evaluation target level for the suppliers is 90 points (see Table 6). If the grade is below 69 points, corrective actions must be defined and documented e.g. in the seasonal meeting. If the rating result has been below the trigger level (49 points) two quarters in a row, the supplier is classified as a problem supplier and either supplier re-audit according to SQP (supplier qualification process) must be performed or top management actions are required immediately from the supplier. (Interviews)

Table 6. Scale of supplier evaluation grades

Rating grades:	
90...100	Target level
80...89	Good
70...79	Fair
50...69	Unsatisfactory
0...49	Poor

Ratings is based on quality, availability and cooperation & development indicators (see Figure 12). Quality performance covers 40 points of total but with some materials 30 points when field quality is necessary to consider. Availability covers 40 points and is divided by on-

time delivery performance with 30 points and 10 points comes from the buffering performance. Cooperation and development is divided into 3 main sections: technical cooperation maximum 5 points, commercial cooperation maximum 10 points and development 5 points. The current model emphasizes the availability and quality indicator, and decrease the boost for collaboration development. (Interviews)

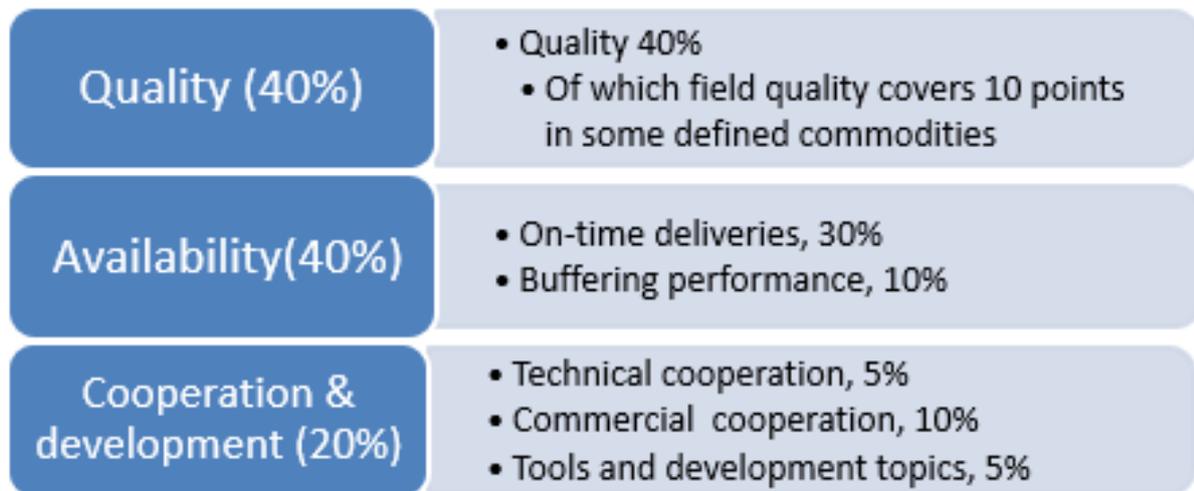


Figure 12. Current supplier evaluation indicators and allocation. (Interviews)

5.3.2 Key performance indicators

In addition to seasonally assessed supplier evaluation template case company is managing their supplier's performance by key performance indicators in a daily, weekly and monthly basis. Figure 13 below introduces the key performance indicators and the evaluation frequency of them.

KPI	Daily	Weekly	Monthly	Quarterly
1. Quality	X	X	X	X
2. On-time delivery		X	X	X
3. Open Late Orders	X	X		
4. Buffering performance	X	X	X	X
5. Purchasing lead-time			X	
6. Technical co-operation				X
7. Commercial cooperation				X
8. Tools & Development				X

Figure 13. Supplier key performance indicators with current management frequency

KPI's 1, 2, 4, 6, 7 and 8 are same as in seasonal meetings at quarterly basis. But quality differs in weekly basis as it focuses the number of open and closed notifications. Open late orders defines the percentage of current late purchase orders from the total number of open purchase orders. Purchasing lead-time is calculated using whether actual or planned lead time. (Interviews)

EMS management has the mentioned KPI's available but measurement is currently more one directional. Relationship and collaboration needs to be built upon interactive communication. The set of KPI's is also missing the flexibility, order intake, testing quality, development and forecasting metrics which are valuable for strategic supplier management. (Interviews)

6 PROPOSITION FOR THE CASE COMPANY

This chapter proposes with whom supplier case company should start strategic collaboration. Then chapter proposes the upgraded supplier relationship model and the dashboard for supplier operations management.

6.1 With whom supplier to start strategic collaboration?

According to Kraljic's segmentation strategic suppliers are sole sources and has a remarkable purchasing spend. With the strategic suppliers' company is assessed to develop partnership in order to minimize business risk and increase the business value from the collaboration.

ABB Drives' top 10 suppliers covers 50 % of the total purchasing spend (see Figure 14). More precisely top 5 suppliers cover the 36 % of the total purchasing spend.

Supplier Spend / percentage						
Notes about data format:						
Latest update						
Data source						
No	Supplier	Type of purchase	Nature of relationship	Kraljic's segmentation	Total spend percentage	
1	A	EMS + semifinished	Sole source	Strategic supplier	15%	
2	B	EMS + semifinished	Sole source	Strategic supplier	7%	
3	C	Semifinished	Multiple source	Leverage supplier	6%	
4	D	EMS + semifinished	Multiple source	Leverage supplier	4%	
5	E	Semifinished	Sole source	Strategic supplier	4%	
6	F	EMS	Single source	Leverage supplier	4%	
7	G	Semifinished	Multiple source	Leverage supplier	3%	
8	E	Component	Multiple source	Routine supplier	2%	
10	H	Component	Multiple source	Routine supplier	2%	
11	I	Component	Multiple source	Routine supplier	2%	

Figure 14. ABB Drives top 10 suppliers spend with Kraljics segmentation and nature of relationship. (Interviews)

It is worth to mention that top 10 suppliers does not include bottleneck suppliers in this research. In order to improve strategic supplier collaboration case company could also consider following actions:

With strategic suppliers A, B and E

1. Secure internal resource allocation to manage and develop the collaboration
2. Make another source available to share manufacturing capacity to improve market volatility responsiveness



3. Listen the supplier base carefully and create a process to share continuously best practices upstream and downstream
4. Consider doing corporate analyse - specially for the new sources

With leverage suppliers C, D, F and G

1. Try to adapt as many sources as possible to enable profitable competitive bidding
2. Readjust continuously inventories in the chain
3. Learn to see and understand warning signs – react immediately and prevent the root cause

With routine suppliers E, H, I

1. Be agile to change capacity between the suppliers – train them to live in continuously changing demand
2. Focus on demand forecast accuracy to supplier base
3. Monitor supplier operational performance continuously
4. Learn to see and understand warning signs – react immediately and prevent the root cause

6.2 Supplier meetings and collaboration

The strategic supplier meeting model could be updated as below (see Figure 15). The current seasonal meeting model could be replaced with the monthly business meeting. Monthly meeting would have more rapid frequency and therefore improved impact to actions and development activities follow-ups. The meeting could be more allocated to innovation discussions and actions follow-up, including shortened operational metrics review.



Figure 15. Proposed strategic supplier relationship model

Sourcing carries the internal ownership of each supplier, but many other functions have also continuous activities with the supplier. Account representative could be nominated for each strategic supplier to coordinate performance, strategy, collaboration, development and financial topics. Single point of contact could decrease the communication interfaces and improve the “big picture” view in the case company. Monthly business meetings could be chaired by the account representative.

6.3 Supplier evaluation

The strategic supplier evaluation allocation could be readjusted by increasing the value of cooperation and development into the 50 points (see Figure 16). Quality then maximum 30 points and availability maximum 20 points. Target for the change is to increase innovations in collaboration which could increase the profitability for both.

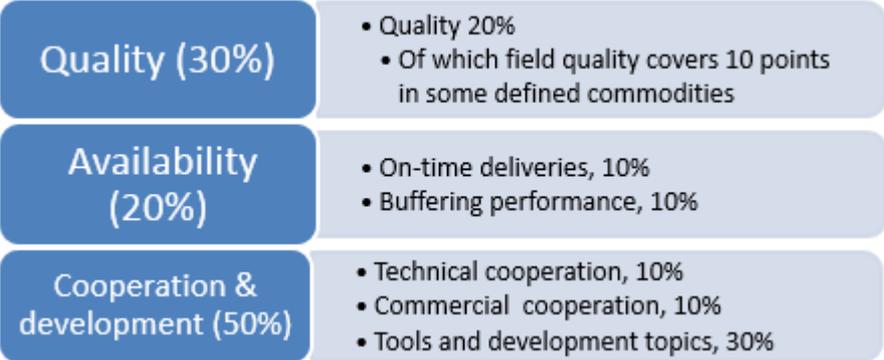


Figure 16. Proposed supplier evaluation indicators and allocation

6.4 Dashboard for strategy supplier operations management

Case company could increase the depth of collaboration to enable more mutual interaction. This could be applied by using real-time operational dashboard where inputs are gathered from the both parties (see Figure 17). This approach is done based on the EMS and R&D operations management needs to enable best possible view from the past, current and future collaboration. Power BI could be the platform for the tool.

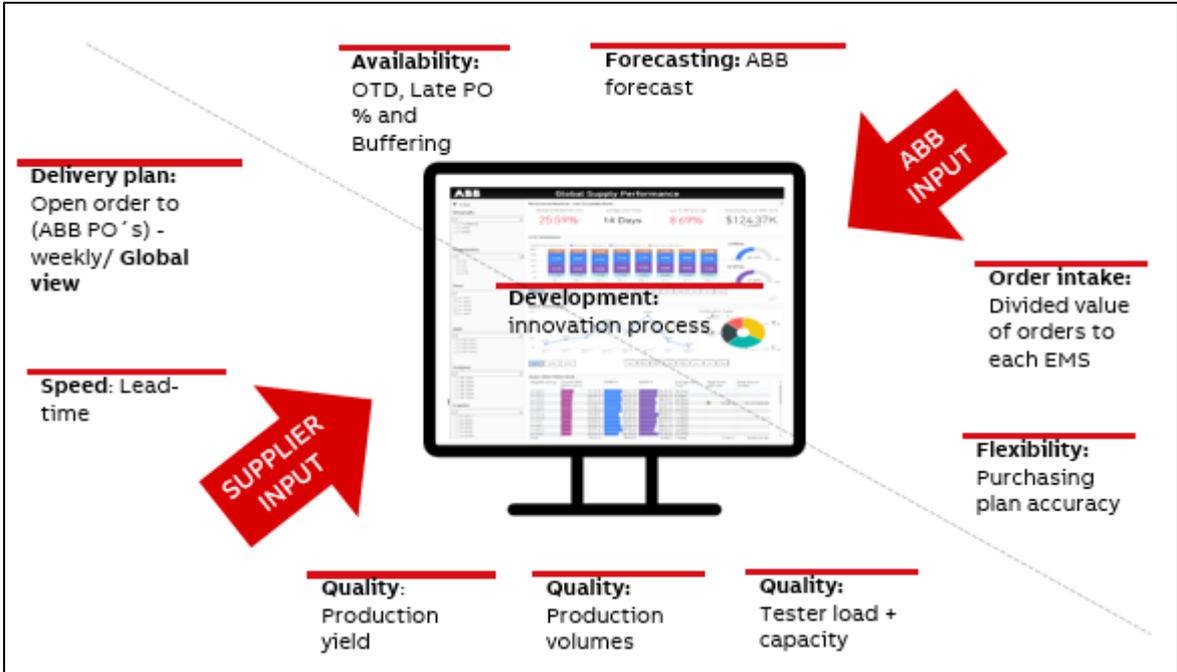


Figure 17. Proposed strategic supplier operational dashboard

Dashboard proposal consists five performance metrics that are from supplier's operations and one shared with the case company.

1. **Delivery plan** is the suppliers' delivery schedule in terms of delivery quantity and transportation method
2. **Lead time** is the duration used from the order receiving into the shipping
3. **Production yield** is the sum of good units and reworked units available for sale
4. **Production volumes** is the number of units produced in specific time
5. **Tester load** is the percentage of available capacity versus planned capacity

Innovation process should be the combined criteria as collaboration profitability can be increased only together. There is four metrics from the case company to be released in dashboard.

1. **Purchasing plan accuracy** is the accuracy of planned purchase orders versus released purchase orders
2. **Order intake** is the value of received orders, should be divided separately into each EMS supplier related operations
3. **Forecasting** is the case company's business forecast to supplier
4. **On-time delivery** is the ratio of goods delivered on time
5. **Late purchase order** percentage is the number of purchase order lines in late versus the total number of open purchase orders
6. **Buffering** is the fill rate of accepted materials in storage versus the current situation

6.5 Supplier's proposal for the collaboration

During the thesis there was opportunity to hold a workshop with one strategic supplier in order to find out key elements for success in collaboration (see Figure 18). Supplier proposed the following actions for profitable collaboration:

- Communication in different levels
 - o Ensure same understanding of actions in every organisational level
- Openness

- Cherish openness - do not hide the problems
- Attitude
 - Have win-win policy and push both forward
- Good co-operation
 - Find a way to do things – solve the problems
- Compatible tools
 - Invest money and resources to have compatible tools

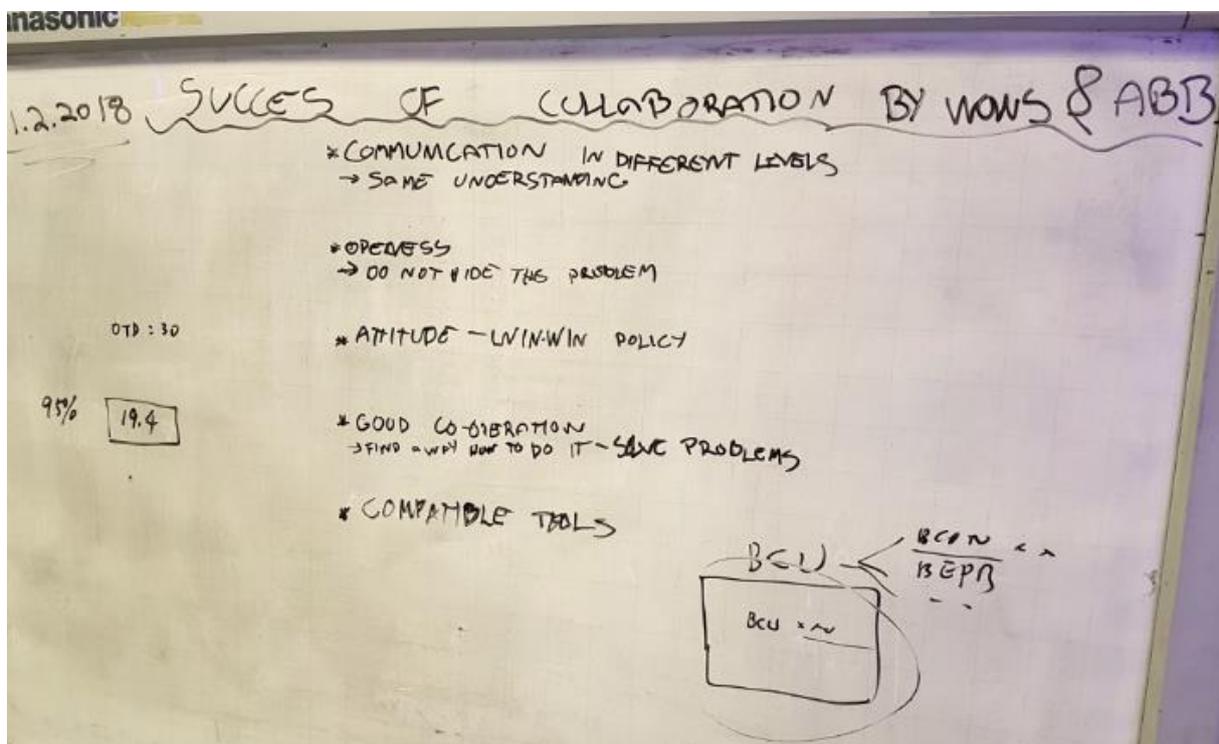


Figure 18. Supplier's proposals for successful collaboration

7 CONCLUSION

Companies outsource to increase the capacity. There is no unlimited capacity, and it is essential to take care of the forecast and planning process. Outsourcing should always increase the value of the entire supply chain. Longer contracts in collaboration can cause business risk when demand will decrease. It can be also a high risk when company is dependent on the capacity and knowledge, whether products are modular or integral.

The buyer-supplier relationship can be measured with the financial and non-financial metrics. The closer collaboration companies have, the more important is to follow non-financial metrics. For example, the number of innovation released and profits gained from them, is one of the main metrics in longer collaboration. Quality needs to be measured from the customer's point of view. Total cost of ownership is the main value in purchasing costs. The supplier capability requirements vary depending the industry you are working with. Process industry requires remarkable capacity flexibility and project industry needs more shared technical innovations from the supplier base.

Kraljic's segmentation model assists to categorise supplier base in terms of purchasing strategic importance and complexity of the market. It is one approach to specify business critical suppliers, with whom to increase collaboration. Operational management is one of the key functions in organisation. It causes lot of expenses but can be the competitive advantage. Successful operations management requires continuous improvement actions into the process, based on the data gathered. Process metrics needs to be addressed based on the customer needs and constantly re-evaluate with the stakeholders. Sub optimization is self-evident but needs to be minimized.

Proposition chapter for the case company includes several improvements for supplier collaboration. Some of the propositions needs more planning and resources than the others. On the other hand, usually reorganising will release resources from the side. Warning signs follow-ups, open and continuous daily discussion with proactive manner in a relationship is a proper way to control risks with strategic suppliers. Account representative nomination should be considered to enable better "big picture" view for the case company. This can be also stated based on the strategic supplier proposition, to enable same understanding of things in



every organisational level. Quarterly meetings need to be shortened and organised monthly. This would improve supply chain management responsiveness for rapidly changing market requirements. The supplier collaboration value should be more followed based the number of innovations created. This requires readjustment for current supplier indicator allocation.

Current set of KPI's needs to be fulfilled with flexibility, order intake, testing quality, development and forecasting metrics. That enables better "big picture" view for the case company and makes interaction with the strategic supplier more intense. This can be precisely assessed to EMS management needs.

8 SUMMARY

These days, the importance of supply chain management increases. The excellence of supply chain management can be the company's competitive advantage. This research highlighted the business criticality of strategic supplier collaboration and strategic supplier measurement.

This thesis main research question was:

1. How case company can establish successful operational collaboration with its strategic suppliers?

And the main research question was divided into several sub-questions:

2. What are the measurable benefits of supplier collaboration?

3. What risks exists in outsourcing and strategic supplier collaboration?

4. With whom supplier's case company should proceed into the collaboration?

5. What kind of operational dashboard case company should create with its strategic suppliers?

Logistics costs has a remarkable effect to the company's ROI. Therefore, the company's supplier selection is a business strategic decision. The robust supplier base makes companies stronger and the supply chain more flexible. Successful strategic supplier collaboration is about the integrated operation and delivery scheduling, improved quality, shared innovations and reduced costs. It can be done only with the trust and commitment in a relationship. Buyer's and supplier's operations needs to be planned and run simultaneously. Collaboration measurement needs to be challenging, interactive and systematically reassessed.

Purchasing portfolio definition helps company to prioritize resources and specify the most critical suppliers. Otherwise supply chain management function would decrease its profitability by just managing the unpredictable occurrences from the supply base. Listening carefully the supply base could be as important as listening the voice of the customer. Strategic suppliers need special attention with focused resources. Collaboration with



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reliability and commitment can generate innovations and therefore increase profitability for both.

Buyer and supplier needs to understand that we can increase the customer value only together. This is the approach also to control and minimize collaboration risks, which needs to be understood, written down and followed-up together.

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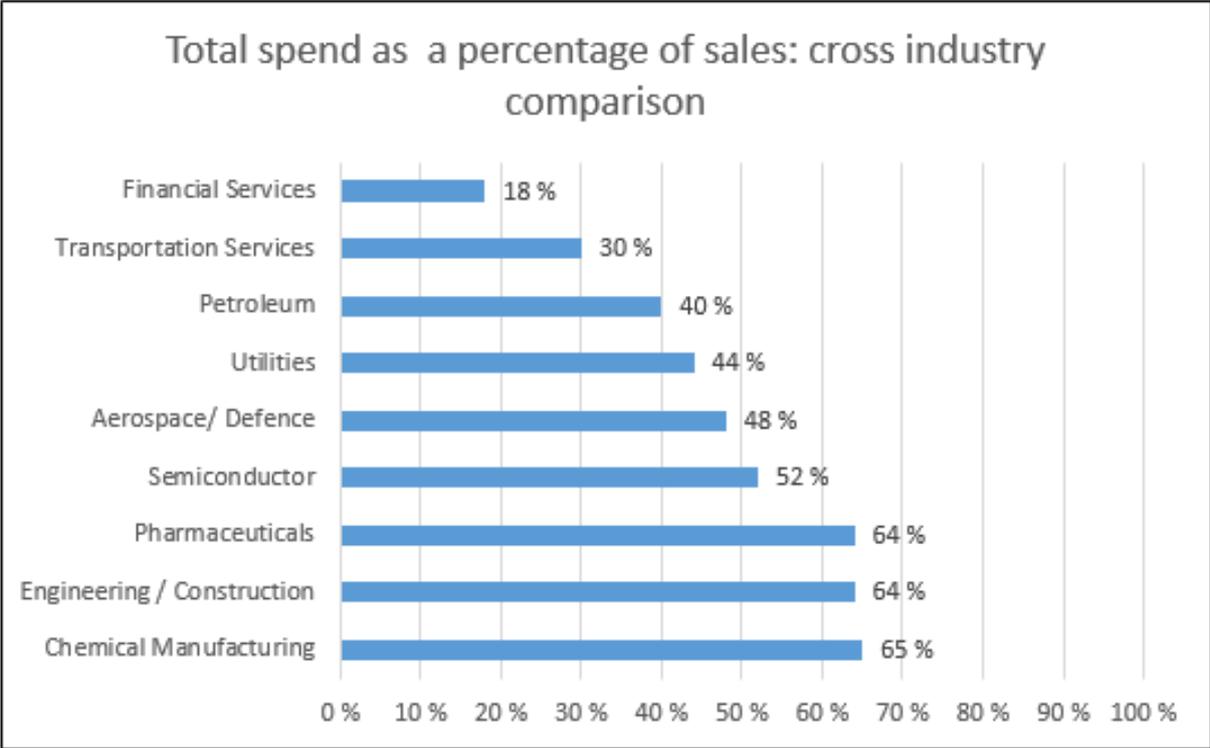
INTERVIEWS

Company	Job title	Date
ABB Drives	Local Product Group Manager	13.12.2017
ABB Drives	Operations manager, EMS & RDC, PG Low Power Drives	13.12.2017
ABB Drives	Global Category Manager Electrical	21.12.2017
ABB Drives	Global Product Engineering Manager, PG Low Power Drives	28.12.2017
ABB Drives	Division Value Chain Manager, RM Division	28.12.2017
ABB Drives	Design Manager, Product testing and subcontractors, Low Power Drives	4.1.2018
Wong´s Electronics Holdings Company Limited	Project Manager	1.2.2018
Wong´s Electronics Holdings Company Limited	Customer Relationship Management	1.2.2018
Nokia Oy	Vice President, Supply Network & Engineering	20.3.2018

APPENDICES

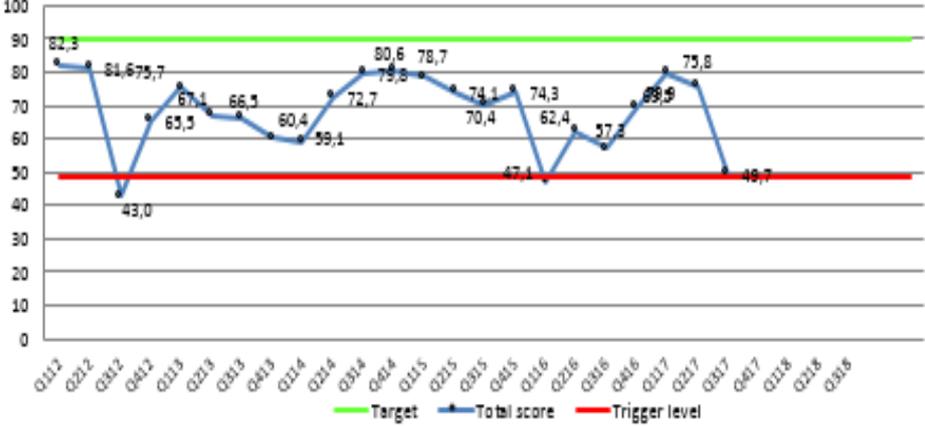
Appendix 1. Procurement proportion of spend relation to sales

Procurement proportion of spend relation to sales. (Mena et al 2014, p. 4)



Appendix 2. Supplier evaluation template

Supplier evaluation template. (ABB Drives)

ABB LV Drives		SUPPLIER PERFORMANCE RATING																																																												
Template prepared by	Date	Approved by	Rev. A																																																											
One	Another	One another	Yes																																																											
Supplier	X			Rating grades: <table border="1"> <tr><td>90_100</td><td>Target level</td></tr> <tr><td>80_89</td><td>Good</td></tr> <tr><td>70...79</td><td>Fair</td></tr> <tr><td>50...69</td><td>Unsatisfactory</td></tr> <tr><td>0_49</td><td>Poor</td></tr> </table>	90_100	Target level	80_89	Good	70...79	Fair	50...69	Unsatisfactory	0_49	Poor																																																
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Rating about	Components																																																													
Rated by (LBU's)	Helsinki																																																													
Rated by	Purchasing, sourcing, production, PE, R&D																																																													
Date	9.10.2017																																																													
SUMMARY																																																														
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Rating history																																																														
 <table border="1"> <caption>Rating History Data</caption> <thead> <tr> <th>Quarter</th> <th>Total score</th> </tr> </thead> <tbody> <tr><td>Q112</td><td>82,3</td></tr> <tr><td>Q212</td><td>81,6</td></tr> <tr><td>Q312</td><td>43,0</td></tr> <tr><td>Q412</td><td>75,7</td></tr> <tr><td>Q113</td><td>67,1</td></tr> <tr><td>Q213</td><td>63,3</td></tr> <tr><td>Q313</td><td>66,3</td></tr> <tr><td>Q413</td><td>60,4</td></tr> <tr><td>Q114</td><td>59,1</td></tr> <tr><td>Q214</td><td>72,7</td></tr> <tr><td>Q314</td><td>80,6</td></tr> <tr><td>Q414</td><td>79,8</td></tr> <tr><td>Q115</td><td>78,7</td></tr> <tr><td>Q215</td><td>74,1</td></tr> <tr><td>Q315</td><td>70,4</td></tr> <tr><td>Q415</td><td>74,3</td></tr> <tr><td>Q116</td><td>47,1</td></tr> <tr><td>Q216</td><td>62,4</td></tr> <tr><td>Q316</td><td>27,3</td></tr> <tr><td>Q416</td><td>89,9</td></tr> <tr><td>Q117</td><td>75,8</td></tr> <tr><td>Q217</td><td>49,7</td></tr> <tr><td>Q317</td><td>49,7</td></tr> <tr><td>Q417</td><td></td></tr> <tr><td>Q118</td><td></td></tr> <tr><td>Q218</td><td></td></tr> <tr><td>Q318</td><td></td></tr> </tbody> </table>							Quarter	Total score	Q112	82,3	Q212	81,6	Q312	43,0	Q412	75,7	Q113	67,1	Q213	63,3	Q313	66,3	Q413	60,4	Q114	59,1	Q214	72,7	Q314	80,6	Q414	79,8	Q115	78,7	Q215	74,1	Q315	70,4	Q415	74,3	Q116	47,1	Q216	62,4	Q316	27,3	Q416	89,9	Q117	75,8	Q217	49,7	Q317	49,7	Q417		Q118		Q218		Q318	
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Appendix 3. An executive summary of corporate analysis

An executive summary of corporate analysis. (Östring 2004, p. 38)

A	EXECUTIVE SUMMARY Recommendations Strengths, Weaknesses, Opportunities, and Threats (SWOT) Conclusions Risk rating
B	ENVIRONMENT Country Political environment Regulatory environment Market Customers Suppliers and logistics Competitors
C	COMPANY Strategy Company life cycle Technology Ownership Corporate structure —Holding company —Subsidiary Organization Management Acquisitions and mergers
D	FINANCIAL ANALYSIS Financial statements Key ratios Forecast