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Master's Thesis

UTILIZING PURCHASING PORTFOLIO TOOLS IN A FAST-GROWING MANUFACTURING COMPANY'S PROCUREMENT

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ABSTRACT

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The aim of this thesis is to research how supplier segmentation and purchasing portfolio tools can be utilized in a manufacturing company and how these tools can be used in assessing the current state of supply management actions.

The framework is built up by presenting supplier segmentation's role in a company's strategic procurement as an information gathering tool that can be used in modelling the current state of a supplier base. After this, four different purchasing portfolio tools which all have a different approach towards the topic are presented in the theory section.

The methodology section is based on a quantitative analysis conducted of supplier data gathered from a case company's ERP-system. Based on this data, the Kraljic's purchasing portfolio matrix is formed and with help of the analyses of variance it is tested if portfolio categories explain supplier quality.

The results of the study indicate that categories themselves do not explain supplier quality. The most important benefit of purchasing portfolio tools seems to be the forming process itself. It provides company executives valuable information of the buyer-supplier relationships formed in the supplier portfolio.

TIIVISTELMÄ

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Tämän pro-gradu tutkielman tarkoituksena on tutkia miten toimittajasegmentointia ja ostoportfoliotyökaluja voidaan hyödyntää valmistavan teollisuuden yrityksessä, ja miten strategisen hankinnan nykytilaa voidaan arvioida näiden työkalujen avulla.

Tutkimuksen viitekehys alustetaan esittelemällä toimittajasegmentoinnin rooli osana strategista hankintaa informaationkeräämistyökaluna jota voidaan käyttää toimittajaportfolion nykytilan mallintamisessa. Tutkimuksen teoriaosuudessa esitellään neljä eri ostoportfoliotyökalua jotka esittelevät neljä erilista tapaa portfolioida hankintoja.

Tutkimuksen metodoliogia-osuus perustuu kvantitatiiviseen analyysiin joka tehdään case-yrityksen toiminnanohjausjärjestelmästä kerätyn toimittajadatan avulla. Toimittajadataa hyväksikäyttäen muodostetaan Kraljicin hankintamatriisi, jota testataan varianssianalyysin avulla. Testin tarkoituksena on selvittää toimittajakategorian ja toimittajalaadun välistä yhteyttä. Testin perusteella toimittajakategoria ei kykene itsessään selittämään toimittajalaatua. Tutkielmassa kuitenkin havaittiin, että toimittajaportfolioinnin hyöty on portfoliointoprosessi itsessään, sillä sen läpivieminen tarjoaa yrityksen päättäjille arvokasta tietoa yrityksen toimittajaportfolion nykytilasta.

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Writing this thesis besides full time work has been a challenge that was bigger than I expected when I began this project. The support of friends, family and colleagues combined with their endless questions regarding the progress of my thesis project helped me push forward when the motivation was not on the highest possible level.

Now when I have almost graduated, it is a good time to look back on my studies at LUT. I would like to especially thank Veli Matti Virolainen, Jukka Hallikas and Katrina Lintukangas for excellent education that I believe is priceless during my future career.

My time at LUT was however not only studying. I am very grateful of the friends and unforgettable moments the years at Lappeenranta provided me.

Now it's the time to head towards new challenges!

In Helsinki, 27th of September 2018.

Kristian Kähärä

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1. Introduction

Successful supply management is one of the most important activities in a manufacturing company in terms of cost controlling and securing of on-time deliveries. As a business function it also contributes largely in transforming the knowledge and knowhow of a manufacturing company's suppliers into customer value for the company's end-customers.

Traditionally supply management has been seen as an operational function which most important task is operational everyday purchasing. However, because of the vast potential of the business function, this kind of approach is not enough if a company wants to fully utilize the sources of competitive advantage supply management could provide it.

On a highly competitive market where only the best and strongest companies survive, wasting a source of customer value and competitive advantage could be described from the management point of view as very risky and almost stupid.

During recent years a growing number of companies have understood the potential of supply management and started to transform the operational purchasing into a more strategically oriented business function. The first steps in this process is normally to understand the suppliers' value for the company as key stakeholders which are the source of a great amount of know-how that can be transformed into end-customer value with skilful management activities. This step requires that companies reject the mindset of seeing suppliers only as sources of costs that needs to be reduced. This mindset often also includes that supply management activities are limited to activities that are aiming for cost reductions with any price.

Companies' have to move towards actions that make sure that the suppliers also benefit from the relationship between the buyer and the supplier. This is the only sustainable base for supply management since companies cannot afford their most important suppliers to leave the market and stop delivering their products or services that the buyer company needs for its own processes. However, research has found out that partnerships with key suppliers are not enough on the modern global

supplier market but instead buyers need to compete of key supplier resources against each other.

1.1 Objectives and research questions

The objectives of this thesis is to study how purchasing portfolio models could be utilized in a small and medium sized manufacturing company. Especially small industrial companies are facing the problem of resource allocation to strategic supply management. A company might recognize the value of supply management and it might be aware of that the current situation related to supply management is not on a sustainable base but on the same time the company is struggling with a continuous lack of resources. Therefore, especially small companies need a simple tool that can be used to find out the most obvious cases where small actions can improve the performance of the supply base or reduce the risk related to the suppliers.

The main interest is to study what kind of purchasing portfolio models the literature provides and how can the information created with help of them be utilized for customer value creation. Based on this the main research question of this thesis is:

How can information provided by purchasing portfolio tools be utilized in value creation?

This main research question is complemented with two sub research questions:

How can information provided by purchasing portfolio tools be utilized in assessing the current state of supply management actions?

What kind of dependencies can be found between supplier quality and purchasing portfolio tool categories?

The sub research questions are interesting because of the resource allocation problem mentioned earlier. Especially small companies might not be able to allocate resources for management of every purchasing portfolio category. Therefore, they need to select where to allocate the limited resources. The aim with the second sub

research question is to find out if belonging to a purchasing portfolio category has a statistic effect on supplier performance in terms of quality.

If it can be shown that belonging to a purchasing portfolio category does not have an effect on supplier performance, then the information provided by purchasing portfolio tools can be used for assessing the impact of supply management actions considering that the allocation of supply management actions are not allocated to the whole portfolio. If the quality performance of suppliers in categories to which supply management actions have been allocated is not statistically any better than the categories to which supply management action has not been allocated, a company might ask if there is something wrong with the supply management activities it is taking or is there something in the buyer-supplier relations that makes the category perform badly compared to other categories.

As a conclusion, the first objective of this thesis is to present different purchasing portfolio tools the literature is providing and how these tools can be utilized in creating an optimal supplier base.

The second objective is to study how information created with help of purchasing portfolio tools can be utilized in order to assess the effectiveness of current supply management actions. To this objective also belongs to find out how the same information can be used to explain what factors in the buyer-supplier relationship are causing the variance in supplier quality performance between different purchasing portfolio categories in the case that the categories themselves don't explain the variance statistically.

1.2 Limitations of the study

Many researchers see purchasing portfolio tools and supplier development as a pair that are closely related to each other. This thesis focuses only on the purchasing portfolio part which means that supplier development is limited out from this thesis.

Another limitation considers the definition of supplier performance. In this thesis it is measured only with on-time delivery performance. This means that all the other

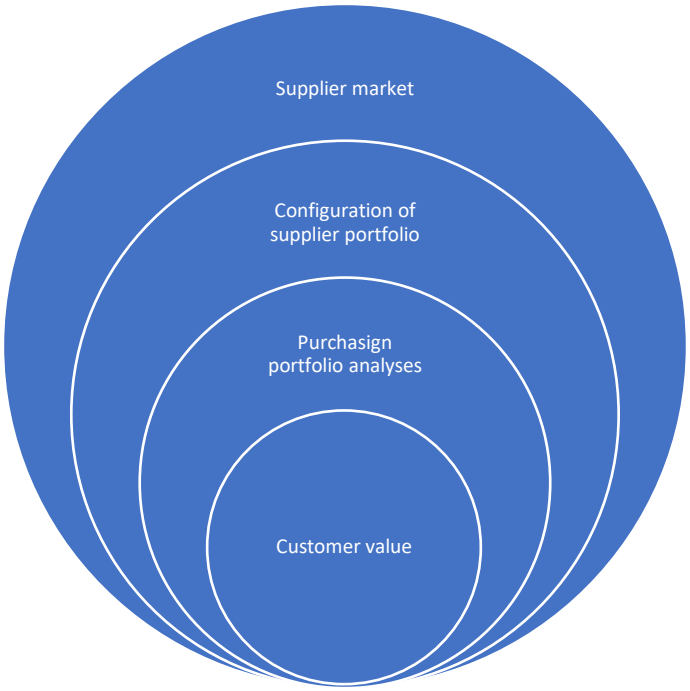
common measures of supplier performance like price and defect ratios are left outside of this thesis.

The third limitation considers the purchasing portfolio tools presented in this thesis. Four different purchasing portfolio tools are presented in the second chapter of this theses. Literature of many other portfolio tools exist, but in order to keep the scope of this thesis limited only four of them were chosen to this thesis. In two of the selected portfolio tools the focus point is in the purchased items whereas the other two portfolio tools focus on the supplier relationships of the buyer.

The fourth limitation considers the purchasing portfolio tools utilized in the methodology chapter of this thesis. Only the Kralic's matrix is formed mainly because of issues related to measurement of the dimensions of the other portfolio tools presented in chapter two. The supplier data available at the case company puts some limitations to what purchasing portfolio tools can be formed. Collecting enough new data for forming the other presented portfolio tools would require more time that is sensible to use in this thesis project.

1.3 The conceptual framework

The conceptual framework is presented in the picture below.



Picture 2. The conceptual framework

The conceptual framework tries to visualize that the customer value creation process where supply management is involved starts from the supplier market that is currently available. The available supplier market is the bottom-line for value creation in the buyer-supplier relationships. Buying companies needs to identify the most potential buyer-supplier relationships that can be used for creating customer value. This is where the configuration of the supplier base comes in. On the way towards supplier-relation based customer value companies need to optimize their supplier base in order to the maximize their received customer value.

Purchasing portfolio analyses are presented one level lower than the supplier base configuration in the conceptual framework since it is used to provide more

information to the configuration process and because of this it is one step closer the destination, received customer value.

1.4 Research method and data collection

The research will be a case study of the company where the writer is working. As main data is used ERP data of approximately 100 suppliers which contains the total yearly spend of a supplier, number of items delivered, on-time delivery percentage, payment term and the current validity of possible frame agreements.

The research questions will be answered by utilizing purchasing portfolio tools to the data. The supplier-relations of the case company are going to be placed to the Kraljic's matrix. After this ANOVA is conducted in order to find out if there is a significant difference in the performance of the suppliers in each category. The performance of a supplier is measured in this thesis with on-time delivery performance.

In order to be able to place the suppliers in the matrix the writer needs an extensive understanding of the supplier base used in the case company. The understanding is gained by using observation as a second data collection method. This method is possible since the writer has been working for the case company for approximately a year at the time of this thesis project.

1.5 Key concepts

The key concepts used in this thesis are listed and defined below in this sub-chapter.

Buyer-supplier relationship

A mutual, two-way, involved exchange between buyer and supplier (O'Toole & Donaldson, 2002). O'Toole & Donaldson (2002) however add to this that the

definition is an ideal condition and that it is widely accepted that this ideal is not achieved in every case.

Supplier segmentation

“A process that involves dividing suppliers into distinct groups with different needs, characteristics or behaviors, requiring different types of inter-firm relationship structures in order to realize value from exchange.” (Day et al. 2010)

Purchasing portfolio tool

“A diagnosing and analysis tool that has a prescriptive nature and is capable of identifying different classes of items” (Medeiros & Ferrera, 2018).

As can be seen from the definitions of a purchasing portfolio tool and supplier selection, even though these two concepts are closely related to each other their meanings are slightly different. Supplier segmentation can be described as a process which is more strategic of its nature whereas a purchasing portfolio tool is an individual tool that can be used for supplier segmentation.

2. Supplier segmentation in capturing supplier value

In this chapter supplier segmentation's role in value creation is explained. To be able to dive deeper into the topic, a definition of supplier value is needed. As supplier value and measurement of supplier performance are closely related, this chapter begins with an explanation of these two concepts.

This is followed by an introduction to competition of supplier resources and the problem of resource allocation. These two concepts are important in understanding the need for supplier segmentation in the supplier base configuration process and that value bringing suppliers cannot be taken as granted on the modern competitive supplier market.

Chatain (2011) proposes that there are three components of interest in value creation in buyer-supplier relationships. These components are service or product line capability, client-specific knowledge, and client-specific economies of scope. Of these three the product line capability is the baseline capability for supplier's capability to create value since it represents the supplier's overall capabilities of delivering the buyer the wanted products or services.

Client-specific knowledge complements the product line capability since it enables the supplier to better customize its products to fit better the buyer's needs. To some extent, suppliers can use freely available knowledge to increase their capabilities in client-specific knowledge. In the long run it is clear how ever that close relations between the buyer and the supplier are needed if the client-specific knowledge is wanted to be improved. The close relations can be used for sharing information about confidential or otherwise unadvertised aspects of the buyer's business that the supplier can take into consideration when tailoring its products for the buyer's needs. (Chatain, 2011)

The last component, the client-specific economies of scope is quite closely related to the client specific knowledge. Normally economics of scope is understood from the production point of view in which it is achieved when same products can be produced in larger scale regardless to who they are sold. The client-specific economies of scope are however achieved when products are sold in larger scale

for one customer. Chatain and Zemsky (2007) defines the client-specific economies of scope as value that is achieved of using only one supplier. This definition includes also the value that exceeds the direct savings of transaction costs that are achieved when buying only from one source.

In a wider perspective, Chatain's explanations on supplier value is an implication of the resource-based view which is a theoretical concept explaining how competitive advantage can be created through value. Kraajienbrink et al. (2010) states that received value can be transformed into sustainable competitive advantage inside a company.

According to Barney (1991) the sources of competitive advantage comes from a firm's resources that are valuable, rare, hard to copy and which cannot be substituted. The main point here is that sustainable competitive advantage is attained only when the company have access to resources that its competitors cannot utilize.

Valuable resources can be defined as resources that help a company to implement strategies that improve its efficiency and effectiveness. It is easy to understand that valuable resources alone cannot create sustainable competitive advantage or even competitive advantage because competing firm's probably also want to utilize these valuable resources. This means that the resources must be also rare. If a company manages to utilize resources that are both valuable and rare it is much less likely that competing firms can gain access to the same valuable and rare resources. (Barney, 1991)

If a firm holds valuable and rare resources that other companies cannot obtain, the holder of these resources may achieve competitive advantage from the first-mover advantage. However, the first mover advantage is not sustainable if other companies are able to easily copy the resources that are more advanced that their own ones. (Barney, 1991)

The last requirement for resources creating sustainable competitive advantage is that there must be no strategically equivalent resources that are themselves either not rare or hard to copy. If these conditions are not filled the competitive advantage

achieved from the resource is not on a sustainable base since other companies are also able to take advantage from these resources. (Barney, 1991)

McWilliams and Siegel (2010) sees some problems in Barneys (1991) paper. According to their view Barney remains silent on the issue of how companies should recognize which resources are valuable and how can they know which resources can be transferred into sustainable competitive advantage. Another issue they raise is how much is it sensible to pay for these resources. They answer this question with a statement that in order for a resource to be sensible as a source of sustainable competitive advantage, the revenue caused by the resource must be higher than the cost of the resource. Of course, this is only the financial side. The other requirements presented by Barney (1991) must also be fulfilled if sustainable competitive advantage is wanted to be achieved from a resource.

2.1 Measuring supplier performance

According to Hald and Ellagaard (2010) supplier performance has traditionally been measured with a very limited variety of measures considering basic financial and technical performance data. In other words, traditional supplier performance measures fail to measure accurately the dyadic relation between the buyer and the supplier. They found out in their study that often companies are concentrated in measuring total cost development, on time delivery performance and quality with different measures like defect ratios. The same research showed that these same companies also have included soft values like co-operation and environment to their set of measurement, but that attention is not paid in the evaluation meetings to these measures as much as it is paid to the measures with a link to short term financial performance.

Dumond (1994) found out that different measures produce different procurement manager decisions. The problem here is that buyer companies define with their selected set of supplier performance measures what kind of suppliers they want. Hald and Ellagaard (2010) ads to this that the supplier measurement process itself explains in some extension the performance of the supplier. In other words, if

companies fail to measure their suppliers keeping in mind the core value the supplier is bringing, they might get false results of the performance of their suppliers and even worse, they can encourage their suppliers to develop their performance to a direction that actually weakens the supplier's ability to create value for the buyer.

2.2 Competition of supplier resources

Accoridng to Pulles et al. (2016a) collaboration with suppliers is not enough on the modern market to make sure maximal competitive advantage is captured from the buyer-supplier relations. This is because the resources of the suppliers are limited, and buyers are competing against each other for these resources. This leads to a situation where some buyers get better resources allocated from the supplier than others (Takeashi, 2001).

Pulles et al. (2016a) found out that buyers with strong selection- and relational capabilities are more likely to gain a competitive advantage from the supplier relations than their competitors with smaller capabilities. They define selection capability in their paper as a capability to recognize valuable cooperation opportunities from the supplier base where as relational capability is defined as a capability to form an effective relation that facilitates resource exchange. Their paper shows that managers should pay attention to the indirect capabilities of the buying firm. In other words, Pulles et al. (2016a) challenges the managers to pay closer attention to a firm's inner capabilities in the competition of sources of competitive advantage.

Pulles et al. (2016b) researched in their article ways of how buyers can become preferred buyers for suppliers on a competed supplier resource market. A preferred buyer is defined as a buyer to whom a supplier allocates better resources than to a less preferred one (Schiele et al., 2012).

Pulles et al. (2016b) found out two concepts that play a crucial role for a company aiming to become a preferred buyer: customer attractiveness and supplier satisfaction. A customer is seen attractive by a supplier if the supplier has a positive expectation towards the relationship whit this customer in the future (Schiele et al.,

2012), or as Ramsay and Wagner (2009) puts it: when buyers show interests towards the products or services of a supplier, the supplier run a series of calculations in order to find out the potential the buyer is representing. If the magnitude of the potential supplier value is big enough the supplier decides to collaborate with the buyer. In other words, supplier resources are allocated to the buyer who can present the supplier the most attractive development plan for the future and in that way bring the most added value or supplier value for the supplier. Ramsay (2005) defines supplier value as a benefit a supplier receives from an interaction with a specified buyer.

The other key component in becoming a preferred buyer is supplier satisfaction. This concept is closely related to customer attractiveness. A supplier is satisfied when it perceives a feeling of equity or fulfilment when the anticipated future supplier value is received (Benton & Maloni, 2005). As can be seen from the definitions the one cannot be achieved without the other. Supplier satisfaction can according to Schiel et al. (2012) be seen as a condition that is achieved if the quality of outcomes from a supplier relationship meets or exceeds the supplier's expectations. Because supplier satisfaction is based on the perceived value, buyers should strive to create a feeling of fulfilment with regard to the suppliers' investments to the relations (Essig & Amann, 2009). If suppliers perceive value from the supplier-buyer relationship they may also have a feeling of equity in the relation even if the actual power balance of the relation would be imbalanced (Benton & Maloni, 2005).

Pulles et al. (2016b) recognized in their paper dimensions that describe the concepts of the customer attractiveness and supplier satisfaction. They built a table of indicators that are reflecting the dimensions that are bringing most value to the concepts. The indicators are presented in table 1.

Customer attractiveness	Supplier satisfaction
This customer is known for its open and quick information sharing	This customer accounts for a large share in our turnover
This customer is known to create win–win situations	This customer pays high prices to us
This customer is of substantial size	Trust matters more for this customer than direct profits in the relationship with us
This customer compensates suppliers for taking risks	This customer guarantees a continuous income flow
This customer is known for the short time between offer to actual sale	This customer helps us to innovate
Trust matters more for this customer than direct profits in the relationship with us	This customer manages realistic expectations
This customer is present in growth markets	This customer's top-management commits itself to the relationship with us by being accessible to us
	There is a chemistry between our and this customer's acting people

Table 1 Indicators of customer attractiveness and supplier satisfaction (Pulles et al. 2016b).

Benton & Maloni (2005) found out that main reasons why companies fail to bring supplier satisfaction to their buyer- supplier relations are problems in the management of supply chain. They understood that reasons that lead to supply management to fail in companies are often:

- Failure to share information
- Fear of loss of control
- Lack of self-awareness
- Lack of partner awareness
- Enormity of supply chain
- Lack of supply chain satisfaction
- Lack of customer understanding
- Lack of understanding of supply chain
- Too short-term strategy
- Lack of mutuality

Many of these reasons occur because effective supply chain management requires managers to share information with suppliers that traditionally is kept strictly inside the buying company. However, if companies want their supply management to bring them the maximal value they need to understand the modern requirements for supply chains to succeed. A manufacturing company is not able to serve its customers in a best possible way if its suppliers are not satisfied to the relation. And even though the suppliers would be satisfied with the relations the manufacturer is not able to transfer the benefits to its customers if the whole supply chain is not aiming towards the same strategic goals which is the reason why an extensive level of information sharing is needed between the members in the supply chain. (Benton & Maloni, 2005)

Like Pulles et al. (2016b) also Benton and Maloni (2005) researched in their paper what is bringing supplier satisfaction to the buyer-supplier relationship. They found out that suppliers are satisfied when they have a feeling of that the buyer-supplier relationship is working. What was a bit surprising was that the performance of the buyer or the supplier alone didn't seem to have an effect on the experienced supplier satisfaction. In other words, companies that are striving towards supplier satisfaction should be focusing on relationship driven supply chain strategies rather than on performance-based strategies.

2.3 The problem of resource allocation

In real life business, the problem with dyadic buyer-supplier relations is the vast amount of relations companies might have. For example, the company that is used as a case-company in this thesis has almost 100 suppliers and therefore almost 100 buyer-suppliers relations. The obvious problem is how to allocate limited procurement resources for managing these relations. Especially small and medium sized companies might find it difficult to allocate any resources to strategic supply management since all resources are allocated to the needs of operational everyday purchasing. Of course, this might look like the best solution in the shorth run, but these companies should remember that this solution might back fire in the long run

and find ways how to allocate resources to manage the most important buyer-supplier relations.

The next obvious question is how companies can identify the supplier-buyer relations where the biggest potential for competitive advantage lies in. By solving this question companies are able to capture the easiest sources of competitive advantage from the buyer-supplier relations with rather small resources. One solution that is provided by the literature for this problem is supplier portfolio management.

Wagner and Johnson (2004) define supplier portfolio management as the management of an array of supplier relationships that are each having various characteristics and serving the firm in different ways. Companies implementing supplier portfolio management are not managing their supplier relations individually, but as a set, at the same time as they are developing a portfolio of supplier relations that lead to an optimized supplier base for the company.

According to Wagner and Johnson (2004) a firm's supplier portfolio consists of all the buyer-supplier relationships the company is involved in. To some extent the portfolios evolve naturally over time and the different relationships take different forms, serve the company in different ways and the government of the relationships is organized in different ways.

The strategic supplier portfolio management differs from the traditional supplier portfolios in a way that a more deliberate approach is taken towards the relationship. Managing the risk relative to the expected returns of the relationship is present in strategic supplier portfolio just as in traditional portfolio management. A strategic supplier portfolio consists of a set of buyer-supplier relationships that are assembled together by a firm with an intent of managing risk and optimizing economic performance. The management activities strive to do this by managing the portfolio as a group instead of managing each buyer-supplier relation separately. (Wagner & Johnson, 2004)

The strategic supplier portfolios should be structured according to factors that the company valuates as most important in order to achieve sustainable competitive advantage, economic performance or both. Managers should also keep in mind that

a special attention should be given to the dependencies and independencies that are created between the buyers and the suppliers in their business relationships. This is key information that can help managers to decide where resources should be allocated and what kind of strategies should be implemented to the buyer-supplier relations. (Wagner & Johnson, 2004)

Wagner and Johnson (2004) found out that the supplier risk derives from the functional aspects of the buyer-supplier relationships. These relations involve risks in terms of on time deliveries, in the support the supplier is providing the buyer and in service- and product quality. These are the risks most easy to understand that are related to the buyer-supplier relationships. However, an important source of value is lost from the buyer-supplier relations if companies fail to understand the input suppliers can provide to innovation and product development and acquisition processes. These risks are managed in the portfolio by continuously evaluating the buyer-supplier relations in the portfolio. This provides the buyer organization information that is seen as the main tool for risk management. (Wagner & Johnson, 2004)

Goffin et al. (1997) suggest that companies often modify their supplier portfolios based on factors that include targets. These targets often include for example a preferred number of suppliers. Companies often strive toward reducing their number of suppliers. This leads to more complex and closer buyer-supplier relationships which of course influence the dependencies between the buyer and its suppliers in the portfolio. Other targets companies may put to their supplier portfolios are for example a number of suppliers with a preferred ownership structure, geographical dispersion of suppliers or a percentage of suppliers holding a certain quality certification for example the ISO 9001. Specially the geographical dispersion of suppliers might be important for companies operating globally since different markets includes a cultural risk that can be controlled with suppliers familiar to the local culture. (Wagner & Johnson, 2004)

Wagner & Johnson (2004) describes the process of managing and configurating the supplier portfolios with three different steps that form a circle.

The process begins with the planning phase where the objectives are placed for the supplier portfolio. These objectives can include for example an optimal number of suppliers which was discussed earlier in this chapter. Claycomb et al. (2000) found out in their study that managers are anticipating positive outcomes from planning activities related to supplier portfolios. The same study shows that managers believes that planning has not only a positive impact to the outcome, but they think that planning is a mandatory activity if positive outcomes are wanted to be achieved.

According to Claycomb et al. (2000) two types of management activities could be found out related to the planning process. According to them the activities were related to the question of which suppliers should be included to the portfolio and what is the best strategy for optimizing the individual buyer-supplier relationships.

The bottom line in the planning process is to decide with which suppliers the company should work with in the future. Here the company creates a target supplier base where current and forecasted supplier performances are reflected to the company's current and future demands. The strategic objectives of both the buyer and the supplier and anticipated changes in the market environment affects this decision. The strategic objectives must fit each other if mutual gains are wanted to be achieved from the buyer-supplier relationship.

The next step for the buyer company in the planning phase is to ask itself how it should work with its individual suppliers in the future. The answer to this question depends on how the target supplier base was set up. The company should find ideal management methods for different types of suppliers to be able to achieve the targets that was put to the supplier portfolio.

The data of Claycomb et al. (2000) indicates that the structure of the supplier portfolio and the specifications of the buyer-supplier relationships is derived from an assessment of the future market combined with current strategic and operational goals. Company executives stated in interviews conducted for the paper that the planning step of the supplier portfolio is a process where cross-organizational involvement is needed. The relation with the most important suppliers brings benefits to a wide range of different internal business functions if the relationship is managed in a sustainable way and both parties of the relationship benefit from it.

This means that the internal business functions need to co-operate with each other in managing the supplier relation. Typical business functions that are involved in supplier co-operations are in addition to procurement for example R&D, quality, operations and in the most important cases even the top management of both parties of the relationship. (Wagner & Johnson 2004)

The second step of the process is the implementation phase. On this step the supplier base is configurated to meet the objectives set on phase one. After the portfolio contains the desired suppliers, supplier development and integration processes are started in order to further develop the co-operation with the selected suppliers. (Wagner & Johnson 2004)

On this step the results of the planning activities are brought into action. According to Wagner and Johnson (2004) the tool kit the buyers are using with their suppliers on this stage is in the big picture almost the same regardless the industry where the company is operating. The main goals are to cut down the number of suppliers, categorize the suppliers to categories based on similarities in the buyer-supplier relations and partly with the help of the information provided by the categorization to form closer relationships with the suppliers that were left to the supplier portfolio.

The reduction of the number of suppliers can be conducted in different ways. But a common way is to centralize purchases to one selected supplier instead of using many suppliers that are competing against each other. Another way how this can be done specially in manufacturing companies is simply to reduce the number of items the company is using in its operations. This can be done for example by using one more complex component instead of many more simple ones. Of course, both ways of reducing the number of suppliers comes with a risk because the buyer becomes more dependent of the supplier. However, this risk can be reduced by careful supplier selection since if the buying company manages to build interdependencies between itself and its suppliers, either party of the relationship should have an intensive to leave the relationship. Therefore, supplier selection has to make sure that the power balance of the buyer-supplier relationship is equal and that either party, or at least the supplier doesn’t have a controlling power position in the relationship. (Wagner & Johnson, 2004)

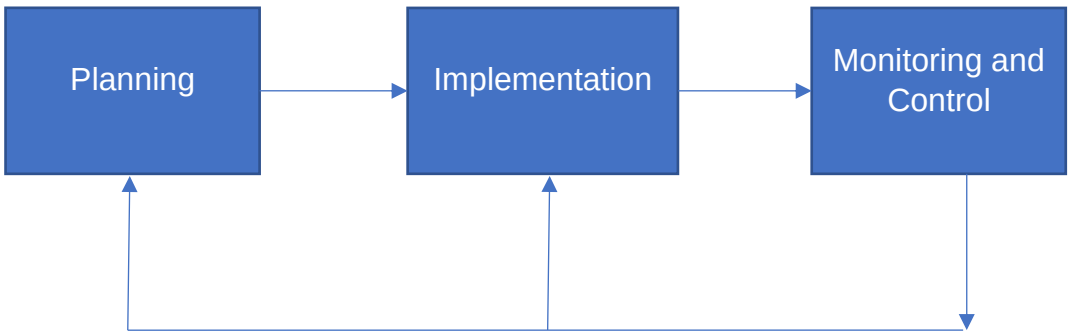
In order to deal with the challenges caused by increased supplier dependency, companies should develop activities and ways of segmenting same kind of supplier relationships. The benefit of this is that management can work out ideal supply strategies for every category instead of for every individual buyer-supplier relationship. This would require much more resources and implementing the individual strategies with every supplier would be very laborious and bind a considerable amount of the buying company's procurement resources. (Wagner & Johnson, 2004)

The most traditional and simple way of categorizing suppliers is the ABC-analyses where suppliers are categorized by the yearly spend. Dubois and Pedersen (2002) however point out that this kind of categorization where the value created in the buyer-supplier relation itself is not taken into consideration is very dangerous. By only looking at a simplified set of measures company managers easily miss out essential sources of potential customer value. Therefore, more sophisticated categorization methods had to be developed where the value created in the buyer-supplier relationship itself is recognized as an important source of customer value. These different categorization tools are later introduced in the second chapter of this thesis.

When the suppliers with who the buyer wants to co-operate in the future are selected and categorized to supplier categories the buyer needs to start to think on how the suppliers are motivated to stay in the buyer-supplier relation. As mentioned earlier, reducing the number of suppliers makes it possible to increase the mutual benefits gained from the closer buyer-supplier relations. However, this comes with a price of losing dependency to the most important suppliers. Therefore, companies have to come up with incentive systems to make sure that the most important suppliers are also committed to the relationship between them and that leaving the relationship would also hurt the supplier. (Pulles et al., 2016b)

The final step of the process is monitoring and controlling the supplier base. On this phase the company reflects the performance of its supplier base to the targets that was placed on phase 1. After the reflection the company needs to decide if it is satisfied with the current situation and continue as before or should the objectives

placed on phase 1 be changed. In other words, the company decides if it returns to step 1 or 2 in the circle process. The process is presented in graphical form in picture



Picture 1. Configuration and management of Strategic supplier portfolios

(Wagner & Johnson, 2004)

3. Purchasing portfolio tools

In this chapter four different purchasing portfolio tools which provide a wide perspective to the topic. It is notable that literature knows also many other purchasing portfolio tools but in order to keep the scope of this thesis limited, only four were selected. The selected four purchasing portfolio tools presents a transformation that has happened in the purchasing portfolio tools literature form an item-based perspective towards a point of view where the buyer-supplier relationship is the point of interest in the categorization.

According to Dubois and Pedersen (2002) purchasing portfolio tools have mainly because of their simplicity gained a lot of attention during the past decades. The same study also points out that suppliers contribute to a large part of value creation in most industries. This leads to that supplier management plays a key role in capturing this potential value. The challenge that supplier segmentation and portfolio tools are answering to is how should companies know to which suppliers they should allocate management resources in order to maximize the value created by the suppliers. Bartolini (2014) points out that if organizations fail to identify the suppliers with highest potential value, even the best supplier management practices won't be useful.

Day et al. (2010) sees segmenting of the supplier base as the starting point for strategic decision making and from where determining the future of supplier management actions should be started. They define supplier segmentation as "A process that involves dividing suppliers into distinct groups with different needs, characteristics or behaviors, requiring different types of inter-firm relationship structures in order to realize value from exchange."

Traditional portfolio models pay often attention to the power relations of the supplier and buyer and sees products as starting points in the models.

Dubois and Pedersen (2002) however argue that this kind of models often fail in recognizing value that is created in the buyer supplier relationship itself. This is because the dyadic point of view does not consider other relationships that the buyer and the supplier have. These other relationships may often enhance productivity

and innovation also in the supplier's and the buyer's business relation since the both parties are able to benchmark the best practices of their entire pool of business relations.

In general purchasing portfolio models are used to differentiate and implement different purchasing strategies to different purchased materials (Gelderman & van Weele, 2002). According to Olsen and Ellram (1997) the biggest benefit of portfolio models in supply management is the help they provide in resource allocation. They also point out that the categorization process should be seen as even more important that the final categorization because the process forces the decision-makers to agree among themselves about the importance of different items.

From the vast amount of purchasing portfolio tools literature is providing. Four different portfolio tools were chosen to be presented in this thesis.

3.1 Kraljic (1983)

The first and most known portfolio model that was brought into procurement context is the Kraljic's (1983) model where a firm's purchased materials are classified based on two dimensions.

1) "The strategic importance of purchasing in terms of the value added by product line, the percentage of raw materials in total costs and their impact on profitability"

2) "The complexity of the supply market gauged by supply scarcity, pace of technology and/or materials substitution, entry barriers, logistics cost or complexity, and monopoly or oligopoly conditions". (Kraljic, 1983)

Olsen and Ellram (1997) adds to the dimension selection that it is important for the organization to understand the complexity of the dimensions. If the dimensions are too complex the danger is that the focus is lost in developing of measures and categorizing the items or elements. In these cases, the danger is that the company cannot see the overall picture in order to take the full advantage of the improved

recourse allocation and communication that could be achieved with the portfolio model. On the other hand, if the selected dimensions are too simple important factors may be overlooked. Therefore, it is important that effort is put to ensure that the portfolio model incorporates all the factors needed.

What is remarkable in the Kraljic's model is that he was one of the firsts who mixed in his model external resources provided by a supplier with the internal needs of a buying company which had previously dominated the research of purchasing. Even though many other portfolio models have been developed after the Kraljic's model. his model still seems to be the dominant approach even though it is not problem free. (Gelderman & van Weele, 2002)

Picture 3. Kraljic's (1983) purchasing portfolio model

As seen in picture 3. Kraljic's model categorizes supplied items with two variables: profit impact and supply risk. According to Kraljic (1983) using the matrix is divided into a four-step process.

1) Classification
2) Market analysis
3) Strategic positioning
4) Action plans

On the classification step a company should categorize all its purchased items with the help of the variables of the model. Profit impact can be measured with the spend of purchases, the percentage of the total spend or with the impact on business

growth or product quality. Supply risk should be measured with criteria like availability on the market, number of available suppliers, competitive demand and storage risk and substitution possibility. (Kraljic, 1983)

By using these criteria, a company is able to sort out its supplied items into four different categories demonstrated in picture 3. It is crucial to understand that each of these four categories demands a different purchasing approach which should be in proportion to its strategic implication. Companies should provide different kind of support for purchasing decisions made in the different supply categories. The strategic items- category may require for example a large amount of market analysis including risk analysis, optimization models and price analysis whereas in the non-critical items category purchasing decisions can be made based on much lighter set of analysis. Companies also have to remember that any purchasing categorizations that are done by using portfolio tools represent only the current state of the supply market. Alternations in the supply or demand of a purchased item might move the item to another portfolio category. Therefore, the categorization has to be redone regularly. (Kraljic, 1983)

The second step in the Kraljic's three phase process is market analysis. This step can be described as a power analysis between the purchaser and the supply market. On this step the purchaser weights its bargaining power against its suppliers' strength as suppliers and tries to find suppliers who can fulfil its quantitative and qualitative needs at the same time as the buyer can utilize its power balance situation in a way that preferred contract terms can be leveraged. (Kraljic, 1983)

Kraljic finds in total ten different criteria that describes supplier and buyer strength.

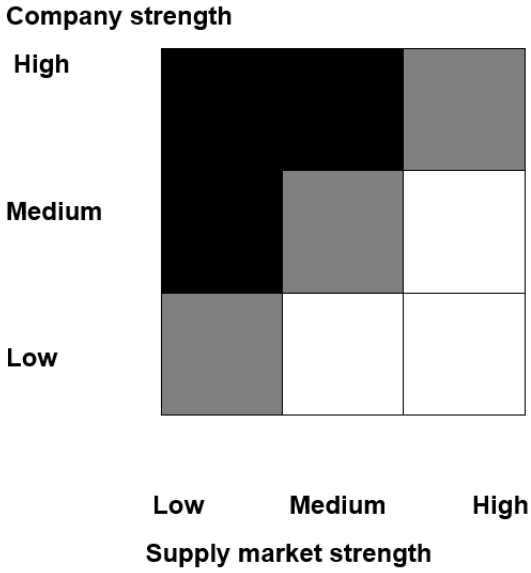
1) Purchasing volume versus capacity of main units
2) Demand growth vs capacity growth
3) Capacity utilization of main units
4) Competitive structure
5) Profitability of main end products
6) Cost and price structure
7) Cost of no-delivery

8) Own production capability or integration depth
9) Entry costs for new sources versus costs for own production
10) Logistics

These criteria are described in the list from the buyer's perspective, but they could as well be looked from the supplier's point of view. What should also be kept in mind is that the list cannot be copied as it is to every industry. Each industry has its special details that should be taken into consideration when making the supply market analysis of a specific industry. (Kraljic, 1983)

The market analyses is always bounded to the current market situation and the level of technological development. Therefore, a certain level of criticism should be kept in mind when reading the list thirty-five years after it was published. However, the Kraljic's criteria gives a good overall picture of things that should be taken into consideration and therefore with certain adjustments it could be used as bases of supply market analyses even today.

The third step in the process is strategic positioning. On this step the company places the items that were identified as strategic during step 1 to the matrix. After this the company is able to identify supplier relations that contain the biggest risks for the buyer an on the other hand also the relations where better terms could be achieved with relatively low effort.
Three basic risk levels can be found from the matrix which is demonstrated in picture



Picture 4. Power relations in the purchasing portfolio matrix

As can be seen from picture 2. three different strategies can be formed based on the power relations in the purchasing portfolio matrix. These strategies are:

1) Exploit, The black area
2) Balance, The grey area
3) Diversify, The white area

On the fourth and final step of the utilization process of the Kraljic's (1983) purchasing portfolio model the supplier should understand the differences caused by the power relations on the supply and how they effect on purchases in different power relation categories.

In the exploit strategy the buyer has the dominant market position. Because the supply risk is low the buyer can push relatively hard in order to achieve a better financial outcome by negotiating better prices and contract terms. Although the buyer has the dominant market position in the short run it has to make sure it will not push the supplier too hard. Provoking the supplier too hard will cause problems for the buyer in the long run since this kind of behavior does not encourage the supplier towards continuous improvement, what would be beneficial also for the buyer, but instead it will probably drive the supplier towards finding new customers. (Kraljic, 1983)

On the other end of the power relation matrix the buyer finds itself in a position where the supplier is in the dominant market position and the buyer should implement the strategy of diversifying. In this situation the buyer should actively look for alternative suppliers and substituting items. Because the buyer is in a situation where it cannot totally relay on steady supplies with a favorable cost levels it should start building stocks in order to deal with possible disruptions in supply. The buyer should in some cases even reconsider its attitude towards the make or buy question and start to explore the option to leave the supply market and start producing the items by its own. Off course this is not always feasible, and this should be considered case by case. (Kraljic, 1983)

The balance strategy could be described as something in between the two first strategies. The exploit strategy cannot be used in its pure form since the supplier is

not in a good enough power situation to be able to push the suppliers hard enough. This kind of actions could lead to harmful outcomes in the supplier buyer relationship that could in the long run cause more damage to the supplier than what the possible benefits would be. (Kraljic, 1983)

In the other hand a full diversify strategy is not either a good option since it is too costly and the buyer has no need to be as careful as in the full diversify strategy since the supplier is not in an as good market situation either. Therefore, the buyer should focus in keeping the supplier relation stable with the selected suppliers and this way keeping the material flow stable and predictable. (Kraljic, 1983)

Table 2 provides a comparison between the recommended practices between the three different market power strategies.

	Exploit	**Balance**	**Diversify**
Volume	Spread	Keep or shift carefully	Centralize
Price	Press for reduction	Negotiate opportunistically	Keep low profile
Contractual coverage	Buy spot	Balance contracts and spot	Ensure supply through contracts
New suppliers	Stay in touch	Selected vendors	Search actively
Inventories	Keep low	Use stocks as buffers	Build up stocks
Own production	Reduce or do not enter	Decide selectively	Build up or enter
Substitution	Stay in touch	Search for good opportunities	Search actively
Value engineering	Enforce supplier	Perform selectively	Start own program
Logistics	Minimize cost	Optimize selectively	Secure sufficient stocks

Table 2. Comparison of market power strategies. (Kraljic, 1983)

3.2 Olsen and Ellram (1997)

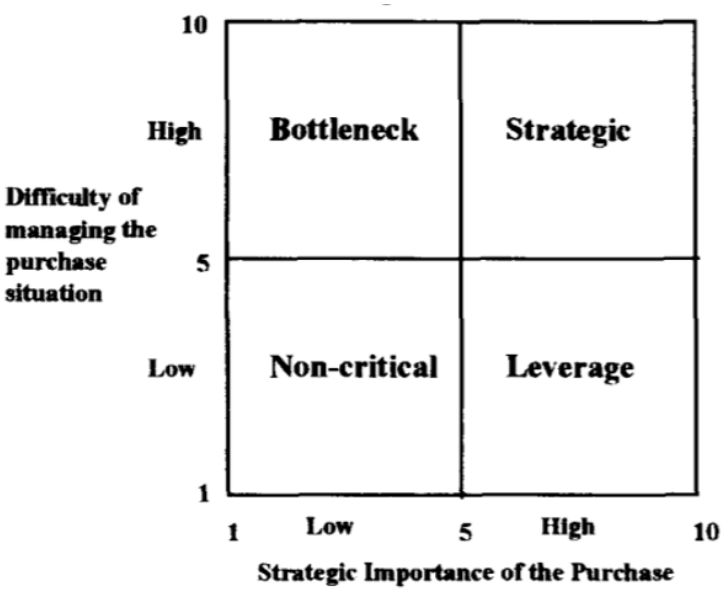
Olsen and Ellram (1997) further develop the model created by Kraljic. The key difference in their portfolio model is in their interest towards the supplier relationships rather than the purchased items. Olsen's and Ellram's model should be approached the way Kraljic introduced in his paper (1983). The utilization of the model can be divided to a three-step process.

1) Analysis of the company's purchases

2) Analyze the supplier relationships

3) Develop Action Plans

The outcome of step 1 is a portfolio where purchases of a company has been analyzed by using difficulty of managing the purchase situation and strategic importance of the purchase as the dimensions. As can be seen in picture 5 the formed categories are the same as in the Kraljic's model even though the dimensions were different.



Picture 5. Olsen's and Ellram's portfolio matrix

During the first step of the Olsen and Ellram (1997) model the buyer company face the same problem related to creating and measuring the factors describing the

dimensions as with the Kraljic (1983) model. Olsen and Ellram (1997) propose in their paper that strategic importance of the purchase should be measured with three main factors:

1. Competence factors
    I. The extent to which the purchase is part of the firm's core competence
    II. Purchase improves knowledge of buying organization
    III. Purchase improves technological strength of the buying organization

2. Economic factors
    I. Currency value of the purchases
    II. The extent to which the purchase is part of a final product with significant value added
    III. The extent to which the purchase is part of a final product with good profitability
    IV. Criticality of the purchase to get leverage with the supplier for other purchases
3. Image factors
    I. Supplier critical image or brand name
    II. Potential environmental or safety concerns

In order to be able to evaluate these factors companies need a good understanding of their core value creation processes. Competence factors describe the purchase's effect on the core value creation process of the company. The greater effect a purchase has to the core value creation process, the bigger is the strategic importance of the purchase. (Olsen & Ellram, 1997)

The economic factor is describing the financial impact of the purchases measured in the currency where the purchases are done. The factor should also be able to capture the interdependencies between the purchases. Therefore, the impact to leverage possibilities in other purchases from the same supplier is taken into consideration in the measure set. (Olsen & Ellram, 1997)

The image factor is describing the extent to which the purchase has an influence to the company's image among its customers, suppliers and other key stakeholders.

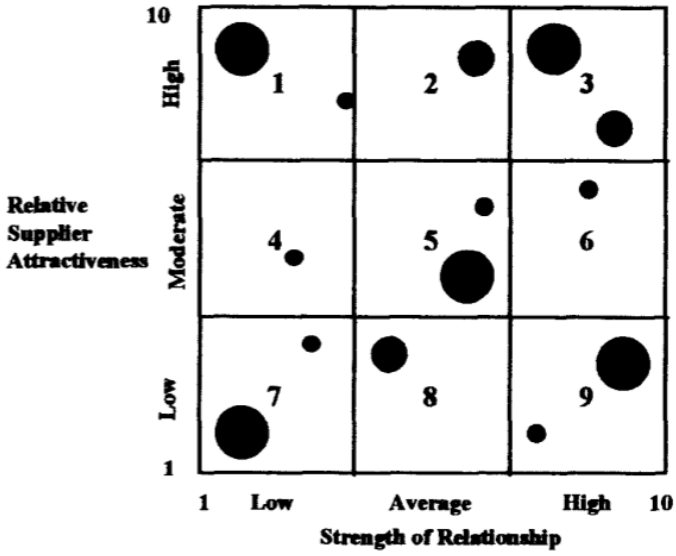
The factors measuring strategic importance of the purchase are concentrating in internal issues the purchase is causing in the buying company where as the factors measuring the difficulty of managing the purchases concentrates in external issues. It should be measured just like the strategic importance with three key factors which are further divided into sub-factors.

1. Product characteristics
    I. Novelty
    II. Complexity
2. Supply market characteristics
    I. Power balance of the market
    II. Suppliers' technical and commercial competence
3. Environmental characteristics
    I. Risk
    II. Uncertainty

Olsen and Ellram (1997) point out in their paper that the factors listed are not comprehensive and they may vary with different companies and market situations. However, the listed factors provide a basic overall picture of issues that needs to be taken into consideration.

The second step in the Olsen and Ellram (1997) model can be seen as a correction to the Kraljic's (1983) model. According to Olsen and Ellram (1997) focusing on current power relation is very dangerous in an environment where the power relations change. Instead they propose that companies should analyze their supplier relationships by using supplier attractiveness and strength of relationship as

dimensions. By doing this another matrix, which is presented in the picture below, is created.



Picture 6. Supplier relationship matrix (Olsen and Ellram, 1997)

The size of the circles in the model represents the current allocation of resources to the relationship (Olsen & Ellram, 1997). The creation of this second matrix is done in the same way as the matrix on the first step of the process. First, the buyer organization needs to select the factors that shall be used in measuring these two dimensions.

Olsen and Ellram (1997) suggest that relative supplier attractiveness should be measured by three main factors. They also point out again that the same factor list cannot be used in all different business cases. The suggested factors are:

1. Financial and Economic factors
    I. The supplier's margins
    II. The supplier's financial stability
    III. The supplier's scale and experience
    IV. Barriers to the supplier's scale and experience
    V. Inefficiency
2. Performance factors
    I. Delivery
    II. Quality
    III. Price

3. Technological factors
    I. The ability to cope with changes in technology
    II. The types and depths of supplier's current and future technological capabilities
    III. The suppliers current and future capacity utilization
    IV. The suppliers design capabilities
    V. The suppliers speed in development
    VI. The supplier's patent protection
4. Organizational, cultural and strategic factors
    I. Influence on the company's network position
    II. The internal and external integration of the supplier
    III. The strategic fit between buyer and supplier
    IV. Management outlook for the future
    V. Top management capability
    VI. Compatibility across levels and functions of buyer and supplier firm
    VII. General risk and uncertainty dealing with the supplier
    VIII. Feeling of trust in the relation with the supplier
5. Other factors
    I. Ability to cope with changes in the environment
    II. Safety record of the supplier

In other words, relative supplier attractiveness can be explained as the mix of characteristics that makes the supplier desirable in the eyes of the buyer. It is logical that at least some of the factors explaining relative supplier attractiveness are also used in the supplier selection (Olsen & Ellram, 1997). Therefore, companies should use same systems in measuring the factors in segmentation of purchases and supplier selection. Literature provides a wide range of research papers focusing on how supplier selection criteria should be selected and measured. Huang & Keskar (2007) points out that purely mathematical criteria evaluation is a bit dangerous if it is not connected to the strategic goals of the company. Therefore, the qualitative goals have to be kept in mind while doing quantitative criteria evaluation.

The other dimension of the matrix, strength of the relationship, is measuring factors that creates a bond between the buyer and the supplier. This can be seen as a

development to the Kraljic's (1983) model since it is measuring a more stable dimension than the current power situation that might change quite rapidly. (Olsen & Ellram (1997).

Olsen and Ellram (1997) suggest that strength of relationship should be measured with factors listed below. Like with all other listed factors they point out that the list is not comprehensive, and it cannot be used unchanged in every case, but it provides an overall picture of factors effecting the strength of the relationship.

1. Economic factors
    I. Volume or currency value of the purchases
    II. Importance of the buyer to the supplier
    III. Exit costs
2. Character of the exchange relationship
    I. Types of exchange
    II. Level and number of personal contacts
    III. Number of other partners
    IV. Duration of the exchange relationship
3. Cooperation between buyer and supplier
    I. Cooperation in development
    II. Technical cooperation
    III. Integration of management
4. Distance between the buyer and supplier
    I. Social distance
    II. Cultural distance
    III. Technological distance
    IV. Time distance
    V. Geographic distance

On the final step of the process an action plan should be developed. It is done by reflecting the actual supplier relationships to the ideal supplier relationships for every category presented on step 1. After this, recourses should be allocated into moving the real supplier relationships towards the ideal relations. This is done according to Olsen and Ellram (1997) by forming a strategy for different relationship types. They found out in their paper three main groups that can be seen in picture 6.

The first group consist of supplier relations located in cells 1,2 and 4 in picture 6. These relations are measured to have a low or an average score in supplier attractiveness and a low or an average in relationship strength. These relations are troublesome for the buyer because the buyer sees the supplier desirable but on the other hand the buyer cannot completely relay on the strength of the relationship.

The strategy should be formed with the help of the classification done in phase 1 on the process. If purchases to a supplier are classified as strategic then resources should be allocated to strengthening the relationship. Olsen and Ellram (1997) propose that strength of supplier relationship should be strengthen by enhancing communication with the supplier, providing the supplier more volume and by involving the supplier in the buyer organization's operations. R&D is a good example of where supplier involvement can be utilized. Olsen and Ellram (1997) also point out that strengthening the supplier relationship takes time and therefore this kind of relations should be prioritized high when allocating resources to procurement development.

The second group of supplier relations that can be recognized from picture 6 consists of supplier relations located in cells 3,5 and 6. In these relations the supplier scores moderate or high in both supplier attractiveness and in strength of relation. According to Olsen and Ellram (1997) the focus should be kept with this kind of suppliers in maintaining the existing balance. Possible improvements should focus in managing these relations with less resources.

In the last group containing supplier relations in cells 7,8 and 9 the obvious strategy would be to change the suppliers since the suppliers are scoring low in supplier attractiveness. However, before these suppliers are changed a careful research should be conducted in order to find out what kind of effect does the supplier relation have on the buyer's suppliers network position.

Cell 7,8,9 include the relations with low supplier attractiveness. This group deserves attention since the best strategy would be to change these suppliers.

Before the suppliers are changed, companies should carefully study what kind of influence does the change have on the buyer's supplier network position. Another issue that needs to be considered is the importance of the products these suppliers

are supplying. The buyer should use the matrix created on step one in order to find out the strategic importance of the purchases. If suppliers are recognized as strategic or bottleneck suppliers, the buyer has basically two alternatives. It can try to increase the attractiveness of the supplier by solving out the issues causing the low value of supplier attractiveness in co-operation with the supplier or it can start working on finding substituting products or working methods so that the supplier could be changed. (Olsen & Ellram, 1997)

3.3 Dyer et al. (1998)

Dyer et al. (1998) takes a bit different approach towards supplier segmentation than the models presented earlier in these theses. They studied in their paper what kind of supplier relations were formed in the automotive industry in the USA, Japan and Korea. They found out that the formed supplier relations could be categorized in two different groups: durable arm's-length relations and partnerships.

Durable arm's-length relations are often used with suppliers that are suppling non-strategic products to the buyer. It is typical that the supplied products are standardized or easy to describe for the supplier. Very complex products are difficult to buy from arm's-length suppliers because information sharing is kept on a low level. With this the buyer wants to make sure that sensitive information is not given to external stakeholders. The positive side with arms-length relations is that the supplier-buyer interdependence is kept on a low level and because of this also the supplier risk is kept on a low or moderate level. The downside is that the knowledge of suppliers is not utilized in the most effective way and therefore a source of competitive advantage is lost. (Dyer et al. 1998)

Partnership relations are formed with suppliers who supply the buyer products or services that has a strategic impact for the buyer's business. These products or services are often customized for the buyer and they are a source for the buyer to customize their end-product as well. Durable arm's length supplier relations are not suitable for these products since a stronger collaboration between the buyer and the supplier is needed because of the potential mutual benefits the relationship can provide the both parties. (Dyer et al. 1998)

The mutual benefits both the buyer and the supplier can achieve from partnerships are in the end mostly economic. The source just differs. The buyer gets access to higher level of product customization and in that way also in a higher level of customer value added by involving the supplier in key activities such as research and development and production. On the other hand, because the supplier is a key resource of customer value for the buyer, the supplier can count on that the relationship is long lasting and therefore also economically beneficial for the supplier. (Dyer et al. 1998)

Dyer et al. (1998) suggest that in order to fully utilize these both supplier relation types, companies should create a supplier management process where the supplier management activities depend on the value the supplier is creating for the buyer.

The buyer organization should analyze the strategic importance of every supplier it has in its supplier base. Based on the analyses suppliers should be categorized to two different groups: Necessary non-strategic suppliers and strategic suppliers. After the categorization, the company should start managing the non-strategic suppliers as durable arm's length suppliers and the strategic suppliers as partner suppliers.

The term durable arm's length supplier might sound a bit paradoxical since traditionally arm's length supplier relations are seen as short lasting. However, research has found out that administrative- and transaction costs associated to managing a large supplier base might in many cases outweigh the benefits of using many suppliers. Because of this Dyer et al. (1998) suggest that the buyer should create a pool of a couple of durable arm's length suppliers for every purchasing category. The idea is that the suppliers selected to the pool will supply the category for the specified time. By doing this the buyer can reduce the amount of its suppliers and transaction cost related to supplier management at the same time as it can utilize the benefits of traditional arm's length supplier relations.

It is very important for the buying company to make sure that competition is created between the durable arm's length suppliers in the pool. This can be achieved with different kind of managerial actions. The buyer is in the position that it is able to set the rules based on which the purchases are allocated to the suppliers. The buyer

can for example concentrate all purchases to one supplier or divide them to the suppliers of the pool. Dyer et al. (1998) suggest that supplier performance can for example be used as a measure based on which the purchases are allocated. This forces the suppliers to continuous improvement without that the buyer has to allocate resources to supplier improvement.

The allocation decisions require some management skills since dividing purchases between many suppliers reduces the suppliers' ability to utilize the economies of scale. Therefore, the buyer need to be sure that the benefits of multiple suppliers outweigh the transactions costs and lost benefits of economies of scale. The buyer also need to check regularly that the suppliers selected to the supplier pool are still the best ones available. Therefore, the suppliers should be re-selected regularly. This can be done for example by organizing open bidding processes and using bigger supplier pools temporarily in order to find out if the original suppliers of the pool are still the most suitable or if they should be replaced with other suppliers that are available on the market. (Dyer et al. 1998)

Suppliers that provide products that the buyer can use to differentiate its end products should be seen and managed as strategic partners. Because of the potential value of these relations a high level of coordination is needed to these relationships.

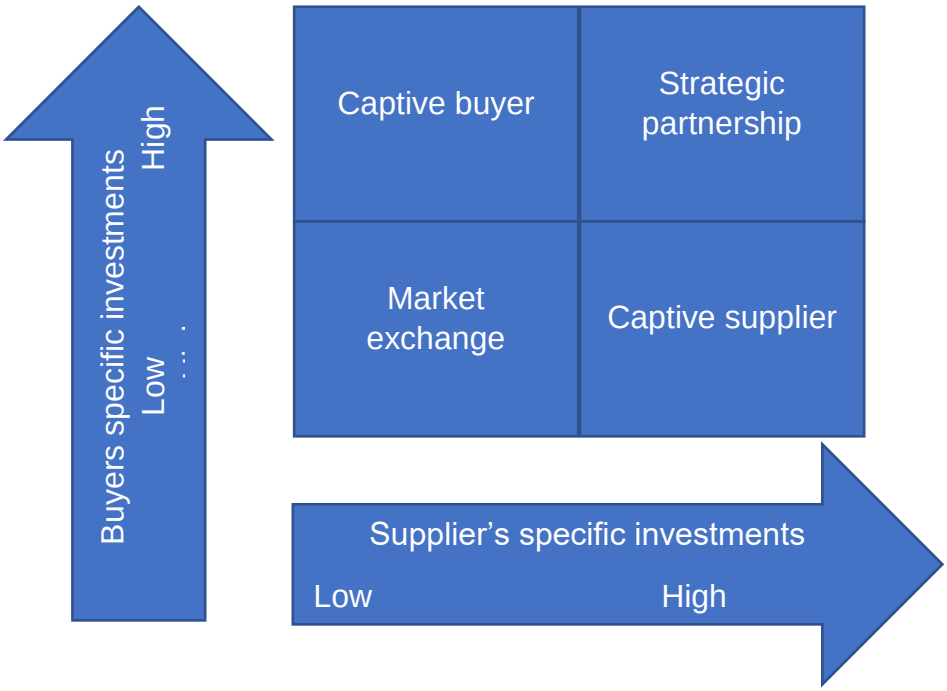
Very often the buyer must make specific investments to the strategic supplier's production lines in order to achieve a higher level of customer specification. From the supplier perspective this shows that the buyer is willing to invest in the relation and therefore the supplier can count on a long-lasting relation. This also means that the buyer and supplier become dependent of each other. In many cases the supplier cannot use the customized production line for serving other customers and the buyer cannot change the supplier because otherwise the money invested to the customization of the production line would be lost. This means that depending on the size of the collaboration, the partners success depends on each other and therefore the both parties have a strong motivation to solve problems in co-operation that occur in the relation. (Dyer et al. 1998)

Dyer et al. (1998) point out that in order to make the partnership work, multiple functions of both parties must be able to work together. It is essential that the supplier understands its role in the buyer's value creation process. The supplier must be provided information that influences the demands that the supplier is facing. The marketing, sales and R&D department must provide information concerning changes in sales volumes, end-customer preferences and possible technological changes in the product. On the other hand, the supplier must also inform the buyer anything that has an effect on its capability to deliver as early as possible so that both parties have time to react to the occurring problems.

Probably the most dangerous thing the buyer can do with its partners is to form partnerships on paper but at the same time manage them as arm's-length relations. Pulles et al. (2016b) found out that trust is one key element in working supplier partnerships. Therefore, if the buyer loses the trust of the supplier it is very demanding and time consuming to repair the partnership. It is also important to understand that in many cases the possible supplier market is not that wide which means that information of the buyer's untrustworthiness might spread to the whole supplier market which would mean that forming working partnerships with any potential suppliers would become significantly harder. (Dyer et al. 1998)

3.4 Bensaou (1999)

Bensaou (1999) also researched in his paper the different kind of buyer-supplier relations formed in the automotive industry in the USA and Japan. He based his approach to the subject on the level of investments the buyer or supplier was willing to invest to the relation. By analyzing questionnaires answered by supply managers working in the automotive industry in USA and Japan he was able to form a matrix based on the amount of investments made to the relation by the both parties containing four different cells where he could locate the different kinds of buyer-supplier relationships found in his data.



Picture 7. Relationships based on investments. (Bensaou 1999)

As shown in picture 7 Bensaou (1999) named his relation types based on the controlling position of the relationship.

Buyer-supplier relations that are in the market exchange category are according to Bensaou (1999) normally formed with suppliers that are supplying the buyer standardized products that doesn't require rarely any information change between the buyer and supplier. These products also often contain mature technology that is normally quite simple or if the technology is more complex the manufacturing processes in the supplier base are well structured. Because of the maturity of the technology little innovation is needed in this product category which also explains why a very low level of information exchange is needed and why the products provide very little possibilities for the buyer to customize its end-products with the help of these products. Bensaou (1999)

The suppliers in this category can be described as small or medium sized companies that doesn't have any proprietary technology they could use as competitive advantage against their competitors. They also have a low bargaining power and are normally quite dependent of the industry where the buying company is operating. Because of the low interaction between the parties and very low or no

investments between the parties also make sure that switching costs are low for both the buyer and supplier which in this case means that the buyer can change the supplier and the supplier can change the customer without significant costs to either of the parties. Bensaou (1999)

For this kind of relations to exist the market usually needs to be stable or declining where many suppliers with no or very small differences in their capabilities are competing of the same customers. It is also typical that the players at the market doesn't change a lot over time. Bensaou (1999)

The second category of the Bensaou (1999) matrix is the category called captive buyer. In this category the supplier is in a position where it can require the buyer to make specific investments to its production without self having to invest in the buyer. The product and market characteristics of where this kind of relations exist are otherwise the same as in the market exchange category, but the difference is that only a few well-established suppliers can be found at the market. Normally these suppliers are large companies that hold proprietary technology and skills the buyers are in a big need for. This puts the suppliers in a position where they can require investments to their production lines form buyers who are willing to buy their products. Very often the buyers try to correct the power imbalance of these relations by maintaining an internal manufacturing capability of these products so that they can react on possible delivery shortages. However, their inhouse production is not often competitive with the suppliers' products. Therefore, the buyer cannot rely on its own production if it wants to maintain its own competitive advantage. (Bensaou, 1999)

The opposite situation to the captive buyer category is called the captive supplier category. In this category the suppliers are often technologically and financially very capable and hold proprietary technology and good innovation and R&D skills. These skills are required from the suppliers since the supplied products are typically also technically complex and are based on new technology. Because of the intense technological development required also the capital investments required are heavy in this category. (Bensaou, 1999)

Even though the suppliers in this category are technologically very capable and the market is usually in a high-growth stage, it is the buyer who holds the dominant position in these relations. This is because of that the market is still in an unstable phase and the players at the market have not yet established their positions. When this is combined to a rather small number of potential buyers it is clear that the suppliers have a very low bargaining power in this category and that the buyer are in a position where it can require specific investments form the suppliers without self making investments in the suppliers.

The last category of the matrix is called the strategic partnership category. It is the second category where the specific investments between the buyer and the supplier are in balance.

In this category the suppliers are supplying products that are technically complex and very close to the buyer's core competence and therefor help the buyer to customize their products for their own end-customers. Because of this the buyer has a strong need to keep the suppliers close to itself and secure a continuous information flow. With the information flowing to both directions, both parties are able to co-operate on a vast front of business functions and therefore react fast on possible changes in the product, market or end-customer preferences. The ability to react fast comes of course with a price and therefore large capital investments are needed from both parties.

According to Bensaou (1999) partnerships exist on markets with strong demand and high growth which are normally concentrated to a set of established players which are competing against each other. A lack of dominant design is also a feature that describes the markets where partnerships occur. This means that the solution partners are competing against changes often. This is one reason more why a close co-operation of the partners is needed.

Bensaou (1999) describes the suppliers of the partnerships as large players with strong technical knowledge and resources and knowhow for high class R&D and innovation activities. These skills are often recognized widely in the field where the partner is operating. This kind of capabilities comes of course with a price and therefore capital investments are needed. From power perspective the partnerships

do not have a party with a dominant position of the relationship. Instead both parties are equally dependent of each other which further increases their motivation to help each other with occurring problems.

The interesting part with Bensaou's (1999) paper is that when he further analyzed his data and tried to find out if he could find statistical evidence of differences in supplier performances in his four categories he couldn't find any. In other words, a partnership itself does not guarantee a well performing buyer-supplier relationship. He figured out that the lack of statistical evidence is caused by that it is as likely in every category that wrong management actions are chosen for managing the relations or that the right management actions are implemented in a wrong way. In other words, for any kind of supplier relationship to work, professionality and skill is required from the managers managing the relation.

Bensaou (1999) point out that firms must match the optimal type of supplier relation to the existing product, market and supplier conditions. When this is done they must adapt a suitable management approach for the selected supplier relation type. If either of these two activities fail, the supplier performance is not with a high certainty going to be on the highest possible level.

This conclusion raises according to Bensaou (1999) a couple of questions: How should the portfolio of relationships be managed and how can the company know which relationship type is the best one? The other main question is how differently should the relationships in the portfolio be managed?

To answer these questions Bensaou (1999) further analyzed his data. The answer to the first question was found quite easily. He found out that the average product complexity in the market exchange category was significantly lower than in the other three categories. In other words, according to Benseau's findings, suppliers delivering products with low product complexity should be managed with the market exchange strategy. Defining when to use the other three categories was a bit more laborious. Benseau found out that three factors: the characteristics of the product, the level of competition in the upstream market and the capabilities of the suppliers available defines statistically when to use the remaining three supplier relation

types. The table below compares these three characteristics in the other three categories.

	Captive Buyer	**Strategic partnership**	**Captive supplier**
Charasteristics of the product	-Technically complex -Based on mature well-understood technology	-Technically complex -High level of customization -Based on new technology	-Technically complex products -Based on new technology developed by suppliers - Significant engineering effort and expertise required -Frequent innovations in the product technology
Level of competition in the upstream market	-Few strongly established suppliers - Suppliers have a strong bargaining power	-Competitive and concentrated supplier market	- Fierce competition - Few qualified players - Unstable market with shifts between suppliers - Low supplier bargaining power
Capabilities of the suppliers available	-Suppliers hold proprietary technology	-Suppliers hold proprietary technology - Strong recognized skills and capabilities in design, engineering, and manufacturing - Active in research and innovation	-Strong supplier proprietary - Suppliers with strong financial capabilities and good RSD skills.

Table 3 Comparison of supplier relation types. (Bensaou 1999).

To answer the question of how the different categories should be managed Bensaou (1999) divided his data of supplier relation categories to low-performing and high-performing relations. By further investigating the high-performing relationships. He found out that the management actions taken in the high-performing relationships could be described with three generic management dimensions: Information-sharing practices, characteristics of boundary spanner's jobs and the social climate.

The table below is a comparison of the management actions taken related to the generic management dimensions in the high-performing relationships.

	Market exchange	**Captive buyer**	**Strategic partnership**	**Captive supplier**
Information-sharing mechanisms	-Operational coordination and monitoring along structured routines -Limited information exchange	-Important exchange of detailed information on a continuous basis -Frequent and regular mutual visits	-Frequent and rich information exchange in different medias - Regular mutual visits -Usage of guest employees common	-Little exchange of information - Few mutual visits, mostly from the supplier to the buyer
Boundary spanners' task characteristics	-Limited time spent directly with supplier's staff -Highly routine and structured tasks	-Structured highly predictable tasks -Large amount of time spent by the buyer with the supplier	-Highly undefined -Nonroutine frequent unexpected events -Large amount of time spent on coordinating issues	-Limited time of the buyer's staff allocated to the supplier -Tasks are complex and focused in coordinating
Climate and process characteristics	-Positive social climate -No systematic co-operation -Suppliers fairly treated by the buyer	-Tense climate -Lack of mutual trust -Strong effort by the buyer towards co-operation	-High mutual trust and commitment to the relationship - Strong sense of mutual fairness	-Limited joint action and co-operation but high mutual trust -Greater burden put on the supplier

	-Suppliers have a good reputation and track record	-Supplier does not necessarily have a good reputation	-Early supplier involvement -Extensive joint actions and co-operation -Suppliers have an excellent reputation	

Table 4. Management actions in high-performing supplier relationships (Bensaou, 1999)

As can be seen from the table, the successful managers are able to allocate the required level of resources to the relationships in order to get them performing well. Bensaou (1999) point out that there are two ways how management of the relationships can fail. Managers can either use more resources to the relations than what is expected and required form the supplier or the other way around. Managers might not understand the need for more resources and use too little resources than what would be expected and required.

3.5 Criticism of portfolio tools

Dubois and Pedersen (2002) argue that purchasing portfolio models have become popular mainly because they are simple and easy to communicate and understand. They give managers practical guidelines of how different purchasing situations should be handled and how firms should allocate their purchasing power through their supplier portfolio and how to minimize the supplier risk they are facing. However, this kind of approach is based on a set of assumptions of how the market operates and concentrates on the value created in single relations rather than in networks. Gadde and Snehota (2000) defines a network as a set of relations that are dependent on other relations together forming a network. This means that portfolio models are not the best tools to use if the value created in the network is wanted to be captured. This is a quite major weakness since suppliers' relationship with the buyer together with its relationships with its other customers is a relevant

source of economies of scale for the supplier (Dubois & Pedersen, 2002). Nellore and Söderquist (2000) also point out that portfolio models often fail to recognize the backgrounds of a relationship. For example, it has a big impact on a supplier-buyer relationship if a product supplied is designed by the buyer, supplier or in a co-operation.

In addition to the problem of not fully understanding the potential of networks, Day (1986) criticized in an early stage of the development of portfolio models that their main problem is measurement. What does factors like profit impact and supply risk mean in real life and how should these factors be measured if they are not unambiguously defined (Gelderman & van Weele, 2003). Nellore and Söderquist (2000) also point out that the variables used in the portfolio models might not be accurate proxies of the dimension they are supposed to measure. De Boer (1998 suggest that the measurement problem should be solved case by case in the companies that are using the portfolio tools instead of defining unambiguous measures and thresholds between the categories.

Dubois and Pedersen (2002) also ask how companies could be able to form supply strategies based on only two dimensions. They see business decisions as complex problems that cannot be solved with simple one size fits them all type of solutions. In addition to this, the portfolio models often fail to see the suppliers point of view. Strategies the supplier is following or the possible counter actions the supplier is taking as an answer to the supplier's actions are not taken into consideration in the portfolio models (Kamann, 2000).

Finally, Gelderman and van Weele (2003) point out the difficultness of managing the supplier relations that are moving from a portfolio category to another. The category specific strategies implemented with the suppliers require often time in order to succeed. The literature presenting portfolio tools gives hardly any tools for managers to successfully make the transfer between the different category strategies. This leads to a situation where buyer companies can have difficulties to know if they should continue with the selected approach with a supplier or should this approach be changed. If they choose to change the approach they also need to know when this should be done and how should the management of change be handled.

Based on the recognized problems related to portfolio tools Gelderman and van Weele (2003) used the Kraljic (1983) matrix as a bottom line and started to look for solutions for the presented problems. Their aim was to find out how procurement professionals handle the problems related to measurement of the dimensions, defining what objectives and strategies to use and how the movement of supplier between different categories should be managed.

By searching for answer for the first question Gelderman and van Weele (2003) found in their paper three different approaches for the measurement problem, the consensus method, the one-by-one method and the weighted factor score method.

The consensus method is a measuring method based on open and creative discussion. The suppliers are placed in their categories as a result of a discussion where people involved in the process are reasoning for each other the category where the supplier should be. The strength of this method is that it provides a very in-depth analysis of the current state but on the other hand comparison of different portfolios is hard if the measurement is conducted in this way. (Gelderman & van Weele, 2003)

The one-by-one method is simplest method of this set and probably because of this it also proved to be the most used method. In this method one measure is defined for each dimension. In the Kraljic matrix these measures could for example be the volume of purchases and the number of alternative suppliers. The positive side of this method is the easiness and repeatability of the process. On the other hand, it does not provide an as in-depth knowledge of the current situation as the consensus method. (Gelderman & van Weele, 2003)

The last of the three methods, the weighted factor score method is probably the most complex one. In this method a set of measures and their weights is defined for each dimension. The dimensions total score is calculated by multiplying the measures scores with their weights and by adding the sub-scores together. This allows the buyer to fully customize the measurement set to answer their needs but on the other hand it requires access to a large amount of data which can be tricky to gather. This method also requires resources for analysing the data. Therefore, companies have to decide if it is worth the cost of resources. The nature of the

method also requires companies to accept that a low score in one measure can be compensated by scoring higher on another measure. A situation where this could be a problem is for example a situation where a supplier cannot be replaced. In this situation the company has to consider if this major source of supplier risk can be compensated by other factors. If this is not the case, then the weighted factor score method cannot be used. (Gelderman & van Weele, 2003)

To make choosing the right measurement method easier Gelderman and van Weele (2003) made a set of questions that can help the choosing.

The required objectiveness? If high, then 1-to-1.

Number of key factors? If high, then consensus or weighted factor.

Time available? No time, then consensus or 1-to-1

Needed customization and flexibility? If high, then weighted factors.

The second aim of Gelderman's and van Weele's (2003) paper was to find out what kind of objectives and strategies buyers are using with their portfolio tools. They found out that procurement strategies in the researched companies were based on the overall business strategy, the situation on the supplier market and the capabilities and performance capacities of the individual suppliers at the market. The aim with the procurement strategy related to portfolio tools was to better capture the value the procurement function could provide the buyer company.

The found objectives of portfolio tools were a bit more practical than the strategies. Gelderman and van Weele (2003) found out that the objectives could be categorized to three different levels. Item-level, category-level and matrix-level.

The item level is the bottom-line of objectives in the higher categories. The company decides on the item level what are the objectives for the specific item and how could the procurement bring more value to the organization in terms of a particular item. The objectives related to the category level are formulated for all the different categories of the portfolio tool. The objectives can for example deal with the number of items or suppliers in a category or they can be related to the total spend of a specific category.

On the final matrix level, the objectives are related normally to the way how the matrix is filled. For example, objectives on this level can be related to moving suppliers between categories or emptying a specific category as much as possible.

Moving suppliers or items between different categories in the matrix relates closely to the third objective of Gelderman's and van Weele's (2003) paper. They found out that basically a company has two choices. Companies can take actions to hold the same positions in the matrix or they can take actions pursue other positions on the matrix. In real life this means that if a company wants to move an item or a supplier from a category to another it must actively find ways to modify the supplier or item so that it fits the requirements of the category where it is wanted to be moved. For example, if a company wants to move items from the non-critical-category to the leverage items-category in the Kraljic's matrix, it needs to find ways to combine purchases and to strengthen its purchasing power. Gelderman & van Weele (2003)

3.6 Conclusions of portfolio tools

Portfolio tools have probably become popular among supply management professionals mainly because they are relatively simple to use, and they are able to form a visual easy to understand overall picture of the procurement situation the company is facing. The portfolio tools also provide supply management professionals a simple set of actions regarding how the different item or supplier groups should be managed in order to fully capture the potential value related to them.

The portfolio tools that were presented in these theses can roughly be divided into two groups. The older tools, Kraljic and Olsen & Ellram focused their analyses in the purchased items whereas the later tools were more interested in the relationship between the buyer and the supplier. This can be seen as an improvement in the tools because the portfolios focusing in analyses of the purchased items are rarely capable to capture the value created in the buyer-supplier relationship itself (Dubois & Pedersen, 2002). Because the portfolios can according to their creators be used

as a bottom line for strategic supplier management actions it is essential that the portfolio tools can capture the whole state of the phenomena it is modelling.

On the other hand, the portfolio tools concentrating on buyer-supplier relationships does not solve the problem related to measurement of the dimensions. In some cases, accurate measurement of buyer-supplier relations might be even harder and less objective than measuring dimensions related to single items. Because of this a relevant question is that is it better to use tools that are in theory better but in real life very hard to use or tools that are not able to capture the whole truth but that can be used more easily in real life. Table 5 provides a comparison of the portfolio tools presented in this thesis.

Authors and year	**Constructed dimensions**	**Segments**	**Action plans**
Kraljic 1983	Importance of purchasing, The complexity of the supply market	Materials: Non-Critical items, Leverage items, Bottleneck items, Strategic items	Exploit, Balance, Diversify
Olsen & Ellram 1997	Difficulty of managing the purchase situation, Strategic importance of purchase	Purchases: Non-Critical items, Leverage items, Bottleneck items, Strategic items	Strengthen the relationship, Improve the supplier attractiveness or the performance of the relationship, Reduce the resources allocated to the relationship
Dyer et al. 1998	Arm's length versus partner suppliers, Trust/ Contracts	Relationships: Durable arm's length relationships, Strategic partnerships	
Bensaou 1999	Supplier's specific investments, Buyer's specific investments	Relationship: Market exchange, Captive buyer, Captive supplier, Strategic partnerships	Design management profiles for each of the conceptual profile.

Table 5. Comparison of the portfolio tools.

4. Methodology and data collection

This study is conducted based only on data collected from one case company. Qualitative research tools are used to collect the data, but the actual analysis is conducted quantitatively. The research strategy used in these theses is case study which Eisenhardt (1989) defines as a research strategy which focuses on understanding the dynamics present within single setting. More specifically the chosen research strategy is a single case study which Kähkönen (2011) defines as a case study where the data is collected from a single case company.

Single case studies should be used when the case is a critical case to test a well-formulated theory or the case is extreme or unique or it reveals a previously inaccessible phenomenon. The advantages of single case studies are that they are able to richly describe the phenomenon they are researching. However, the problem with this research strategy is that generalization of the case is very difficult. The researcher may also easily make a mistake by exaggerating the easily available data or by misjudging the representativeness of the data. (Kähkönen 2011)

Yin (2003) suggests that multiple data sources should be used when conducting a case study. This strengthens the validity and reliability of the study. Using multiple knowledgeable informants who are able to look on the researched phenomena from different angles are a good way of reducing bias of the data. Therefore, different kind of informants and sources of data should be used when conducting a case study. This is called data triangulation.

In this case study the data triangulation is done by collecting the data from archives and by using observation as data collection method. Because the writer is an employee of the casa company, observation is a good method of gaining deep knowledge of the phenomena’s inside the company. The employment made it also possible to get free access to the archives of stored supplier data that has been collected in the case company. The employment also made it possible to attend unofficial discussions where subjects that would probably not have been discussed in official interviews where discussed. This further helped to form an overall picture of the researched phenomena.

According to Metsämuuronen (2011) observation is a qualitative data collection method where the researcher more or less objectively observes the research object and makes notes of it during the observation. Traditionally observation is understood as visual observation but also other senses like smell and sound can also be used as observation methods.

Bogdan and Biklen (1992) introduced the term participant/observer continuum to describe the objectiveness of the observer. In one end of the continuum the observer is observing the research object totally objectively where as in the other end the observer is over participating, and the researcher goes native. In this case the line between the research object and the researcher disappears.

Adler and Adler (2000) divides the level of involvement in observation to four different categories: (1) Complete observation, (2) Observer as participant, (3) Participant as observer and (4) complete participant. To this list can be added the Bogdan and Biklen's (1992) over participation and Grönfor's (1985) hidden observation. Whereas the over participation can risk the objectiveness of the study, hidden observation can in certain cases be a good and reliable data collection strategy. In this strategy the researcher infiltrates to the researched target and acts like a participant even though he or she is actually observing the situation as an outsider without really influencing the observed target. This kind of data collection strategy requires a solid analysis of ethicality and researcher has to make sure he or she is not causing harm to observed object.

Choosing the level of involvement in observation has to be done case by case. Observation without involvement is according to Grönfors (1985) a good strategy when the researcher is familiarising himself with the research object. It is smart for the researcher to gain basic information before involving in the activities as a participant. Grönfors (1985) also points out that this is the only ethically acceptable for of observation when observing objects that are involved in illegal activities.

When the researcher is participating the activities of the observation object the researcher has to consider what is the optimal level of involvement. The aim is that the researcher involves is a way that he or she gets the best possible understanding of the object and that the level of involvement is adjusted so that involving in the

activities feels natural. The observer has to understand the unwritten code of conduct the research object is following and the language they are using in order to naturally be able to participate the actions and collect data at the same time. (Grönfors, 1985)

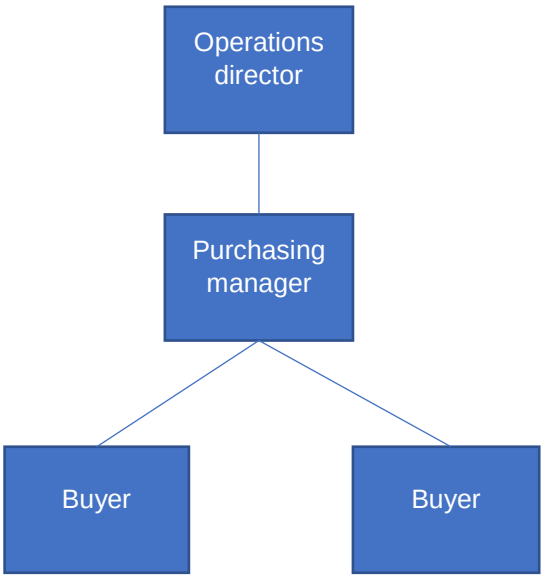
4.1 Case company presentation

The case company from where the quantitative data of this theses is collected is a part of a big multinational industrial company. According to the case company's marketing material it is specialized in electric powertrain systems which deliver market-leading efficiency, and which are suitable for hybrid and electric applications within the power range of 30Kw to 2000Kw. The case company provides its services to three different target markets: marine, transportation and off-highway where the off-highway is currently the most important one.

The case company is based in Finland where the headquarters and the manufacturing is based, but it also serves its international customer through a network of international operation bases. Approximately 90 per cent of the sales is generated from export and the company has been during recent years able to grow its sales annually from 50 to 100 % which of course causes some challenges to the operations function which also includes the procurement of the company.

Another feature of the case company that can be seen both as a weakness and a strength is the very low level of bureaucracy in the company which is due to the relatively young age of the company. This makes it possible for the case company to react and adapt very quickly to market changes but on the other hand this means also that very often the processes of the company have not had time to develop to the most effective form. This means that in many cases the company could save resources with more efficient processes.

The procurement is organised in the case company as a part of the operations function which is managed by the operations director. Picture 8 clarifies how the procurement is placed in the operations function and therefore it is not presenting the operations function as a whole.



Picture 8. Procurement function of the case company.

In reality, the procurement function is not this simple because the function is sharing resources with other departments too especially with the research and development which is closely involved in sourcing activities of the case company.

Currently the case company has identified its most important suppliers mainly by analysing its dependence of its suppliers. By the result of the analysis the case company has identified the suppliers it allocates strategic supply management resources to. In real life this means that the case company is mostly focusing its supplier development actions to these suppliers.

4.2 Data collection

The data of which the quantitative analysis is going to be based on is collected from the case company's ERP-system and it is based on the figures from the year 2017 The data consist of the basic information the company is collecting of its suppliers. This includes the total spend, number of items delivered, on-time delivery percentage, payment term and the current validity of possible frame agreements.

The data is gathered from 82 supplier relationships and the suppliers are mainly supplying both customized and standard electrical and mechanical components.

The biggest problems considering the validity of the data lies in the spend and in the on-time delivery percentage since collecting of these measures requires some manual work that can go wrong. The ERP-system that the case company is using allows the user to make purchases without specifying a price for the ordered item. In these cases, the system assumes that the price is the same as it was in the last purchase. If an item is purchased for the first time and a price is not defined, the system assumes that the price of the item is zero. The problem regarding data validity is that the case company does not have many suppliers it uses fixed prices with which means that the price of an item may variate between different purchases. In other words, the data is valid only if the purchasers of the company make sure that right prices are put to the ERP-system.

The other problematic measure, the on-time delivery percentage is calculated in the ERP-system based on the wanted delivery date that is put to the system and the date when the goods are received in the system. This leads to a few problems. First, when the purchaser sends a purchase order he normally proposes a delivery date that the supplier has to confirm. If the supplier confirms another date the purchaser has to remember to change the delivery date in the system. Otherwise the on-time delivery percentage will be calculated wrongly. An on-time delivery is defined in the system as a delivery which arrives maximum three days earlier than the wanted delivery date but latest on the delivery date. This means that orders that are delivered earlier than three days before the delivery date are considered as late deliveries.

Another problem lies in receiving of the goods. The delivery date of an item depends on the used delivery term. This means that in some cases the delivery date is the date the goods are delivered to the buyer's premises but in other cases the delivery date can be the day when the goods are ready for shipment in the supplier's premises. In order for the on-time delivery data to be valid, the right delivery date has to be defined with regard to the used Incoterm. This requires carefulness and motivation of the employees who are receiving goods. Otherwise the on-time delivery data will not be completely valid.

To make sure these things does not form a major problem for the data validity, random checks of data validity were conducted. This was done by comparing delivery dates from the ERP-system to actual delivery dates that could be seen in the delivery notes of the orders. As a result of this comparison it was found out that this was not a real problem. In all of the randomly selected cases the delivery date in the ERP-system was the same as in the delivery note.

When the purchasing prices in the ERP-system where compared to prices in invoices of orders, a same kind of conclusion could be done regarding data validity as in the previous case. Some differences were found but they could be counted rather in cents than in euros. This means that the difference between the actual yearly spend and the spend that was taken from the ERP-system variates so little that it does not have an effect to the outcome of this study.

4.2.1 Forming the Kraljic's matrix

After the raw data was collected, supplier portfolio tools were utilized to it. The matrix tool that was tested was the Kraljic's matrix. The implementation process started with figuring out how the dimensions of the matrix should be measured. After a discussion with the case company's purchasing manager, a mix of the one-by-one and the consensus method introduced by Gelderman and van Weele (2003) was selected as the measurement method. This method was selected mainly because the interest was to keep the tools as simple as possible and at the same time give the best picture of the current state of the buyer-supplier relationships. Because every supplier of the case company supplies very similar kind of goods, it was considered that instead of placing single items to the matrix, the suppliers of the items would be placed there instead. By doing this, the amount of data in the matrix was reduced significantly without leaving out any significant information.

Putting the suppliers to the matrix started by using the one-by-one method. Only one measure was selected to measure the dimensions. Supplier's total annual spend was selected to measure the profit impact and the number of other potential suppliers available at the market was selected to measure the supply risk.

The thresholds of the categories were defined so that the profit impact was considered high if the total spend of a supplier belonged to the group of suppliers

that were responsible of 80% of the total annual spend. The other dimension, the supply risk was considered high if there was only one potential supplier available at the market. A problem that occurred here was the suppliers who in theory had a potential substituting supplier but due to exit barriers like supplier specific investments changing the supplier was because of economic reasons not an option. In these cases, the suppliers were considered as suppliers with a high supplier risk.

After putting the suppliers to the Kraljic's matrix using the one-by-one method a meeting was organized with the procurement manager where a discussion about the positions of the suppliers was conducted. As a result of this discussion some suppliers where moved to different categories since there was a feeling based on every day experience that the original category was not representing good enough the current state of the supplier-buyer relationship. This was specially the case with suppliers with who the case company has deepened the relations with lately. Because the data was based on purchases that was made during 2017 the impact of the newly deepened relationships was not big enough for the supplier to reach the category where it should belong in terms of future managerial actions. This also pointed out the importance of understanding that portfolio analyses are not modelling a static condition. Instead they are modelling the current state of continuously developing buyer-supplier relations.

This discussion could also have been the primary method of placing the suppliers to the matrix, but the discussion revealed that the process was quite time consuming even though the suppliers were already placed with one method. If the pre-placement would not have been done, the consensus method would probably have been too time consuming on its own and therefore the updates of the categorizations would probably not be done in the future. So, in other words the selected method was basically the consensus method where the one-by-one method is used as the starting point of the discussion.

With the selected methods, 82 suppliers could be placed to a category. However, in total 7 of these 82 suppliers could be seen as hard cases since no of the categories perfectly described them. This was mainly because of uncertainty of how the demand of the supplied items would change in the future. It was considered very likely that the current situation was going to change but it couldn't be said with

certain how much or to what direction. Despite this problem these suppliers were placed to the category that seemed more suitable than the other one.

Category	Number of suppliers	Percentage of suppliers
Bottleneck	14	17%
Leverage	14	17%
Non-Critical	39	48%
Strategic	15	18%

Table 6. Suppliers in the Kraljic's portfolio.

Suppliers in the bottleneck category are mainly delivering the case company standardized items that due to technical capabilities required from the supplier are hard to buy from other suppliers. All the suppliers in this category are big multinational companies that have a strong market share of the business they are in.

The suppliers in the leverage category are mostly delivering items that are customized to the needs of the buyer. The level of technology needed in manufacturing these items is not especially high and the manufacturing of the customized goods does not require a high level of information change between the buyer and the supplier.

Non-critical suppliers of the case company consist of very many kinds of different suppliers. Most suppliers in this category are supplying standardized goods but the category also contain suppliers supplying customized items that are either not important for the buyer or the economic value of the purchases is small at the same time as the supplier could easily be changed to another one if needed.

The most important category, the strategic suppliers are supplying the case company items that are very essential for their end-product. Most of information sharing in the buyer-supplier relations of the case company is done with the strategic suppliers and many internal stakeholder groups of the case company is in close collaboration with their counterparts at the strategic supplier. The strategic suppliers- category is also almost an exact copy of the

4.3 Analysing the data

Because the categories in the portfolio models are nominal level measures regression analyses cannot be used in order to find out if a category explains supplier quality. Because of this the data is going to be analysed using the analyses of variance or ANOVA. The specific form of ANOVA that is going to be used is one-way ANOVA

ANOVA is used to find out if the means of two or more groups are statistically different on some dependent variable. ANOVA can be used when there is one at least interval level dependent variable on which a set of groups is being compared to and at least one nominal or ordinal level independent variable on which the groups are based. The independent variable is often called a factor. Because ANOVA compares the means of the dependent variables in different groups, the dependent variable needs to be measuring something from which it makes sense to count the mean of. This is also the reason why the dependent variable must be at least an interval level variable. (Leik, 1997)

The base line for ANOVA is the null hypothesis according to which there is not a statistic difference between the means of the groups. The null hypothesis can be rejected if the analyses show that there is a big enough difference between the groups. In practice this is done by comparing variances inside the groups and variances of the means between the groups. If these two variances are close to each other, it is likely that the distributions of the populations in the different groups are quite similar. In these cases, the null hypothesis cannot be rejected. If the variances inside and between the groups have a significant difference, it is likely that the groups are representing different kinds of distributions. In this case the null hypothesis can be rejected. (Leik, 1997)

The statistical significance is tested with the F-test and the p-value or probability value related to it. If the p-value is smaller than the chosen risk-level, the null hypothesis can be rejected. Normally a risk-level of 5% or 0,05 is used. This means that in order to reject the null hypothesis the p-value has to be smaller than 0,05. (Leik, 1997)

In ANOVA of these thesis the hypotheses are constructed as follows:

H_0 There is not a difference in the on-time delivery percentages between the categories in the Kraljic's matrix.

If the null hypothesis is rejected the alternative hypothesis is:

H_1 There is a difference in the on-time delivery percentages between the categories in the Kraljic's matrix.

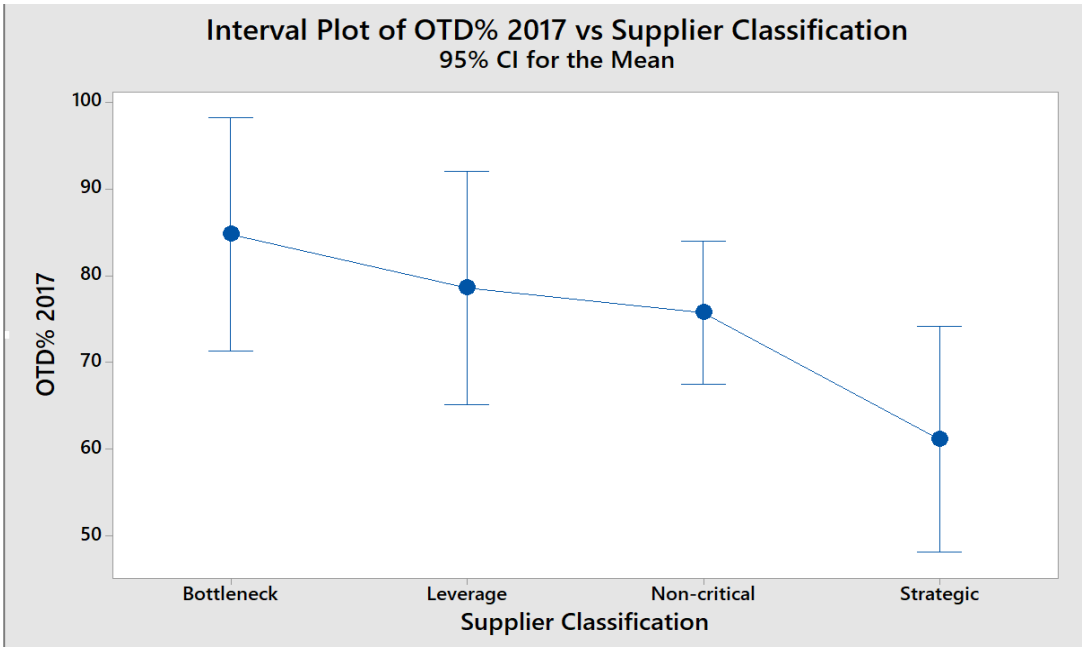
5. Results of the study

As can be seen from the underneath pictures, there was a small difference between the on-time delivery percentages in the different categories of the Kraljic's matrix. It was just not big enough for rejecting the null hypothesis. Therefore, according to this test the categories of the Kraljic's matrix does not explain the on-time delivery performance of a supplier.

Analysis of Variance

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Supplier Classification	3	4425	1474,9	2,31	0,083
Error	76	48549	638,8		
Total	79	52974			

Picture 9. Analysis of Variance



Picture 10. Interval plot of OTD% vs Supplier classification

Because the null hypothesis could not be rejected the analysis of the results has to be focused on why the category cannot explain supplier performance. The analyses

will start with digging deeper into the supplier relations in every category and by finding factors that explain why the performance level of a category is on a level it is and why there is not a statistically significant difference in the performances of the categories.

What was a bit surprising in the results was the placement of the strategic suppliers-category compared to the other categories. The mean of the on-time delivery percentage was lower than the mean of the other categories.

Reasons for this can be found by further investigating the suppliers that are categorized as strategic and by filtering them according to their on -time delivery capabilities.

By doing this it was found out that strategic suppliers who performed worst in terms of on time delivery where quite new suppliers who supply technically demanding items specially designed for the case company's needs. However, the variance of on-time delivery performance among strategic suppliers cannot be explained only by this. It is true that the best performing supplier relations are older than the worst performing ones. The problem lies in the supply relations that performs somewhere in the middle. Among these relations are relations that are as old as the worst and best performing ones.

In addition to the maturity of the buyer-supplier relationship another factor that could explain why the on-time delivery capability among strategic suppliers was worse than among other supplier categories is the complexity of the purchased item. This cannot be tested with help of the available data since it doesn't contain anything whit what the complexity could be reliably measured. This aspect would also require finding out how much co-operation has been done with each supplier in order to find out a how good starting point the supplier has for successful deliveries.

What is also remarkable is that the case company's list of suppliers to which it allocates its supplier development activities was almost the same as the strategic suppliers in the Kraljic's matrix. This means that the case company's supplier development actions have not been able to significantly improve the supplier quality of the selected suppliers compared to the other suppliers. There are basically two options this may be due to. It might be possible that without the taken supplier

development actions the supplier performance of the strategic suppliers would be worse than what it is now. In this case the complexity and technical requirements the strategic suppliers are facing would explain the relatively low performance of the strategic suppliers. The other possible option is that the supplier development actions the case company is taking are wrong or then the right actions are implemented in a wrong way. From the future point of view this would be the more preferred option because it would mean that the performance of the strategic suppliers could be increased by developing processes inside the case company. This would in many cases be probably easier than increasing the capabilities of a supplier in a situation where almost all possible support is already given for supplier development.

In real life the truth of why the strategic suppliers- category is performing worse than the other ones in terms of on-time delivery performance lies probably somewhere in the middle of these two alternatives. It is hard to believe that there is nothing that could be done better in terms of supporting the strategic suppliers and on the other hand it is also not very likely that taken supplier development actions would not have any effect on the performance of the strategic suppliers.

Now when it has been analysed why the strategic suppliers are doing worse compared to the other supplier categories the analyses can be focused on what kind of suppliers are found from the other categories and what could from their point of view explain the results of the ANOVA.

Another interesting question related to the on-time delivery performance of the Kraljic's categories is why the bottleneck suppliers seems to be doing better than the other suppliers.

When the question is approached in the same way as when finding out why strategic suppliers are performing worse than the other ones, it was found out that the bottleneck suppliers are delivering mainly standardized items. In addition to this the buyer-supplier relations have been quite stable during the past years. This means that the supplier can anticipate the demand much easier than the strategic suppliers and therefore it is also easier for the bottleneck-suppliers to be able to meet the on-time delivery requirements.

The last two categories, the non-critical suppliers and leverage-suppliers are in this case the trickiest one to explain. These categories contain suppliers that have features from the both two other supplier categories. In other words, they contain supplier delivering customized items as well as suppliers who mainly deliver standardized items that can be found on the suppliers list of products.

The suppliers in the non-critical category are mostly distributors of components that can easily be bought from many different retailers. The category includes also suppliers supplying customized items, but these items are easy to manufacture, and it is easy to find a substituting supplier for them. These products are also needed only occasionally, and the need is normally not related to direct operational capability which means that quality problems with the customized items in the non-critical category does not cause as much damage for the case company as other bad quality customized items it is buying.

Because of the nature of the purchases made from the suppliers the reliability of the data concerning the non-critical suppliers is probably the worst of the categories. This is because normally the interest in these purchases is just to get them done as easily as possible. This may easily lead to a situation where required delivery dates and other requirements of the purchases are not possible to fulfil from the suppliers' side. When this is combined to the fact that especially bigger retailers don't always confirm the orders placed to them, the quality of input data to the ERP-system from which the data is collected for this research cannot be guaranteed.

From procurement point of view, the challenge with supplier quality in the leverage category is the big number of items that are bought from these suppliers. Even though the products are technically much easier to produce than the products in the strategic or bottleneck supplier- categories the number of items and the relatively small spend per item makes the case company a less attractive buyer in the eyes of the suppliers. Of course, the case company has also smaller leverage-suppliers for who the total spend of the case company can provide a big source of motivation.

These points summarize very well the biggest problem the case company has in its procurement. Even though it is concentrating its whole available purchasing power to some suppliers, the spend is still not big enough so that the larger suppliers would

really be interested of the case company as a customer. The smaller suppliers are a help to this situation but because they are mixed in the categories with the bigger ones, the categories just contain too many kinds of suppliers and supplier relations so that the category itself could be used in explaining some features of the suppliers it is containing.

6. Discussion and conclusions

Supplier segmentation can as a process provide organizations a lot of useful information related to their supply chains. Supplier segmentation should be used as a method to divide different suppliers into groups based on their characteristics. The idea is to create different strategies to each group that fits the characteristics of the suppliers in the group. By doing this buyers' try to maximize the value they are receiving from their suppliers. (Day et al., 2010)

In this thesis the segmentation of suppliers was done by using Krajlic's purchasing portfolio matrix as the portfolio tool. As Olsen and Ellram (1997) pointed out, the process of the supplier segmentation is as important as the outcome of the segmentation itself. This was the case also in this thesis. The measurement problem of purchasing portfolio tools presented by Gelderman and van Weele (2003) was a real challenge when the purchasing portfolio tool was implemented. However, tackling the problem gave a lot of information about the supply chains of the case company.

Even though the measurement problem was tackled with the Kraljic's matrix it doesn't mean that the measurement would be solved if other portfolios were used. The main question regarding the measurement problem is how much it is worth to spend resources in creating real life measures for the different purchasing portfolio analyses. When the measured dimension becomes more complex, the measurement becomes easily less reliable because of problems related to it.

As a counter question for this, it can be asked if precise measurement of the dimensions is necessary or could the benefits of the purchasing portfolio tools be achieved without precise measurement.

Gelderman and van Weele (2003) answered this by introducing their three different measurement methods for purchasing portfolio tool dimensions. From these three methods the consensus method provided a way of getting around the strict measurement since an essential part of the method is to have a deep discussion with people familiar with the supply-relation in question in order to place the suppliers to the right categories based on this discussion.

In this thesis the most efficient way was to use a mix of measuring methods. First the dimensions were measured with one simple measure each. After the supplier were placed to categories based on this, a discussion was organized where the placements of the suppliers where re-checked. As a result, some suppliers where moved to categories that better described the features of the supplier.

If the results of the study are looked from the supplier performance's point of view, it can be asked if a single supplier performance measure can be used to measure correctly the performance of all the supplier categories. As the sources of competitive advantage presented by Chatain (2011) and Barney (1991) are very different among the different supplier categories, the result of the ANOVA could be very different if a customized measurement system had been created for each category to better suit the characteristics of sources of competitive advantage the suppliers in each category are providing.

6.1 Answering the research questions

Even though purchasing portfolio tools have some major drawbacks they are useful tools of collecting information of the supplier base. The main research question of this thesis, *how can information provided by purchasing portfolio tools be utilized in value creation,* can be answered by that the segmentation process itself forces the company utilizing purchasing portfolio tools to dig deep into their supplier base and think on what kind of supplier relations are formed between the company and its suppliers (Olsen and Ellram, 1997). This knowledge can be used to create an understanding of what kind of risks and possibilities the current supplier base is causing. When the company executives are also aware of in what kind of supplier relations the risks and possibilities are in, it helps the executives to develop actions to control the risks and utilize the possibilities.

The information gathered from purchasing portfolio tools can also be used as a baseline for a supplier management strategy (Day et al., 2010). Based on the segmentation, it is possible to develop a portfolio strategy where an ideal future supplier portfolio is defined. After this separate action plans can be developed for

each category where the steps of moving the current situation of the category towards the ideal situation are defined.

The first sub research question, *how can information provided by purchasing portfolio tools be utilized in assessing the current state of supply management actions,* can be answered in general if a company has focused its supply management actions to a specific supplier category. This was the case in the case company of this thesis. Most of the supply management efforts were concentrated to a group of suppliers that matched very closely the strategic suppliers- category in the Kraljic's matrix.

This information can be used to find out if the performance of a category to which supply management actions have been allocated is performing better than the other categories.

In the case company of this thesis, a statistically significant difference in the performances of the categories could not be found even though supply management actions had been focused to basically one category. As Bensaou (1999) puts it, this can be due to that either wrong actions are taken or then the right actions are not implemented in a way so that the best possible solution could be achieved. However, it is impossible to say how the strategic suppliers- category would have performed if any supply management actions would not have been taken. Therefore, it is impossible to say now how well the actions have worked. In order to say this, a before and an after test should be conducted. Based on these it would be possible to assess how well supply management actions are working.

When trying to answer the last sub research question, *what kind of dependencies can be found between supplier quality and purchasing portfolio tool categories,* nothing was found in the test conducted in this thesis. In other words, it failed to be shown that a purchasing portfolio category would statistically explain supplier quality.

Bensaou (1999) gives a good explanation of why this happened. According to him supplier categories does not explain supplier quality because it is as likely in every category that wrong management actions are taken. The most important thing to understand from this outcome is that a strategic partnership or any other kind of

relation with a supplier does not itself guarantee that the relation is going to work. Therefore, skilful supply management actions are needed.

6.2 Suggestions for future research

As was mentioned earlier in chapter, it is a good question if it makes sense to measure the performance of all the supplier categories with a same measure since the sources of competitive advantage received form the different supplier types is very different.

First, it would be interesting to repeat the ANOVA test conducted in this thesis with a larger amount of data including a bigger variance in types of the suppliers it is presenting. In this way the validity of the research could be improved. Secondly the same analysis could be conducted after tailoring a performance measurement set for each category. This would first require an extensive literature review on supplier performance measurement in order to be able to form the measurement system in the best possible way. After this the ANOVA could be used to explain more reliably the dependence between supplier categories and supplier performance.

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