MASTER

# A roadmap to cost reductions in the second tier supply base of high tech organizations

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# A roadmap to cost reductions in the second tier supply base of high tech organizations

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# Preface

With this master thesis my study at Eindhoven University of Technology at the faculty of Industrial Engineering will be concluded. This project was executed at the procurement department of a high tech organization, in which I have investigated how this organization could enable a structured approach for realizing cost reductions in their second tier supply base.

First of all, I would like to thank Bonnie Beerkens, my university mentor, who supported me during the entire project with input and feedback. Our regular meetings, in which we discussed the progress of the project, motivated me to overcome the challenges I had and to pursue good results for this project. Secondly, I would like to thank Jimme Keizer, my second assessor from the university, for his input on the research methodology and feedback on the project.

At the organization in which this research was conducted, I would like to thank my company supervisor for giving me the opportunity to execute my master thesis in this organization. Personally, this was a very valuable experience in which I have come to learn that I want to continue my career in the procurement profession. I would also like to thank her for providing me with input and the required data for executing this project. I would also like to thank all the other employees of the procurement department within the organization for the time and effort they invested in my project.

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Finally, I would like to thank my family, girlfriend, friends and especially my parents who have supported me during this graduation project and all my other years at the university. Your support is much appreciated.

Jeffry ter Meer

December, 2013

**Due to confidentiality regulations the name of the organization, in which this master thesis is conducted, is mentioned as organization X. The same applies for organizations in which case studies were conducted, these are mentioned as organization A, B and C.**

# Management Summary

The global economic recession causes the markets of organizations and their products to erode; as a consequence organizations are forced to reduce their costs. There are several internal opportunities for organizations to reduce their costs; another option is to make sure an organization buys the products from its suppliers for the lowest possible price. However, most high tech organizations like organization X have optimized their first tier supply base so far that none or limited cost reduction opportunities are left or they are not known. Tough price negotiations and increasing pressure on suppliers' margins have resulted in very low profit margins for the suppliers, which also results in suppliers running out of options to cope with the annual cost price reduction targets imposed by the customer organizations. Therefore additional steps need to be taken to realize cost reductions in the supply chain.

This research focusses on one of those additional steps, the one in which a high tech organization tries to cut costs in the deeper levels of its supply chain: the second tier supply base. However, organizations cannot cut costs directly at their second tier suppliers, since an organization buys products from its first tier suppliers, not directly from the second tier suppliers. The cost reductions at the second tier suppliers thus initially have to be enabled via the first tier suppliers. This lead to the following problem statement:

*Organization X faces market price erosion of their products and has optimized its first tier supply base as far as possible, therefore additional ways of cutting costs are necessary. To achieve this, it must be found out what cost reduction strategies for their second tier supply base are and how they can apply these on their first and second tier suppliers and sourced product types.*

To find a solution to the problem statement, a literature review and qualitative research in the form of cases studies in high tech organizations was conducted. This resulted in a conceptual model which is shown in Figure 1; this model provides high tech organizations with a structured approach for realizing cost reductions in their second tier supply base.

In the first two steps, an organization has to create supply chain transparency with the first tier suppliers of strategic products. In this research became clear that these products are best suitable to consider for second tier supplier cost reduction strategies, and supply chain transparency is necessary to identify the cost reduction opportunities. The process continues with identifying key second tier suppliers in step 3. These are the second tier suppliers of leverage and strategic parts; since these parts have a relatively large influence on the cost price of the end-product they also have a relatively high cost reduction potential.

In step 4, organizations have to determine their customer position as a second tier customer; this information can be used to determine the leverage advantage against a second tier supplier. In order to make optimal use of their leverage advantage, an organization first must obtain a good second tier customer position. To achieve this, organizations can apply several strategies to increase their attractiveness and become an important second tier customer.

When this position is obtained, an organization can start with choosing a second tier supplier cost reduction strategy in step 5. These split up in two kinds of strategies: clustering and countering strategies. Clustering strategies are aimed at improving the whole supply chain while reducing costs for all involved parties. In the countering strategies, two parties in a supply chain develop a relationship to counter the bargaining power of the third party. It depends on the kind of cost reduction strategy chosen, if closed triads with a second tier supplier need to be created. In a closed triad the focal organization and the second tier supplier have established a formal link, share information and manage their mutual relationship with contracts and regular interaction. In the final step, the second tier supplier cost reduction strategy can be enabled.

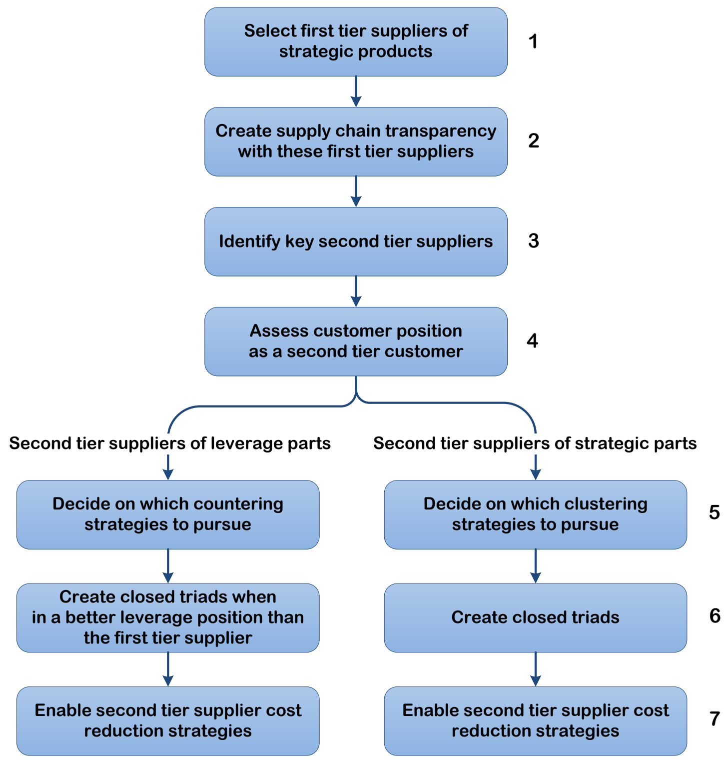


Figure 1: Conceptual model for enabling cost reductions in the second tier supply base

This research contributed to the current body of knowledge in the procurement profession by showing that, regarding second tier supplier second reduction strategies, key second tier suppliers are suppliers of strategic and leverage parts, which end up in strategic products of first tier suppliers.

Another contribution made is the importance of the customer position as a second tier customer. The second tier customer position can be used to determine the leverage advantage against a second tier supplier, which can be utilized when the cost reduction strategies are executed. This paper also provides the reader with factors which can help to determine the second tier customer position and strategies for organizations to increase their attractiveness as a second tier customer.

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# 1. Introduction

The global economic recession causes the markets of organizations and their products to erode; as a consequence organizations are forced to reduce their costs. Irrespective of sector, size or situation, the economic downturn has driven organizational costs high up the agendas[1]. There are several internal opportunities for organizations to reduce their costs, for example to optimize its production processes, payroll cost reduction, benefits cost reduction, etc. (Bragg, 2010). Another option is to make sure an organization buys the products from its suppliers for the lowest possible price. Organizations can do this for example by cost price negotiations (Van Weele, 2009), supplier consolidation, value engineering (Bragg, 2010) or by installing a Vendor-Managed Inventory system (Dong & Kefeng, 2002).

However, most buying organizations have optimized their first tier supply base so far, that none or limited cost reduction opportunities are left or they are not known. Tough price negotiations and increasing pressure on suppliers' margins have resulted in very low profit margins for the suppliers, which also results in suppliers running out of options to cope with the annual cost price reduction targets imposed by the customer organizations. Therefore additional steps need to be taken to realize cost reductions in the supply chain, ensure suppliers stay financially healthy and to cope with the rising market pressure (Follis and Enrietti, 2001).

This research will focus on one of those additional steps, the one in which an organization tries to cut costs in the deeper levels of its supply chain, the second tier supply base. When costs are cut at the second tier supplier level, first tier suppliers can buy products at a lower price, which translates into potentially lower prices for the organization itself. Second tier suppliers are defined as *organizations which sell and deliver goods or services to a first-tier supplier*[2], thus any organization which is contracted to a first tier supplier of a focal organization. A focal organization is defined as *the initiator of an international business transaction; they conceive, design and produce the goods or services intended for consumption*[3], so organizations which sell their products to the end-users.

Organizations cannot cut costs directly at their second tier suppliers, since an organization buys products from its first tier suppliers, not directly from the second tier suppliers. Therefore cost reductions at the second tier suppliers initially have to be enabled via the first tier suppliers. For this reason it is essential to investigate how these first tier suppliers and sourced products can be used for the purpose of enabling cost reductions in the second tier supply base. This will be further elaborated on in the problem statement in chapter 1.2.

[1] Found on - http://www.supplymanagement.com/resources/how-to/2010/uncovering-hidden-costs/ - Published on 7 January 2010 by Paul Livingston and Mike Fogg - viewed on 15-09-2013

[2] Found at http://lexicon.ft.com/Term?term=second_tier-supplier - Longman Business English Dictionary – Viewed on 15-09-2013

[3] Found at http://wiki.answers.com/Q/What_is_the_meaning_of_focal_firm - By Cavusgil, Knight and Riesenberger, 2008, International Business - Viewed on 15-09-2013

## 1.1. Description of Organization X

In this section, a short description of organization X and its procurement department is given in order to create a better understanding of the context in which this research took place. This description will also serve as an introduction to the problem statement and research questions in the next sections.

Organization X has operations in more than 60 countries worldwide and consists out of several business groups. Next to the business group in which this research took place, business group X, there are 3 other business groups. Business group X makes up about 70% of organization X' sales and is therefore an important business group in the organization. The procurement department is one of the several business units within business group X, which is illustrated in Figure 2. The scope of this research will lie on this procurement department and the supply base of organization X, which will be dealt with in more detail in the next chapters.

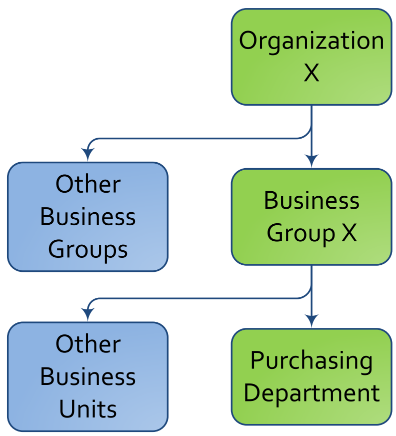



Figure 2: Organogram of organization X

This market in which organization X is operating is marked by aggressive competition and also new competitors are entering and growing rapidly on the market. This causes that the products of organization X are subject to price and margin erosion, which is the main reason for this research as will be explained in the next section. In Figure 3 below is illustrated what the place of organization X' products are in the supply chain, which is at the end of the supply chain right before the end-user.

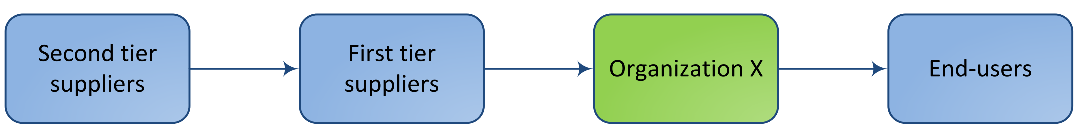



Figure 3: Position of organization X in the supply chain

The production of organization X is characterized by low volume, high mix and high complexity and the bill of material makes up approximately 75% of the organizational costs. In the past decades organization X has moved part of its production to low cost countries and outsourced some of its activities in order to reduce costs. This enhanced the importance of managing the first tier suppliers and the role of the purchasing department within organization X.  The supply base of organization X consists mostly out of single source suppliers, which are providing an increasingly higher level of assemblies. Therefore organization X can provide the same product with less internal production.

## 1.2. Problem statement

In this part is explained what the problem statement is and it is applied to organization X. In the introduction was explained that when organizations like organization X are confronted with market price erosion of their products, they have to reduce their costs. Like other organizations, organization X has managed to deplete its first tier suppliers in such a way that none or limited cost reduction opportunities are left. For this reason, other cost reduction opportunities have to be investigated; this research will focus on one of these opportunities: realizing cost reductions in the second tier supply base.

The problem of enabling cost reduction opportunities in the second tier supply base of organization X is two folded, these two parts are elaborated on below.

The *first part (1)* of the problem is that cost reduction strategies for the second tier supply base are very little described in current academic literature; these cost reduction strategies must first be investigated and identified in order to be able to execute them. Strategies for unlocking cost reductions in the second tier supply base will further be referred to as *second tier supplier cost reduction strategies*.

A problem related to second tier supplier cost reduction strategies, is that the benefits can be relatively diffuse. If cost reductions are realized in the second tier supply base of organization X, first tier suppliers can benefit from this as well, since they buy their products for a lower price. Therefore it is important that the outcome of the strategy is potentially beneficial for organization X and not solely for the first tier supplier, since a first tier supplier will preferably maintain its pricing and thereby increase its profit margin. This conflict of interests is important to take into account when regarding second tier supplier cost reduction strategies.

The *second part (2)* of the problem lies in the difference between the kinds of suppliers and sourced products from these first tier suppliers, on which these second tier supplier cost reduction strategies can be applied to. Not all second tier supplier cost reduction strategies will have the same utility for all kinds of first and second tier suppliers and sourced product types. The second part of this problem is thus to identify the most relevant factors which can be used *to categorize the first and second tier suppliers and sourced products for the purpose of enabling cost reduction opportunities in the second tier supply base*.

Combining these two problems leads to the overall problem statement and is illustrated in Figure 4.

*Organization X faces market price erosion of their products and has optimized its first tier supply base as far as possible, therefore additional ways of cutting costs are necessary. To achieve this, it must be found out what cost reduction strategies for their second tier supply base are and how they can apply these on their first and second tier suppliers and sourced product types.*

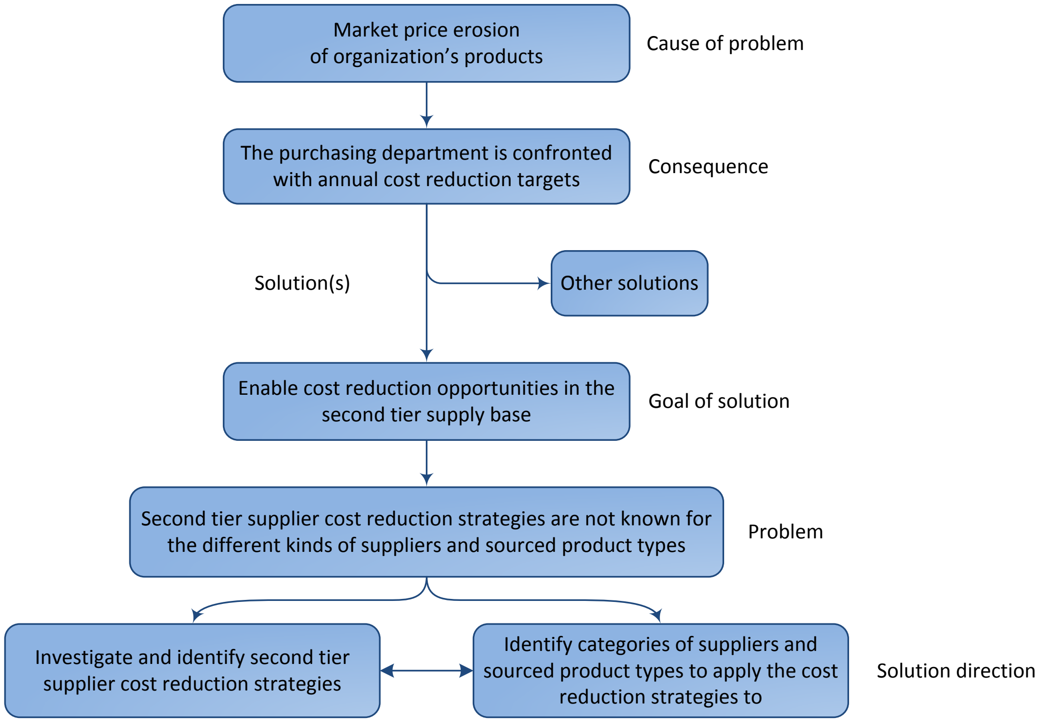


Figure 4: Problem statement

## 1.3. Research question

The problem statement is now formulated into a research question and provides a basis for the sub research questions. The research question which follows from the problem statement is:

*How can the procurement department of organization X identify and deal with cost reduction strategies in their second tier supply base?*

### Sub questions

In this section, 5 sub questions for this research question are given. Answering these sub questions should give a solution to the problem statement by forming a conceptual model.

1) What are second tier supplier cost reduction strategies, which are in the sphere of influence and beneficial for a focal organization?

2) How can first tier suppliers, second tier suppliers and sourced products best be categorized for the purpose of second tier supplier cost reduction strategies?

3) What second tier supplier cost reduction strategies fit the categorization of sub question 2?

4) How does the supply base of organization X fit in this categorization and which second tier supplier cost reduction strategies are applicable?

5) What are the side effects of implementing second tier supplier cost reduction strategies for organization X?

## 1.4. Research Methodology

To answer the research questions mentioned above and come to a conceptual model, a literature review and qualitative research in the form of cases studies were done, which is illustrated in Figure 6. This process can be described according to the regulative cycle of Van Strien (1986) in Figure 5, which is a problem solving cycle which can used to create new designs for existing problems. The first step in this cycle, problem definition, was described in the problem statement in chapter 1.2.

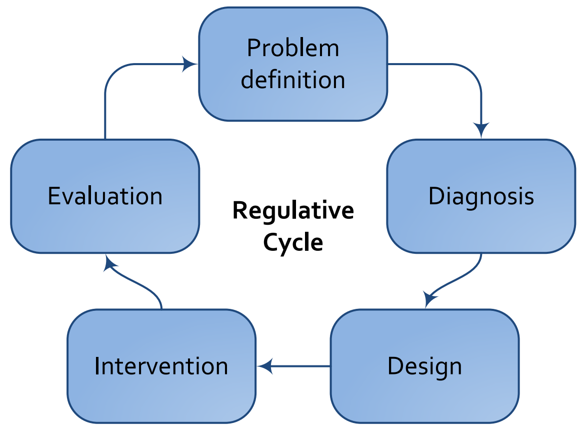



Figure 5: Regulative Cycle

First was started with a literature review to investigate the current knowledge on this topic and related topics, which is the diagnosis step in the regulative cycle. Once these topics were investigated and the current state of knowledge of these topics was described, a preliminary conceptual model was designed based on the information found in academic literature. This represents the design step in the regulative cycle. Next to that, knowledge gaps in current literature were identified, which served as a basis for further investigation in the case studies.

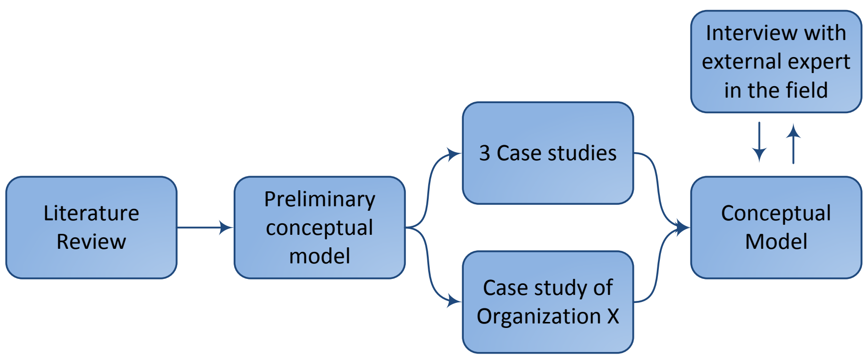



Figure 6: Research methodology

To validate the preliminary conceptual model, gain extra information on this topic and investigate the knowledge gaps, qualitative research was conducted. This is the intervention step in the regulative cycle. The explorative nature of this research project is the reason that qualitative research instead of quantitative research was chosen (Van Aken et al., 2012), since this research sought to gain understanding in second tier cost reduction strategies by theory forming and finding new methods in second tier supplier management. Qualitative research was done via semi-structured interviews in the form of one case study within organization X itself, three case studies at other high tech organizations and one interview with an external expert in this field. The interview questions are listed in Appendix V. To be able to compare the cases in the case analyses, propositions were formulated after the preliminary conceptual model was designed.

Typical cases, which are representative for the high tech sector in which organization X is operating, were selected for the case studies (Van Aken et al., 2012; Yin, 2009). The unit of analysis for these cases was the procurement department of the organization, a purchasing manager which has a good overview on the whole department was chosen for the interviews itself.

The interviews were semi-structured interviews because the framework of questions left enough room for new ideas to be brought up during the interviews (Van Aken et al., 2012). After the interviews were conducted and analyzed, brief follow-up interviews were conducted which is illustrated in Figure 7. The reason for this was that some conclusions needed further clarification and some topics needed to be discussed more in depth.

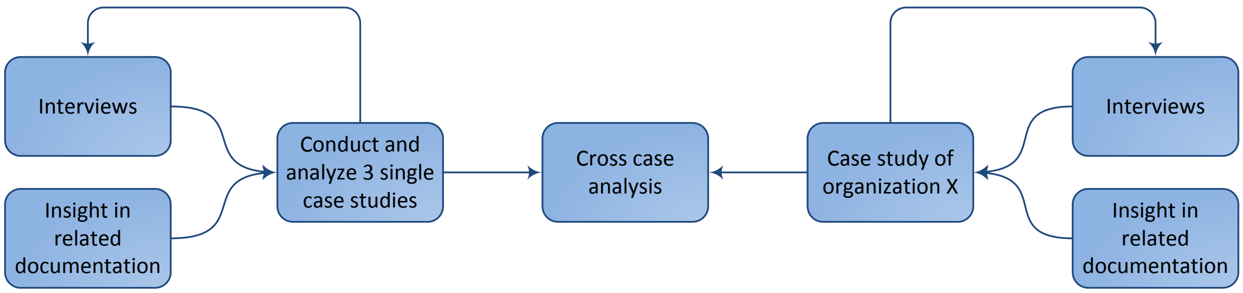


Figure 7: Research methodology for case studies

To ensure the quality of qualitative research, four quality aspects were taken into account: construct validity, internal validity, external validity and reliability (Yin, 2009). To ensure construct validity, the interviewees were asked to provide additional data and documentation from the organization about the topics discussed in the interviews. In this way a chain of evidence was obtained. For internal validity of the interviews, the worked out interviews were feed back to the interviewees to check whether the conclusions drawn from these interviews corresponded with what they actually meant. Given the explorative nature of this research, the external validity and generalizability is limited. Therefore *analytic generalization*[4] was used for the cases studies, since the preliminary conceptual model was designed based solely on academic literature. To enhance the reliability of the case studies, semi-structured interviews were conducted and the interview questions were based on the propositions made after the literature review.

Once all the cases were finished and analyzed separately, a cross case analysis was done by comparing all the cases on the propositions made after the literature review. In this way differences between the organizations in their approach regarding second tier supplier cost reduction strategies could be compared and analyzed, after which cross case conclusions were drawn based on their common denominator (Yin, 2009). These cross case conclusions were used as input for the final conceptual model. The final conceptual model was then validated in an interview with an external expert in the field, to see if the model matches his ideas and expertise.

A last step in this master thesis was to formulate recommendations for the organization X, which is illustrated in Figure 8. Here, the conceptual model was reflected to the current situation in organization X, after which recommendations could be made. This is also the last step in the regulative cycle, evaluation.

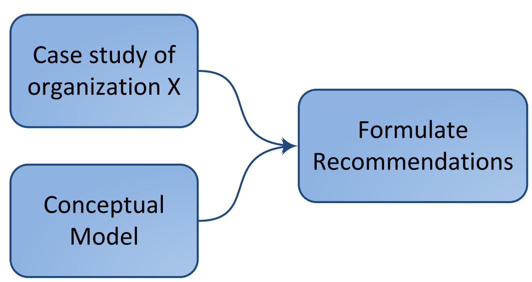


Figure 8: Recommendations for organization X

[4] Definition: a previously developed theory is used as a template with which to compare the empirical results of the case study (Yin, 2009)

## 1.5. Goal and need of this research

Since not much academic literature was available on this topic, the nature of this research was explorative and the target was to contribute in a first step in multi-tier supply chain theory forming, which focusses especially on cost reduction strategies for the second tier supply base.

Most organizations have yet to start with managing their second tier supply base and in academic literature second tier supplier management is also still largely unexplored territory (Mena et al., 2013; Skilton & Robinson, 2009; Kim et al., 2011). In some industries there is already extensive experience with second tier supplier management, for example in many automotive organizations, but very little of these experiences are translated into academic literature. Current research on the sub-tiers of the supply chain focusses mainly on the topics of supply risk (Kraljic, 1983; Harland et al., 2003; Kull & Closs, 2007), product quality (Tse et al., 2011) and new product development (Vaccaro et al., 2010; Kannan & Keah, 2010). Solid multi–tier theories for the supply chain still need to be created, as Mena et al. (2013) mentioned, ”what happens within the multi-tier supply chain is still largely underexplored”. There is no study about cost reduction strategies in the second tier supply base; therefore this topic needed further investigation

In the case of organization X, this research provided an addition to the current actions taken to realize cost reductions in their second tier supply base and provided a model to solve the problem statement. Current actions within organization X originate mostly from the experience and expertise of employees, but not from literature or theories specifically on this topic. However, there is much knowledge within the procurement department of organization X about cost reduction strategies and its supply chain, therefore this research served to close the gap of knowledge within the procurement department of organization X by creating a conceptual model for the second tier supplier cost reduction strategies. The aim of this conceptual model was to not only be applicable to this procurement department, but also to other business groups within the organization and to other similar high tech organizations.

## 1.6. Thesis outline

The outline of this master thesis is illustrated in Figure 9. In chapter 2 will be started with a summary of the complete literature review which was made as a preparation for this master thesis and provides theoretical background on this topic. The preliminary conceptual model, which was designed after the literature review, is described in Appendix III. Next the case study analyzes are described in chapter 3 and cross case conclusions are drawn. Once these cross case conclusions are described, the final conceptual model is made in chapter 4. This master thesis will be concluded with general conclusions of this research and recommendations for the purchasing department of organization X in chapter 5.

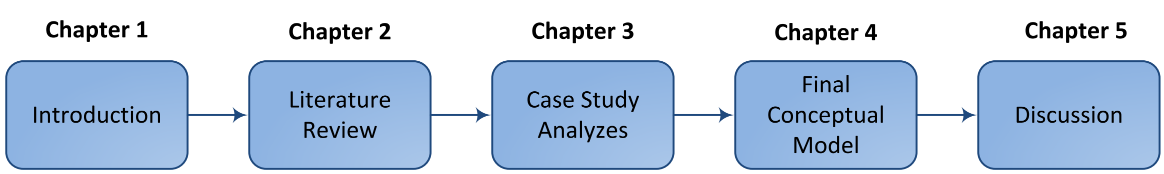



Figure 9: Thesis outline

# 2. Literature review

As a preparation to this master thesis, a literature review was conducted in which theoretical background on second tier supplier cost reduction strategies was provided. In this chapter a summary of the essential aspects from this literature review are given.

The goal of this literature review was to give a preliminary answer to the sub research questions, by making a preliminary conceptual model. In order to answer these sub research questions, several aspects of second tier supplier cost reduction strategies were consulted in literature. Since second tier supplier cost reduction strategies are part of second tier supplier management in general; second tier supplier management is discussed first in chapter 2.1. After this the, multi-tier supply chain structure is discussed in chapter 2.2 to give insight in the involved parties and their relationships. Next supply chain transparency is discussed in chapter 2.3, since creating a certain degree of supply chain transparency is essential to enable second tier supplier cost reduction strategies. The remainder of the literature review will focus on the two parts of the problem statement: supplier and sourced product categorizations are discussed in chapter 2.4 and second tier cost reduction strategies in chapter 2.5. In chapter 2.6 the knowledge gaps in literature are discussed, after which the preliminary conceptual model is illustrated in chapter 2.7. A detailed description of the preliminary conceptual model is given in Appendix III.

## 2.1. An overview on second tier supplier management

Before zooming in on a specific part of second tier supplier management, second tier supplier cost reduction strategies, it makes sense to first elaborate on different aspects of second tier supplier management and why organizations should manage their second tier suppliers at all. The rationales behind second tier supplier management are discussed in this section.

### 2.1.1. Rationales behind second tier supplier management

Organizations can benefit significantly in performance and costs from building relationships with suppliers beyond the first tier, since organizations with a broad span of supply chain integration outperform those with a narrow integration span (Trkman & McCormack, 2009; Kannan & Keah, 2010). This is an important reason for organizations to integrate and manage their second tier suppliers. Supply chain integration can be defined as *an approach that seeks to manage and harmonize all elements of a supply chain from raw material to finished product in order to achieve higher levels of performance and reduced costs*[5]. However, for most organizations an average of 95% of the integrative efforts focuses on the first-tier suppliers and it differs per organization and per industry if managing beyond the first tier of suppliers is necessary and important (Fawcett & Magnan, 2001).

The most important rationales for organizations to engage in second tier supplier management found in literature are elaborated on below.

[5] Found at - http://seaonline.org/Briefings/documents/SupplyChainIntegration.pdf definition used by the Supplier Excellence Alliance – Viewed on 15-09-2013

### The price of subcomponents

Products which are bought from suppliers often consist out of subcomponents which come from second tier suppliers; the price of products is therefore influenced by the second tier supplier's subcomponents price. Next to that: the average bill of materials makes up 68% of the total organizational spend in the Dutch industry[6], which implies that first tier suppliers also have an average bill of material of 68%. This translates into a relative spend of approximately 50%, which an organization spends indirectly on its second tier suppliers. This is an important reason for organizations to manage their second tier supply base and control the prices of subcomponents (Lee, 2010; Follis and Enrietti, 2001). Therefore, organizations must create supply chain transparency in order to identify and manage the cost drivers in the sub-tier supply chain (Möller et al., 2011).

### The quality of subcomponents

Since the parts of sub-tier suppliers eventually end up into the product which is sold in the consumer market, the quality of products also depends on the sub-tier supplier's product quality (Lee, 2010; Follis and Enrietti, 2001). Quality is a critical aspect to the success of focal organizations and therefore an important reason to manage the second tier suppliers (Vaccaro et al., 2010; Kannan & Keah, 2010).

### How outsourcing complicates second tier management

Outsourcing leads to a focal organization losing control and insight over the sub-tier suppliers, which were previously the first tier suppliers for the outsourced products. Managing these sub-tier suppliers thus becomes necessary to keep control and insight over for example the pricing and quality of products (Hoffjan et al., 2011; Follis and Enrietti, 2001).

### Supply risk and globalization

Globalization has as a consequence that suppliers of today's organizations are positioned all around the globe, which enhances supply risk and the likelihood of a disruption in the sub-tier supply chain (Behnezad et al., 2013). Supply risk can also have several other causes, for example a bad relationship between sub-tier suppliers or natural disasters (Behnezhad et al., 2013; Aggarwal & Bohinc, 2011).

### The influence of sub-tier supplier's misbehavior

Sub-tier supplier actions can greatly influence a focal organizations reputation when environmental or social misbehavior of sub-tier suppliers becomes public (Grimm et al., 2012). Supply chain transparency is also a key-aspect in this case, to get insight and prevent any social or environmental misbehavior in the entire supply base.

## 2.1.2. Concluding on second tier supplier management

Regarding organizational costs, it can be concluded that the price of subcomponents is an important rationale for integrating and managing the second tier supply base. Due to a high average bill of material and a high indirect spend on the second tier suppliers, there is a high cost reduction potential in the second tier supply base. However, to identify and realize these cost price reductions, a certain degree of supply chain transparency is necessary, which will be discussed in chapter 2.3.

[6] Found at - http://statline.cbs.nl/StatWeb/publication/default.aspx?VW=T&DM=SLNL&PA=81156NED&LA=NL - Bedrijfsleven; arbeids- en financiële gegevens, per branche, SBI 2008 – Viewed on 04-07-2013

## 2.2. The multi-tier supply chain structure

Now that the different aspects and rationales behind second tier supplier management are explained, the structure of a multi-tier supply chain is discussed in order to give insight in the involved parties and their relationships.

Most academic studies have only described and analyzed dyadic relations in supply chains (Mena et al., 2013; Choi & Wu, 2009; Fawcett & Magnan, 2001; Blanchard, 2010). A dyadic relationship is *a relationship between two organizations* and therefore only a small part of the supply network, which makes it an oversimplification of reality. However, more studies are now focusing on complex supply networks which also include sub-tier suppliers (Mena et al., 2013; Choi & Wu, 2009; Fawcett & Magnan, 2001).

### 2.2.1. The supply network of an organization

The supply network which lies behind the focal organization includes "*all companies that take part directly or indirectly in supplying industrial inputs to a focal organization with or without that company's knowledge*" (Choi et al., 2001). This implies that some organizations might not even be aware which second suppliers are in its supply chain. If an organization is aware of its second tier suppliers, they are within the "visible hand" of the organization, which means that *the sub-tier suppliers are known and potentially in direct contact with the focal organization* (Choi & Krause, 2006).

The supply network which lies behind a focal organization can have different degrees of integration and collaboration: *direct supply chains* (1) which include a focal organization, a supplier and customer; *extended supply chains* (2) which also include the second tier suppliers; and *ultimate supply chains* (3) which cover the entire supply chain (Mentzer et al., 2001). This research will focus on extended supply chains, which is illustrated in Figure 10.

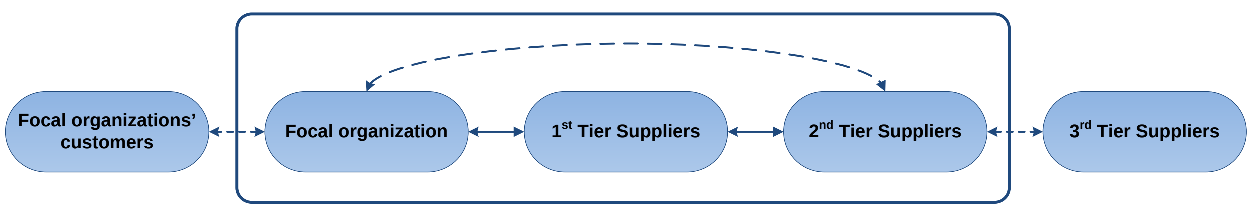



Figure 10: The extended supply chain

### 2.2.2. Relationships in the Extended Supply Chain

Triadic relationships in the extended supply chain can either be relationships between the buyer and two first tier suppliers (Triad 1), or a relation between a buyer, a first tier supplier and a second tier supplier (Triad 2), this is illustrated in Figure 11. This review will focus mainly on the latter triad (Triad 2), which is also the least investigated kind of triad, since most research has focused on the buyer-first tier supplier-first tier supplier relationship (Choi & Wu, 2009). Both triads are briefly discussed below.

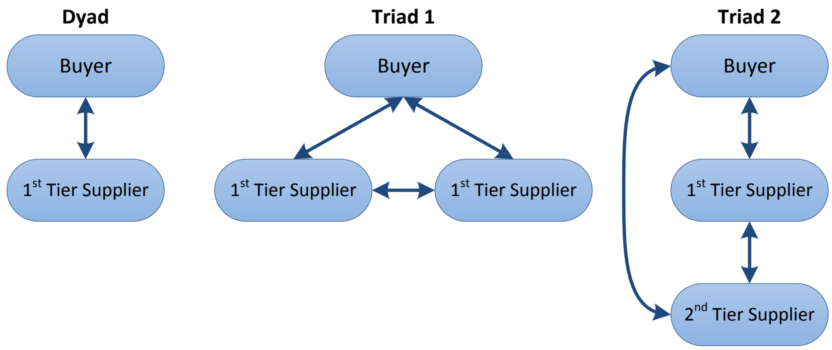



Figure 11: Relationships in the extended supply chain

## Triad 1

Choi et al. (2002) formulated three types of relationships to describe the relationships in Triad 1. In *a competitive model* (1), the first tier suppliers are direct competitors and do not have direct communication lines, in *the cooperative model* (2) the first tier suppliers work closely together, exchange ideas and engage in joint venture projects and in a *co-opetitive model* (3) the relationship between the suppliers is characterized by a constantly competing and cooperating environment.

However, the relationships in Triad 1 are very different from those in Triad 2, since the first tier suppliers are now the buyers for the second tier suppliers, which puts the relationships in a different context.

## Triad 2

Mena et al. (2013) identified three kinds of triadic relationships in Triad 2: the open triad, transitional triad and the closed triad. This is illustrated in Figure 12. The first triad is the *Open Triad* (1), which represents a supply chain where product and information flows are linear and there is no direct connection between the focal organization and the second tier supplier. In a *Closed Triad* (2), the focal organization and the second tier supplier have established a formal link, share information and manage their mutual relationship with contracts and regular interaction. A *Transitional Triad* (3) is characterized by the process of organizations which are going from the Open Triad to the Closed Triad.

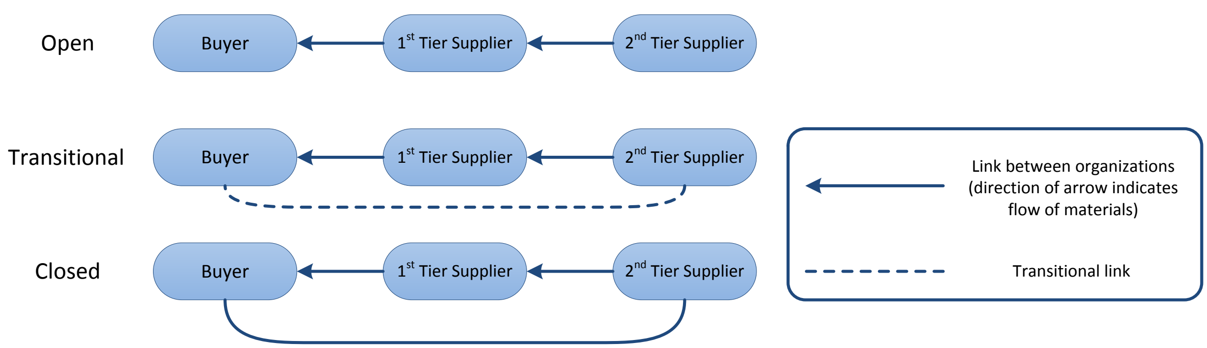



Figure 12: Triadic relationships

These triads and their implications are discussed in more detail in Appendix I and the conclusions are briefly discussed below. The first conclusion is that when a triadic supply chain moves from an open triad to a closed triad, *the power balance changes* (1) between the members of the triad. If the second tier supplier is suddenly directly connected to the focal organization, the power of the first supplier is reduced and the first tier supplier has lost part of its position as a bridge in the supply chain. A second conclusion is that a focal organization can benefit from connecting directly with its second tier suppliers, since it is then able to *positively influence key product characteristics* (2) of the second tier supplier, such as quality and sustainability. Third conclusion is when a triad moves from an open to a closed structure, *the sense of interdependence among its members grows together with a higher stability and overall satisfaction with their participation* (3) in the triad. The last conclusion is that *investments in management resources are required* (4) to influence stability and control across the multiple tiers of the supply chain.

A closed triad is a good example of supply chain integration together with increased transparency through the sharing of information, which is discussed in the next section. By establishing a direct link with a second tier supplier, the second tier supplier can be managed and an organization starts a partnership which can have a variety of benefits as described above.

## 2.3. Creating supply chain transparency

Without supply chain transparency it might not even be known what the second tier suppliers are, where they are located and what prices they charge, which makes it difficult to identify cost reduction opportunities in the sub-tiers of the supply chain (Möller et al., 2011). Supply chain transparency can be defined as *the extent to which information about the organizations, suppliers and sourcing locations is readily available to end-users and other organizations in the supply chain*[7]. However, sensitive information is usually kept private by most first tier suppliers (Kajüter & Kulmala, 2005), since this information could open up information of suppliers which they rather not share with the focal organization.

It differs a lot per organization and sector how much transparency is favorable and how this information is used (Möller et al., 2011; Romano & Formentini, 2012; Agndal & Nilsson, 2008). Which kinds of transparency exist and the important factors in creating transparency are discussed in this section.

### 2.3.1. Supply chain transparency types

Lamming et al. (2000) identified three kinds of supply chain transparency, which have as a metaphor the hitting of light on a surface: *opaque, translucent and transparent*. In *opaque* (1) transparency is a “no-go” area for both organizations, relevant information can or will not be shared. In the *translucent* (2) state, there is a partial degree of transparency, the focal organization or the supplier is able to exclude some factors which it will or cannot share and both parties agree with this. *Transparent* (3) is complete transparency: costs, margins and other operating details are fully shared between two organizations. This gives organizations the opportunity to share knowledge and come to collaborative activities.

### 2.3.2. Important factors in creating supply chain transparency

The success of creating supply chain transparency will largely depend on how good the relationship between an organization and its supplier is (Windolph & Möller, 2012; Kajüter & Kulmala, 2012; Hoffjan et al., 2011). How good this relationship is depends on various factors, for example the history between the organizations and the level of trust. Some important factors are elaborated on below.

[7] Found at http://lexicon.ft.com/Term?term=supply-chain-transparency - Definition from the Financial Times Lexicon – Viewed on 15-09-2013

**The influence of trust**

Trust is a requirement for sharing information and there must be a minimal level of trust established between organizations before information will be shared at all (Agndal & Nilsson, 2010; Möller et al., 2011; Kajüter & Kulmala, 2012; Hoffjan et al., 2011; Romano & Formentini, 2012). More information is shared between organizations as trust grows (Agndal & Nilsson, 2010) and trust is also mentioned as a key aspect in reaching the second tier suppliers (Fitzgerald, 1996). From a supplier's point of view, sharing cost information can also be a way of showing trust and commitment to the relationship, since they put themselves at risk (Agndal & Nilsson, 2008; Kajüter & Kulmala, 2012). Suppliers for example do not want their pricing or other strategies ending up at their competitors.

**The effect of supply chain transparency on suppliers' relationship satisfaction**

A higher degree of information disclosure has a negative effect on the supplier's relationship satisfaction, since organizations can easily use this data against their suppliers, which explains that supplier satisfaction declines with an increased degree of disclosed information (Windolph & Möller, 2012). When this information is used as a basis for finding joint cost reduction opportunities in the supply chain, supplier satisfaction increases. This clearly indicates that cooperation is essential to keep the suppliers satisfied with the relationship and organizations should only ask their suppliers to engage in creating supply chain transparency, if finding joint cost reduction opportunities is on the agenda (Agndal & Nilsson, 2008).

**Communication and information validity**

If organizations are not able to sensibly analyze the data provided by their suppliers, for example due to language barriers or a different information system, the communication quality has to be streamlined in order for supply chain transparency to be effective (Hoffjan et al., 2011; Kajüter & Kulmala, 2012).

Information credibility was mentioned by Skilton and Robinson (2009) as an important problem in supply chain transparency and showed that 89% of organizations do not fully trust the information provided by the suppliers. For organizations it would thus be wise to check the validity of the information provided of the suppliers.

### 2.3.3. Strategy for creating transparency: Incentives for suppliers

In order to overcome hesitance of suppliers to share information, an optional strategy for focal organizations is to give the suppliers incentives. If suppliers do not see extra benefits from supply chain transparency and the focal organization does not offer a win-win solution, suppliers will be afraid that they are being exploited if they reveal their cost structure (Romano & Formentini, 2012).

A variety of incentives can be given by organizations, when the right incentives are given suppliers might adapt to the focal organizations requirements (Agndal & Nilsson, 2008; Agndal & Nilsson, 2010; Hoffjan et al., 2011). Several *contractual incentives* (1) are possible, for example, agreeing on an increased purchasing volume or other long-term contractual agreements. *Financial incentives* can also help elicit suppliers, for example a fair division of benefits. An organization can further help its suppliers by *supporting the negotiations with the second tier suppliers* or by starting a *co-marketing program*. Several other incentives in the form of *knowledge sharing* are also possible, of which an example is to start an inter-organizational problem solving team. A last type of incentive can be the *exclusion of a supplier* which does not want to participate in the transparency process. This is a negative incentive but can be a powerful one, since it forces the supplier to participate if it wants to continue doing business with the focal organization.

## 2.4. Supplier and sourced product categorizations

In this section models are discussed which are developed by academics for categorizing suppliers and products. The focus will lie on identifying those factors and models which can be used to categorize suppliers and products for the purpose of enabling cost reduction opportunities in the second tier supply base. Sine this is a new categorization for which no model exists yet, the important factors for this categorization have yet to be identified. Supplier and product categorization can be defined as *a process that involves dividing suppliers and products into distinct groups with different characteristics requiring different approaches for a certain goal* (Day et al., 2010).

### 2.4.1. Supplier characteristics

The first group of factors and models can be grouped under supplier characteristics, which can be placed in four sub groups: spend on supplier, power relationship, partnerships and mutual trust.

**Spend on supplier**

High spend on a particular supplier indicates that this supplier is relatively more important to an organization than other suppliers; this is therefore a factor to categorize suppliers on (Dyer et al., 1998). Spend on a particular supplier is also an important factor to group suppliers on when considering second tier supplier cost reduction strategies, since a higher spend on a first tier supplier indicates a higher indirect spend on second tier suppliers. This could indicate a higher cost reduction potential on the second tier suppliers.

The *80/20 rule* implies that an organization has 80% of its spend on 20% of its suppliers. Therefore this 20% of suppliers has a relative large spend reduction potential compared to the other 80% of the suppliers (Koch, 1998; Wyld, 2012), which makes this 20% more important to organizations than the other 80%.

**Power relationship with the supplier**

Which party in a buyer-supplier relationship is the dominant one and has a higher bargaining power, has many implications for the relationship, which makes it an important factor to categorize suppliers on (Cox, 2004; Tang, 1999). For second tier supplier cost reduction strategies, this can be an important factor, since organizations will better be able to force a supplier to switch to another second tier supplier when it is the dominant party.

A model developed by Kraljic (1983) is the purchasing product portfolio, which combines the power relationship with a supplier with the previous factor, spend on supplier. Therefore this model can be used to assess the dependency on a supplier, with respect to the financial impact of the products from a supplier. This results in a matrix with two variables: supply risk and financial impact. This is illustrated in Figure 13. These quadrants and their characteristics are elaborated on below (Van Weele, 2009).

- **Leverage products** can be obtained from various suppliers at standard quality grades, which represent a relatively large share of the end products cost price
- **Strategic products** are high tech, low-volume products, which are often supplied at customer specification. Only one source of supply is available, which cannot be changed in the short term without incurring considerable costs
- **Routine products** usually have a small value per item and there are many alternative suppliers, with which there are mostly short-term contracts
- **Bottleneck products** have a relatively limited value in terms of money but they are vulnerable with regard to their supply, since there is only one source of supply

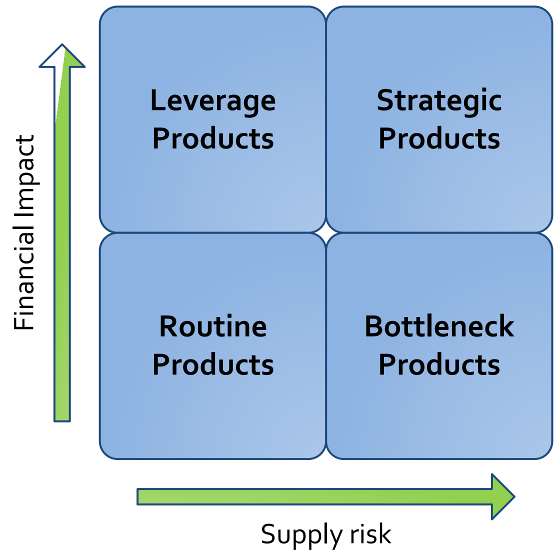


Figure 13: Purchasing product portfolio

Several models are available for determining the distribution of power in a relationship; two are discussed below, the Dutch Windmill and the Power Matrix.

The Dutch Windmill builds on the supplier portfolio of an organization (Kraljic, 1983), which is combined with a suppliers' customer portfolio, this allows organizations to mirror their view of the supplier with the one used by the supplier (Van Weele, 2009). This leads to more realistic expectations and plans for organizations regarding their supply chain strategy. From the supplier's point of view, their sold products can be classified by two variables, customer attractiveness and relative value of the products (Cheverton & Van der Velde, 2010), which results in the matrix shown in Figure 14. With this matrix can be assessed in which of the 16 business-to-business relationships a focal organization is with its supplier, each of these relationships require a different sourcing strategy.

A tool for organizations to assess how the power is distributed in the relationship between an organization and its supplier is the power matrix designed by Cox et al. (2003), which is shown in Figure 15. This categorization can be used to identify in which of the four power relationships an organization is with its supplier: buyer dominance, supplier dominance, dependence or interdependence.

## Partnerships

Another way to categorize suppliers is by partnerships, partnerships have several implications for all kinds of factors in the relationship between an organization and its supplier: increased information sharing, investments in relation-specific assets and they rely on trust to govern their relationship (Dyer et al., 1998). A partnership with the supplier will also have implications for second tier supplier cost reduction strategies, since a partnership positively influences the willingness of a supplier to engage in strategic activities in supply chain management (Rezaei and Ortt, 2013).

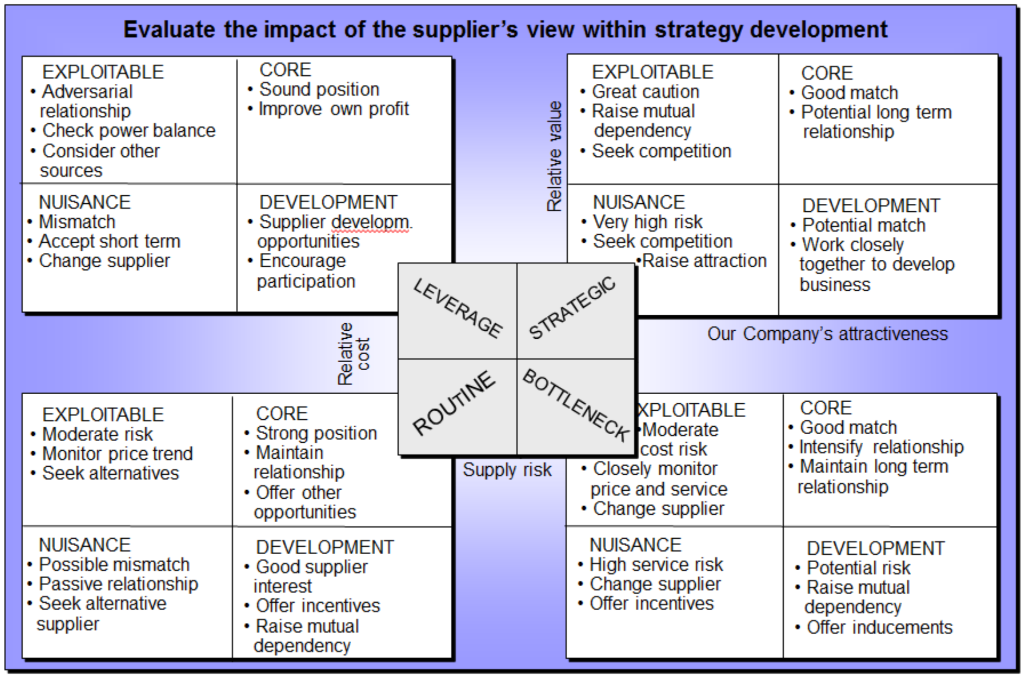
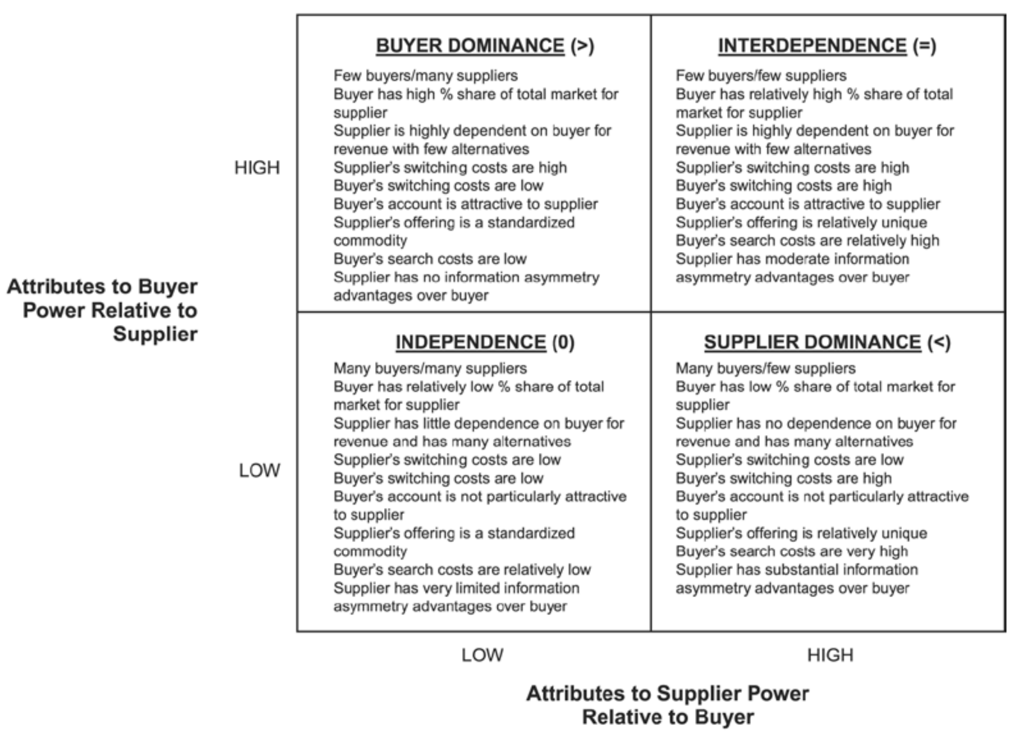



Figure 14: The Dutch Windmill [8]





**Source:** Cox *et al*. (2003, p.54)

Figure 15: Cox power matrix of buyer-supplier relationships

[8] http://www.arjanvanweele.com/16/text/18/files/Weele.5th%20ed.Chapter%2005.2010.ppt

#### Mutual trust

Trust can be a useful criterion to assess if a supplier is suitable for second tier supplier cost reduction strategies at all. If a supplier does not trust the focal organization, for example due to a troublesome history together, this could result in a supplier not even disclosing who the second tier suppliers are. Therefore, mutual trust plays an important role in the relationship between the buyer and supplier (Olsen and Elram, 1994; Dyer et al., 1998).

### 2.4.2. Product characteristics

The second group of factors and models can be grouped under product characteristics: product complexity and product costs.

#### Product complexity

A high product complexity indicates that it consists out of many subcomponents of which all those subcomponents have their unique material and labor costs (Kajüter & Kulmala, 2012). Subcomponents therefore all have their own cost reduction opportunities; for that reason product complexity has an effect on the potential of second tier supplier cost reduction strategies. This makes it a useful characteristic to categorize products on (Hadeler & Evans, 1994).

A complex sourced product generally indicates that subcomponents come from more second tier suppliers, since more subcomponents are used. If a product is for example made up out of 500 parts which come from 300 different second tier suppliers, it will take more effort to realize cost reductions at all those 300 second tier suppliers, compared to when there are only 20 second tier suppliers for those 500 parts.

Therefore this factor goes two ways, complex products might be prone to more cost reductions; however it might be harder to realize cost reductions if the subcomponents come from more second tier suppliers.

#### Product costs

This factor is important regarding second tier supplier cost reduction strategies for the same reason as spend on suppliers, a high relative cost of a product indicates a high cost reduction potential. This factor was identified by Steele and Court (1996) to categorize products. They used for example a distinction between products which account for more or less than 0.5% of the total costs.

### 2.4.3. Key second tier suppliers

When it comes to managing costs in the second tier supply base, a first step is identifying key suppliers so appropriate actions can be taken (Grimm et al., 2012). An important aspect in this case is that key second tier suppliers must be identified in a cost reduction perspective for a focal organization, therefore key second tier suppliers are defined as *second tier suppliers which are responsible for a significant part of the indirect total cost of an organization and have a high cost reduction potential.* An organization can have several kinds of indirect spend on a second tier supplier which is illustrated in Figure 16.

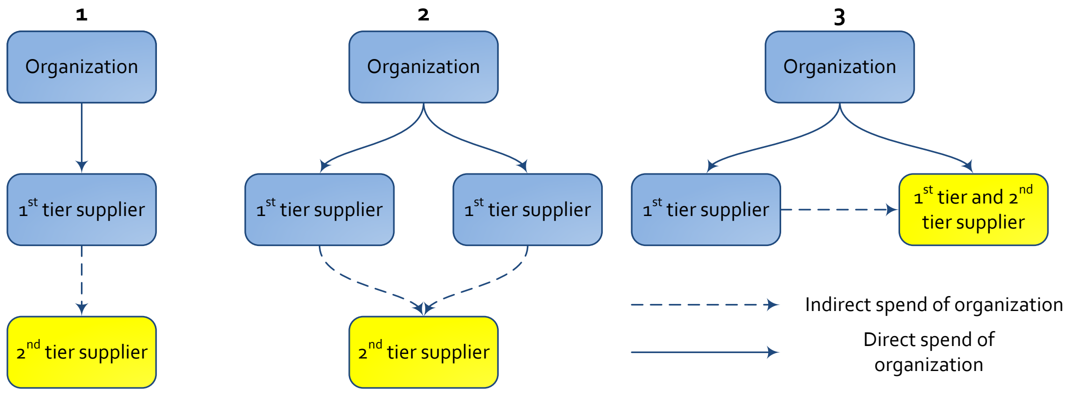



Figure 16: Kinds of indirect spend on a second tier supplier

Some studies have focused on developing a method for identifying key second tier suppliers, but no easy and excelling methods exist yet (Kim et al., 2011; Nobar et al., 2011). Most methods for identifying key second tier suppliers are focused on supply risk or on how embedded suppliers are in the supply network (Kim et al., 2011).

Since no suitable method for identifying key second tier suppliers regarding second tier supplier cost reductions exist yet, identifying key second tier suppliers is a knowledge gap in current literature.

### Managing key second tier suppliers

Initially second tier suppliers will only be managed by the first tier supplier, since focal organizations do not have a relationship yet with their second tier suppliers; this was described as an open triad. Once is decided by an organization which key second tier suppliers will be managed, it must find a way to get in touch with these key second tier suppliers. However, since the second tier supplier is initially managed by the first tier supplier, this has to be done in accordance with the first tier supplier.

For some key second tier suppliers can also become clear that they can best be managed by the first tier supplier in order to realize cost reductions. This could for example be due to a focal organization not having enough resources to start managing all their key second tier suppliers. Choi and Dooley (2001) proposed that organizations which find a right balance in managing a certain number of second tier suppliers outperform organizations in misbalance.

## 2.5. Second tier supplier cost reduction strategies

This section focusses on cost reduction strategies for the second tier supply base, which were defined as*: a strategy for unlocking cost reduction opportunities in the second tier supply base*.

Since current literature brings few publications about cost reduction strategies in the sub-tier supply chain (Soares et al., 2008); this literature review also maps information from documented best practices of organizations. The advantages and drawbacks of best practices are discussed in this section. Some frequently used cost reduction strategies by organizations which can be ‘extended’ to the second tier supply base are also discussed.

As mentioned in the problem statement, benefits of these cost reduction strategies can be relatively diffuse and might not always be directly measurable in monetary terms. Therefore it is important that the outcome of the strategy is potentially beneficial for an organization and not solely for the first tier supplier, since a first tier supplier will preferably maintain its pricing and thereby increase its profit margin. This conflict of interests is important to take into account when considering second tier supplier cost reduction strategies. However, if no specific agreement is made to share the resulting cost reductions, an organization might still benefit because the first supplier has become a more reliable and effective business partner (Bragg, 2010).

### 2.5.1. Clustering versus countering strategies

Two kinds of second tier supplier cost reduction strategies in a triad can be identified: countering and clustering strategies (Skilton & Robinson, 2009). In clustering strategies, "all three parties in the triad develop relationships in order to pool resources and create competitive advantage for the triad". Clustering strategies are aimed at improving the whole supply chain while reducing costs for all involved parties in the triad. In the countering strategies, two parties in a triad develop a relationship to counter the bargaining power of the third party. In other words, with countering strategies an organization will aim at reducing costs by making use of its greater bargaining power. The cost reduction strategies found in literature and documented best practices are all grouped under either clustering of countering strategies for a triad, these are discussed below.

**Drawbacks of other organization's best practices**

Although best practices cannot be generalized and they are often sector and production type specific, learning how other organizations improved their competitiveness is an important strategic weapon for organizations (Briscoe & Fawcett, 2004). Dr. Harpal Singh, CEO of Supply Chain Consultants mentioned about supply chain best practices: "*Trying to define supply chain best practices is like trying to select the best car, it is not so much how good the car is, but how well the car works for you*".[9] Differences in production, for example low versus high volume, can make a big difference in the ability to "copy" a supply chain strategy. This is a limitation for most organizations seeking to optimize their supply chain via benchmarking.

### 2.5.2. Clustering strategies

Clustering strategies for triads can be grouped under 4 categories: transmit competencies to suppliers, supplier integration, value engineering and supplier certification.

A change in attitude will be necessary in many organizations when clustering strategies are considered, since instead of finding joint cost reduction opportunities, forcing rebates and squeezing the margins of suppliers is currently a very common strategy. However, in the long run this is not a fruitful strategy for organizations, since without reasonable profit margins suppliers could for example switch to other customers. In this way organizations would have to find alternative suppliers which are possibly more expensive or provide poorer quality. Hence, organizations should partner up and see their (sub-tier) suppliers as part of the organization itself (Dyer, 2002), since proactive supplier development is often the key to both short- and long-term success of the entire supply chain (Briscoe & Fawcett, 2004).

[9] Found at http://www.cio.com/article/628635/The_Trouble_with_Supply_Chain_Best_Practices - viewed on 07-08-2013

### Transmit competences to the supplier

Most of the documented best practices regarding second tier supplier cost reduction strategies are related to transmitting competences to the first or second tier suppliers. These best practices are summarized below and detailed descriptions are given in Appendix II.

To transmit competences to the first or second tier suppliers, mostly workshops or training courses were used (Grimm et al., 2012). An example of a workshop is a best practice of Honda, in this workshop Honda goes together with a first tier supplier to a second tier supplier to give a training class and transmit a competence for a certain production process. Honda has achieved a remarkable success in training its second tier suppliers, by gaining 30-40% in productivity and reduced costs (Fitzgerald, 1996). Another example comes from FIAT, which initiated a consortium with first and second tier suppliers aimed at transmitting competencies to the second tier suppliers (Follis and Enrietti, 2001). To enable this, FIAT started several multi-day training courses about a definite topic, designed to reduce costs and improve quality.

Several benefits are noticeable for the best practices described in Appendix II and the ones mentioned above. By organizing workshops for second tier suppliers or starting a consortium, an organization will be able to effectively transmit competences to a high amount of second tier suppliers at once. Second tier suppliers can be trained in all kinds of competences and they can learn about and from each other in these workshops. As a result, improved aspects such as productivity and reduced waste can lead to reduced costs in the supply chain. Despite that benefits of these programs are relatively diffuse, measurable improvements on key manufacturing metrics such as cycle time, productivity and on-time delivery were shown after these programs.

### Supply chain integration

Supply chain integration was stressed as one of the rationales behind second tier supplier management (Kannan and Keah, 2010), however most supply chain integration initiatives are dyadic and few organizations have their second tier suppliers in focus; this responsibility is often passed through to the first tier suppliers (Briscoe & Fawcett, 2004; Fawcett & Magnan, 2001).

Strategies of supply chain integration which can lead to recued costs are the implementation of *vendor managed inventory systems* and *electronic data interchange systems* to coordinate the supply chain. Iskandar et al. (2001) concluded that the network effect makes electronic data interchange systems more cost-effective as more suppliers adopt it and helps to reduce costs throughout the supply chain. However, they also concluded that the adoption of electronic data interchange systems in the second tier supply base is often low due to low perceptions of benefit and high costs.

Data standardization is a method to help in reducing costs throughout the supply chain and a long proved method for cost reductions within organizations (Michael & McCathie, 2005). Data standardization is based on standard data for locations and products for organizations across the supply chain, with which processes are streamlined and operational inefficiencies in the supply chain improved. These strategies can be extended to the second tier suppliers once the first tier suppliers are integrated in data standardization systems.

### Value engineering

With this cost reduction strategy the design teams of an organization and its (sub-tier) suppliers get together to make design improvements on a certain product, which can lead to lower costs or higher quality (Bragg, 2010). With this cost reduction strategy organizations make use of the expertise of second tier suppliers, which an organization might not have in-house. This strategy could be especially beneficial for complex products, in which the expertise of second tier suppliers can prove a valuable addition.

### Supplier certification

Supplier certification is the formal process through which focal organizations work together with suppliers to evaluate and improve product quality along with reduced costs (Briscoe & Fawcett, 2004). Supplier certification can also be a good way for organizations to make sure suppliers are keeping up to date on newest techniques and inspection methods, which is a best practice used by IBM (Chong[10]). It could become clear during these inspections that a second tier supplier is testing and inspecting the same products, then there is an opportunity to eliminate some duplication which can also reduce costs in the supply chain (Bragg, 2010).

## 2.5.3. Countering strategies

The second kinds of strategies are countering strategies, in which two parties in a triad develop a relationship to counter the bargaining power of the third party. Two countering strategies were found in literature: the Buy/Sell strategy and supply base consolidation.

### Buy/Sell strategy

The buy/sell strategy originates from Hewlett Packard, in which it buys products directly from its second tier suppliers and sells them to their first tier suppliers (Billington and Kuper, 2003). In this way Hewlett Packard stays in control of the costs in the supply chain, since first tier suppliers must buy the parts via Hewlett Packard before processing them into a product. The bargaining power of the first tier supplier is thus reduced with this strategy. Despite the high costs of executing this strategy, it resulted in better pricing for Hewlett Packard and a return on investment of 8-to-1. This strategy proved to be especially suitable for strategically important products, since Hewlett Packard stays in control of the costs and supplier selection in the second tier supply base.

### Supply base consolidation

Supply base consolidation is a strategy in which an organization reduces the number of suppliers with whom they do business with and has proven to reduce the procurement costs organizations (Choi, 2006). Supply base consolidation is mostly applied to first tier suppliers, but is also possible at the level of second tier suppliers, when an organization would collaborate in this process with its first tier suppliers to consolidate the second tier supply base.

A strategy of Honda is to encourage its first tier suppliers to become suppliers to other first tier suppliers. In this way first tier suppliers also become second tier suppliers. This system, in which first tier suppliers supply other first tier suppliers, gives Honda a beneficial effect, since these first tier suppliers already have a relationship and are familiar with the way of working of Honda.

[10] Found at - http://www.smta.org/penang/presentations/S1_P1_Chong_Celine.pdf By Celine YC Chong, IBM Procurement Quality Engineer - viewed on 02-10-2013

## 2.6. Knowledge gaps in current literature

In this literature review became clear what the knowledge gaps are in current literature, these knowledge gaps will be further investigated in the case studies and are summed up below:

- On which criteria can key second tier suppliers be identified regarding second tier supplier cost reduction strategies
- What are additional second tier supplier cost reduction strategies
    - When do organizations engage in these strategies and what are the conditions
    - What are important aspects for organizations to take into account regarding these strategies
    - What are potential side-effects of second tier supplier cost reduction strategies

## 2.7. Preliminary Conceptual Model

After the literature review, a preliminary conceptual model was designed based on the information found in literature. This model served as input for the case studies and the final conceptual model. The process which is shown in the model in Figure 17 is based on the factors found in literature and logically placed in consecutive steps and concludes with the second tier supplier cost reduction strategies. The previously discussed knowledge gaps in literature are marked in yellow. The preliminary conceptual model is discussed step by step in Appendix III.

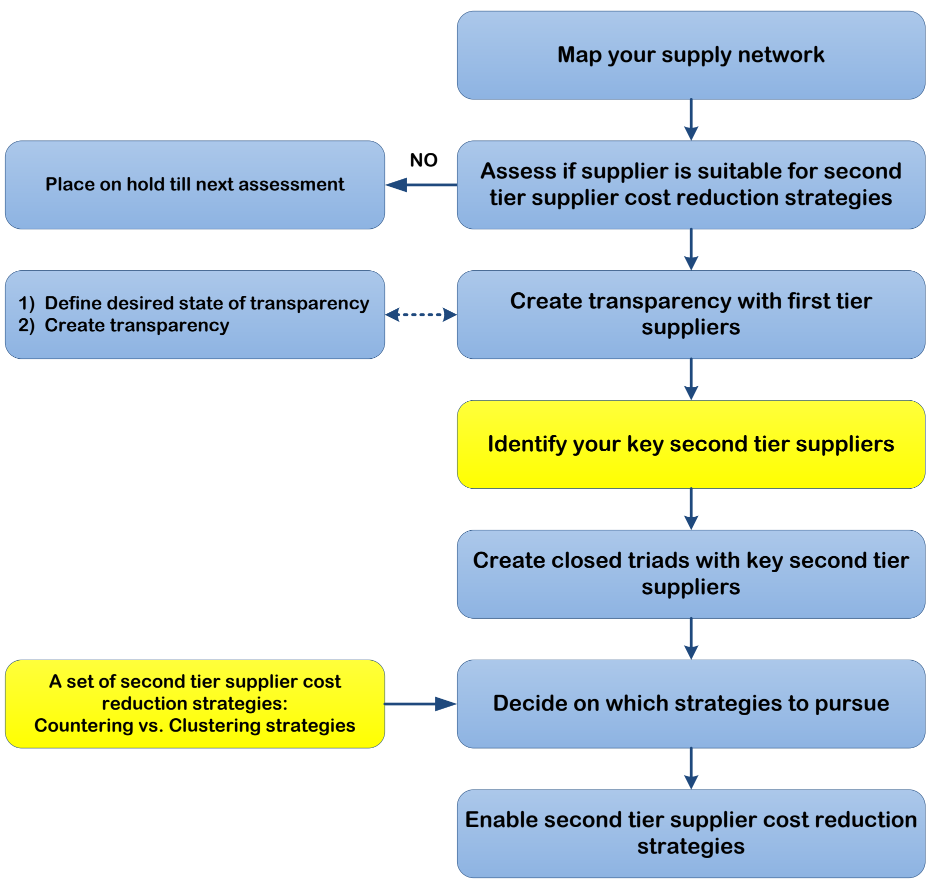



Figure 17: Preliminary conceptual model

# 3. Case analyzes

In order to validate the preliminary conceptual model, four case studies were conducted in which was investigated how organizations realize cost reductions in their second tier supply base. In order to check if the preliminary conceptual model is correct, several propositions were formulated to test in the case studies, these are described in chapter 3.1. A brief description and motivation for the organizations is given in chapter 3.2. Detailed case descriptions of organization X and the other organizations are given in Appendix VI, the cross case conclusions from these case studies are described in chapter 3.3.

## 3.1. Propositions

The propositions listed in Table 1 are based on important factors in the preliminary conceptual model, which were derived from literature. With these propositions the differences between the organizations in their approach regarding second tier supplier cost reduction strategies were compared and analyzed. In Appendix IV is elaborated with which part of the preliminary model the propositions are linked, together with the outcome of the proposition per case study, which are incorporated in the cross case conclusions in chapter 3.3.

| # | Proposition |
|---|---|
| | **Supply base of the organization** |
| **1** | Organizations deliberately chose first tier suppliers with which they want to engage in second tier supplier cost reduction strategies, based on several criteria |
| | **Supply chain transparency** |
| **2** | Before engaging in second tier supplier cost reduction strategies, organizations have to create supply chain transparency |
| **3** | Organizations use incentives to overcome the hesitance of first tier suppliers in creating supply chain transparency |
| | **Key second tier suppliers and closed triads** |
| **4** | When engaging in second tier supplier cost reduction strategies, organizations structure their approach by identifying key second tier suppliers |
| **5** | In order to identify key second tier suppliers, organizations categorize their second tier suppliers on several criteria |
| **6** | Non key second tier suppliers are left out of focus by organizations when regarding second tier supplier cost reduction strategies |
| **7** | Organizations determine who can best manage a second tier supplier in order to realize cost reductions, either the first tier supplier or themselves |
| **8** | Before engaging in second tier supplier cost reduction strategies, organizations create closed triads with key second tier suppliers |
| | **Second tier supplier cost reduction strategies** |
| **9** | Organizations have specific strategies to realize cost reductions in their second tier supply base |
| **10** | When organizations engage in second tier supplier cost reduction strategies, first tier suppliers are involved in executing these strategies |

Table 1: Propositions

## 3.2. Description and motivation for the organizations

All the organizations in which the case studies were conducted are high tech organizations with a production mostly characterized by mostly low volume, high mix and high complexity. Like organization X, they are large organizations with locations all over the globe. The products of these organizations are sold directly to the end-users, which puts these organizations at the end of the supply chain.

As mentioned in chapter 2.5.1, supply chain best practices of other organizations are limited useable since they are often sector and production type specific, which impedes the ability to “copy” a supply chain strategy. Therefore high tech organizations with similar characteristics as organization X were chosen, to enhance the usability of these best practices. The characteristics of these organizations are summed up below:

- Organizations manufacture and sell high tech products
- Large organizations ( > 500 employees)
- Multinationals
- Mostly low volume, high mix and high complexity production
- Organizations are at the “end” of the supply chain, right before the end-users

## 3.3. Cross case analysis

In this section, four cross case conclusions are drawn from the case studies, of which some have sub-conclusions. The cross case conclusions are based on the common denominator in the cases, so the conclusions suit all cases as good as possible. The conclusions are described in the four sections below and used in the next chapter to design the final conceptual model.

### Conclusion 1

*Organizations select the first tier suppliers of strategic products to engage with in second tier supplier cost reduction strategies*

Managing the second tier suppliers was generally considered the responsibility of the first tier suppliers, since the organizations actually pay them for this responsibility. However, from the case studies can be concluded that organizations should engage in second tier supplier cost reduction strategies when three conditions are met:

1. Products supplied by the first tier supplier are high-value products, since higher costs indicate a higher cost reduction potential
2. An organization has a long supplier change over time or is dependent on a first tier supplier, switching to another supplier is difficult or costly
3. There are none or limited joint cost reduction opportunities left with the first tier supplier

The purchasing product portfolio, which was explained in chapter 2.4.1., can be used to categorize the first tier suppliers according to these conditions. This is illustrated in Figure 18. Supply risk in the matrix is replaced by dependency on a first tier supplier, since dependency on a first tier supplier better describes condition 2 and supply risk influences this dependency. Strategic products in the matrix comply with condition 1 and 2 mentioned above. To comply with condition 3 has to be assessed if the joint cost reduction opportunities with a first tier supplier are already depleted.

Dependency was found to be an important condition to select the first tier suppliers on, since if an organization is not dependent on a supplier or has multiple suppliers available it is able to leverage them, with which the first tier suppliers are already forced to reduce their costs. Therefore diving deeper in the supply chain was generally considered as not necessary, as long as the organizations have a leverage advantage. Factors derived from the case studies which influence the dependency on a supplier and their change over time are listed in Table 2.

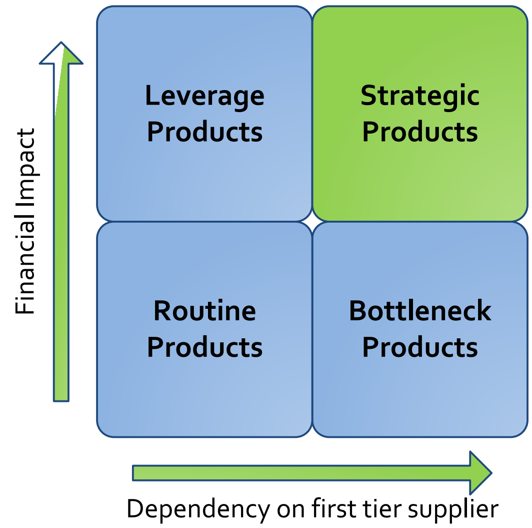


Figure 18: Purchasing product portfolio

Strategic products in the purchasing product portfolio are mostly complex products, which was described in chapter 2.4.1. One of the findings from literature was that product complexity positively influences the cost reduction potential of products. This supports the choice for strategic products when engaging in second tier supplier cost reduction strategies.

| **Factors which determine the dependency on a supplier** |
|---|
| • Supply risk, first tier supplier is a single source supplier or few alternatives are available<br>• Long term contracts are in place with the first tier supplier<br>• A product is developed together with the first tier supplier<br>• Dependent on a certain technology, quality standard or IPR of a first tier supplier<br>• Long life cycle time of products, therefore after sales from suppliers is needed for a longer period<br>• Organizations consolidated their supply base, which resulted in fewer suppliers and closer relationships with the remaining suppliers<br>• A significant amount of resources are invested in a certain supplier, for example due to supplier development programs<br>• Products are high tech and require intensive R&D before manufacturing of the actual product takes place. This has led to early supplier involvement in the design process of products, which causes that suppliers are integrated in the production process |

Table 2: Factors which determine the dependency on a supplier

This conclusion confirms step 2* of the preliminary conceptual model and since first tier suppliers of strategic products are chosen, this step will be modified to *select first tier suppliers of strategic products*. It also confirms proposition 1*, since organizations do deliberately chose first tier suppliers with which they want to engage in second tier supplier cost reduction strategies. It thereby also gives an answer to a knowledge gap in current literature: *when do organizations engage in second tier supplier cost reduction strategies and what are the conditions.*

* Step 2: Assess if supplier is suitable for second tier supplier cost reduction strategies
* Proposition 1: Organizations deliberately chose first tier suppliers with which they want to engage in second tier supplier cost reduction strategies, based on several criteria

### Sub-conclusion 1.1

*Before engaging in second tier supplier cost reduction strategies, organizations have to create supply chain transparency for strategic products from first tier suppliers*

All organizations agreed on supply chain transparency being an essential aspect to be able to manage costs in the sub-tier supply chain, since transparency gives organizations the opportunity to identify and manage the cost drivers in the second tier supply base.

If supply chain transparency was pursued by an organization also depended on the importance of a particular supplier or product in terms of for example quality or supply risk, not necessarily on its costs. Creating supply chain transparency does not have a high priority for non-essential products, since this data will not be used by the organizations as long as products keep coming in and they are satisfied with the price and quality of the products.

This conclusion validates step 3* in the preliminary conceptual model and confirms proposition 2*. In combination with conclusion 1 can be concluded that when organizations want to engage in second tier supplier cost reduction strategies, they have to create supply chain transparency with the first tier suppliers of strategic products. Therefore step 3 in the conceptual model will be changed accordingly.

Several factors caused that the organizations were not always able to enforce its suppliers to give supply chain transparency. Some suppliers are for example larger than organizations itself, which gives a leverage advantage to the suppliers. Another factor is that some suppliers make a significant part of their profit in the after-market; giving transparency could give the opportunity to buy the products directly at the second tier suppliers and cut away the profit margin of the first tier supplier.

If incentives were not sufficient to overcome the hesitance of suppliers, the only way for organizations to create some kind of transparency was to do a should cost analysis.

### Sub-conclusion 1.2

*Organizations use exclusion rather than positive incentives to overcome the hesitance of their suppliers in creating supply chain transparency*

In chapter 2.3.3 was mentioned that organizations can use a variety of incentives in order to overcome hesitance of suppliers to share information.

A conclusion drawn from the case studies is that organizations indeed do use incentives for their suppliers, however only one kind was brought up during the interviews, exclusion of the supplier in future business opportunities when they do not want to cooperate in creating transparency. This confirms proposition 3*, however this is a negative incentive instead of the mostly positive mentioned in literature. In order to overcome the hesitance of suppliers, organization C emphasizes the shared interest in the supply chain, since when organization C increases its turnover the whole chain will benefit as well.

---

* Step 3: Create transparency with first tier suppliers
* Proposition 2: Before engaging in second tier supplier cost reduction strategies, organizations have to create supply chain transparency
* Proposition 3: Organizations use incentives to overcome the hesitance of first tier suppliers in creating supply chain transparency

## Conclusion 2

*When engaging in second tier supplier cost reduction strategies, organizations structure their approach by classifying the second tier suppliers of leverage and strategic parts as their key second tier suppliers*

From the case studies can be concluded that when organizations engage in second tier supplier cost reduction strategies, key second tier suppliers are classified based on two conditions:

1. The parts from the second tier supplier end up in a strategic product supplied of a first tier supplier, this follows from conclusion 1
2. The second tier supplier provides high-value parts and these have a relative large influence on the cost price of the end-product, since higher costs indicate a higher cost reduction potential

The purchasing product portfolio can now be used to categorize the parts from the second tier suppliers according to condition 2. This is illustrated in Figure 19. Again, supply risk is replaced by dependency on a second tier supplier in the matrix. Parts with a relatively high financial impact on the cost price of the end-product are marked as leverage and strategic parts.

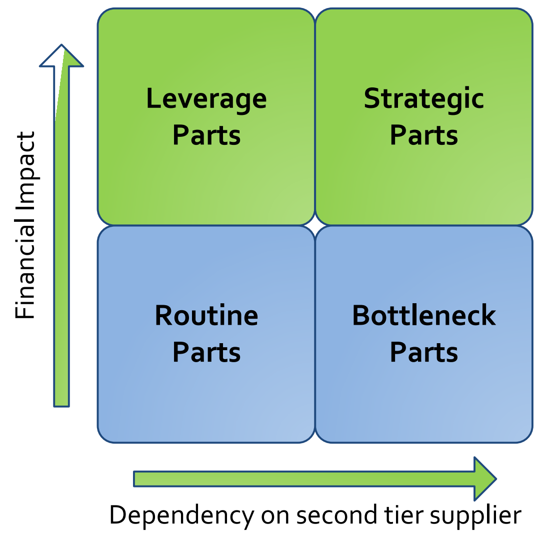


Figure 19: Purchasing product portfolio

An important division has to be made between leverage and strategic parts, since this will influence the choice for the second tier supplier cost reduction strategy, which is explained in conclusion 4.

Strategic parts have as a characteristic that an organization is in some way dependent on a second tier supplier. The factors listed in Table 3 can influence the dependency on a second tier supplier and could cause that switching to another second tier supplier by a first tier supplier is difficult or costly.

| # | Factors which influence the dependency on a second tier supplier |
|---|---|
| 1 | **Quality**: the quality of a part from a second tier supplier is exceptional and critical to the end-product of an organization |
| 2 | **Supply risk:** second tier supplier is a single-source supplier or few alternatives are available, for when a second tier supplier possesses a certain technology or IPR |
| 3 | **Product development**: when a product is developed together with a second tier supplier, it thereby became part of the production process and the organization is constrained to this second tier supplier |
| 4 | **Contracts**: Long term relationships or contracts are in place between the first and second tier supplier |

Table 3: Factors which influence the dependency on a second tier supplier

This conclusion validates step 4* in the preliminary conceptual model, since second tier suppliers of leverage and strategic parts are classified as key second tier suppliers. It also confirms proposition 4* and 5*, next to that it also answers a knowledge gap in academic literature: *on which criteria can key second tier suppliers be identified regarding second tier supplier cost reduction strategies.*

It can also be concluded from the cases that non-key second tier suppliers are left out of focus by organizations when second tier supplier cost reduction strategies are considered, which confirms proposition 6*. For these second tier suppliers the responsibility is left with the first tier suppliers, which includes enabling cost reductions in the second tier supply base.

## Conclusion 3

*Before engaging in second tier supplier cost reduction strategies, organizations assess their customer position as a second tier customer in order to determine their leverage advantage*

From a supplier's point of view, their customers can be classified by two variables, customer attractiveness and relative value of the products sold to these customers, which is also known as the customer portfolio matrix. This matrix is shown in Figure 20. In chapter 2.4.1 was explained that this customer position can be used by focal organizations to create more realistic expectations and plans regarding their supply chain strategy. Therefore it makes sense to assess the customer position as a second tier customer, when cost reduction strategies are considered.

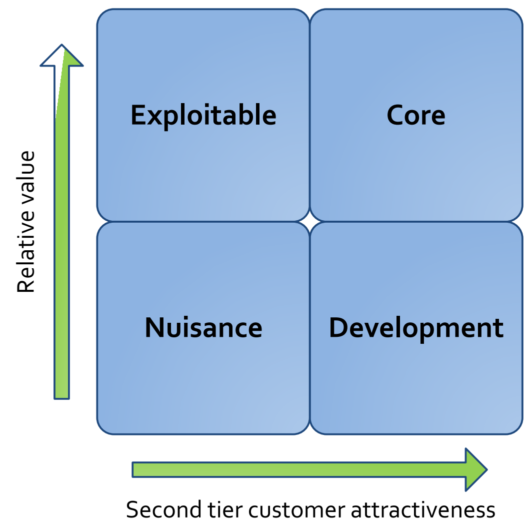



Figure 20: Customer portfolio matrix

Determining the second tier customer position can be difficult, since the organization is no direct customer of the second tier supplier, which is illustrated in Figure 21. Therefore, the customer position of the combination of the organization and the first tier supplier has to be determined. This combination is delineated in Figure 21 and will further be referred to as a *tandem*. The second tier customer position is therefore defined as *the customer position of the tandem in the second tier supplier's customer portfolio.*

As mentioned, the second tier customer position can be determined by using the customer portfolio matrix, which is based on two factors, (1) relative value and (2) the second tier customer attractiveness. The first factor represents the relative value of products sold to the first tier supplier, since the second tier supplier sells its products to the first tier supplier, not directly to the focal organization. Factors

* Step 4: Identify your key second tier suppliers
* Proposition 4: When engaging in second tier supplier cost reduction strategies, organizations structure their approach by identifying key second tier suppliers
* Proposition 5: In order to identify key second tier suppliers, organizations categorize their second tier suppliers on several criteria
* Proposition 6: Non key second tier suppliers are left out of focus by organizations when regarding second tier supplier cost reduction strategies

which influence the second tier customer attractiveness of an organization, which were derived from the case studies, are listed in Table 4 below.

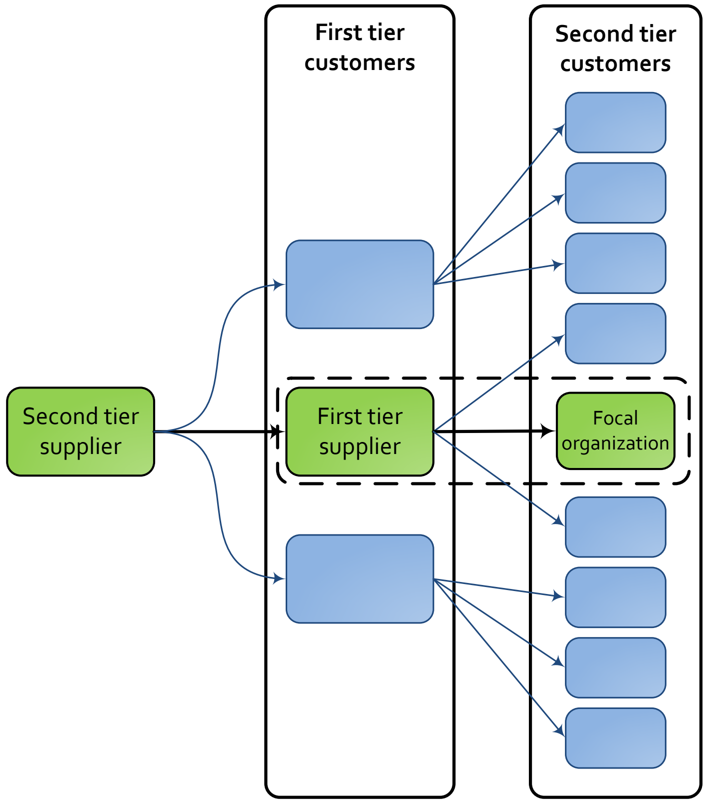



Figure 21: Illustration of the second tier customer position

| Factors which determine the second tier customer attractiveness |
|---|
| • How dependent is the second tier supplier on the tandem<br>  o Share of the tandem in the total turnover of the second tier supplier, this is delineated in Figure 21<br>  o How many other tandem customers does the second tier supplier have<br>  o Via how many first tier suppliers is the organization connected to the second tier supplier<br>• Is the tandem a stable customer duo, or is there much fluctuation in their purchase behavior<br>• Does the organization have interesting future business opportunities for the second tier supplier<br>• Is the brand of the organization a valuable addition to the customer portfolio of the second tier supplier<br>• Does the organizational mission match the one of the second tier supplier, in other words, are they in the same sector and working towards the same goal |

Table 4: Factors which determine the second tier customer attractiveness

By assessing the second tier customer position, organizations actually determine the power relationship with a second tier supplier, which can be used to determine the leverage advantage. This leverage advantage can then be utilized in the second tier supplier cost reduction strategies, in order to realize cost reductions.

Determining the second tier customer position was not part of the preliminary conceptual model, therefore this will be added as a step in the final conceptual model. After the key second tier suppliers are identified in step 3, should be determined what the second tier customer position is for these key second tier suppliers.

The power relationship with a (sub-tier) supplier was already identified as an important factor in literature and used in the preliminary conceptual model for assessing suppliers. A special case is when a first tier supplier is also supplying other first tier suppliers, which makes it both a first and second tier supplier. In this case the customer position is much easier to determine since the organization is already doing business directly with this first/second tier supplier.

### Sub-conclusion 3.1

*Organizations have certain strategies to increase their attractiveness as a second tier customer*

When organizations want to increase their second tier customer position as to increase their leverage advantage, they should increase their attractiveness as a second tier customer. Preferably, the tandem which the organization is part of, becomes a core customer to the second tier supplier. Organizations can apply several strategies which positively influence how attractive an organization is, these are described below.

**Strategy 1: Integrate second tier suppliers with a bright future perspective**
When new products are developed by an organization, they can involve a second tier supplier in this process with the prospect of growing mutual business in the future. In this way the dependency of the second tier supplier will increase, which could make the tandem a core customer. These to be developed parts can also be sold to other customers of the second tier supplier, which makes it even more beneficial for the second tier supplier to participate.

**Strategy 2: Emphasize the purchasing stability of the tandem to the second tier supplier**
If the tandem is a stable customer, this can be an advantage for an organization as a second tier customer compared with other unstable tandem customers. After all, a stable purchasing volume of a customer will make it an attractive customer for a second tier supplier.

**Strategy 3: Attach the organizational brand to the customer portfolio of the second tier supplier**
By being in direct contact with the second suppliers, organizations can link their brand to the customer portfolio of the second tier supplier. Although they are not a direct customer, the second tier suppliers' products do end up in the end-products of the focal organization. If the brand of the focal organization is a valuable addition to their customer portfolio, the attractiveness as a second tier customer will be increased.

**Strategy 4: Supplier development**
Supplier development is aimed at maximizing the value as a customer towards a second tier supplier. Suppliers of leverage parts are not taken into account for supplier development programs, simply because an organization and its first tier supplier can easily switch other cheaper or better suppliers for these parts.

Organization A and C actively make use of this strategy and assesses per supplier how they can develop and support their second tier suppliers in both reducing their costs and improve their relationships. The organizations have several strategies to realize this, they for example train their sub-tier suppliers in several competences such as, logistics, 6sigma, contracting, reducing waste, etc. However, by supporting their sub-tier suppliers they also help themselves, since their suppliers will become a more stable partner which effectively contributes to the supply chain. Supplier development does not stop at the second tier suppliers for organization C, they go as deep in the supply chain as long as there are strategic sub-tier suppliers.

When the organizations improve the customer position of the tandem and become more important than other tandem customers to their second tier suppliers, they can utilize this advantage by leveraging a better pricing. Therefore supplier development is also used as a cost reduction strategy.

**Second tier suppliers approaching the focal organizations**
Some second tier suppliers approached the case study organizations when they saw future business opportunities for their products via the first tier supplier. Although this is not a strategy for focal organizations, it does show what can happen when an organization and the tandem become a core or development customer in their second tier supplier's customer portfolio. In these cases organizations did not even have to take the initiative when there were future business opportunities, thanks to their high second tier customer attractiveness.

## Conclusion 4

*Countering strategies best fit for second tier suppliers of leverage parts, clustering strategies best fit for second tier suppliers of strategic parts*

In conclusion 2, the parts supplied by second tier suppliers were split up in leverage and strategic parts, these were considered appropriate for second tier supplier cost reduction strategies.

The basic supplier strategies which apply for strategic and leverage parts are respectively performance-based partnership and competitive bidding (Van Weele, 2009). Performance-based partnership is aimed at partnership, collaboration and giving transparency. This seems to match with clustering strategies, since these are aimed at developing relationships in the triad in order to pool resources and create competitive advantage for the triad. Therefore clustering strategies are used for second tier suppliers of strategic parts. Competitive bidding is based on tendering, as suppliers and their products are basically interchangeable. This seems to match with countering strategies, since these are aimed at countering the bargaining power of a third party as to reduce costs in the supply base. Therefore countering strategies are used for second tier suppliers of leverage parts.

The second tier supplier cost reduction strategies derived from the case studies are elaborated on in sub-conclusion 4.1 below.

### Sub-conclusion 4.1

*Organizations have certain strategies to realize cost reductions in their second tier supply base*

In the case studies was informed what kind of second tier supplier cost reduction strategies were enabled by the organizations. These can be grouped under several strategies, which are briefly discussed below. For each of these strategies is assessed whether they belong to the countering or clustering strategies, detailed descriptions of the strategies per organization can be found in Appendix VI.

**Strategy 1: Make use of a higher bargaining power than the first tier supplier**

In some cases organizations have a better bargaining power against a second tier supplier than their first tier supplier. In these cases an organization should try to take over the price negotiations and contracting from a first tier supplier, since it is in a better position to negotiate a lower price for the tandem. This strategy best matches with the countering strategies, since it is aimed at countering the bargaining power of the second tier supplier as to negotiate better contracts and a better pricing.

A remark on this strategy is that it is not for granted that an organization may take over price negotiations and contracting from a first tier supplier, since the first tier supplier may not want to give away this responsibility. Therefore it is essential for organizations to firstly get an agreement with the first tier supplier to take over negotiations.

An organization can have several kinds of indirect spend on a second tier supplier, which is illustrated in Figure 22. Three situations are depicted in this figure; these all require a different sub strategy and are explained below.

*Situation 1*

For this situation first has to be found out which party in the tandem has the highest leverage advantage. Since the organization buys all the products from the second tier supplier via the first tier supplier, it cannot have a higher share in the total turnover than the first tier supplier itself.

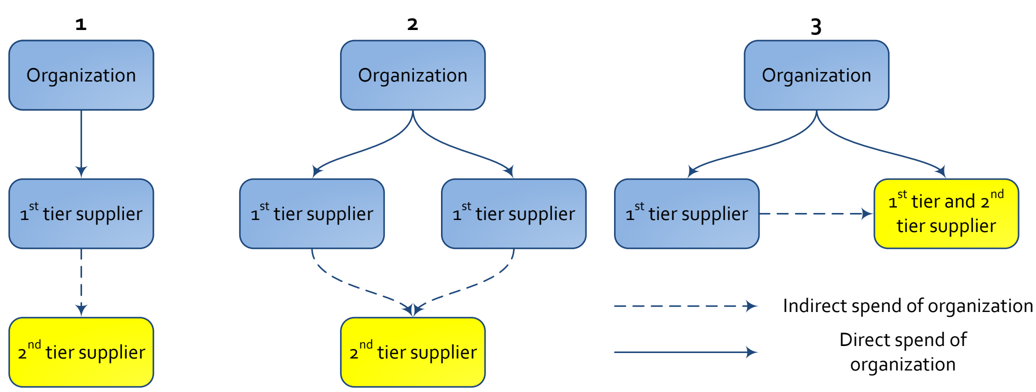



Figure 22: Kinds of indirect spend of an organization on a second tier supplier

However, it could be the case that the organization has a better bargaining position than its first tier supplier, because it has higher customer attractiveness, for which the factors were mentioned in Table 4. This could enable the organization to negotiate for a better price.

In some cases organization X engaged in price negotiations together with the first tier supplier. In this way they were able to bundle their powers and counter the bargaining power of the second tier supplier.

*Situation 2*

If a second tier supplier is supplying multiple first tier suppliers of an organization, there is an opportunity that the organization has a higher total share in the turnover of the second tier supplier than the first tier suppliers apart, since the organization is part of multiple tandems. This gives the organization a better bargaining position than the first tier suppliers; therefore it should try to take over price negotiations of these first tier suppliers.

However, if an organization wants to take over the management of a second tier supplier to reduce costs, it will also take over a portion of the responsibility for that second tier supplier. The first tier supplier will no longer be responsible for reducing the cost price of second tier supplier's products; therefore organizations have to be sure they are in a better position to realize the cost reductions.

*Situation 3*

If a first tier supplier is also supplying other first tier suppliers, it is actually both a first and second tier supplier. Therefore there is a possibility that the organization has a higher total share in the turnover of the second tier supplier than the first tier supplier itself. In these cases organizations should also try to take over price negotiations of the first tier supplier.

**Strategy 2: Second tier supplier consolidation**

This strategy follows on the previous strategy, since it is aimed at increasing the bargaining power of an organization against a second tier supplier by increasing the share in their total turnover. Therefore this is also a countering strategy.

By prescribing a second tier supplier to several first tier suppliers, organizations ensured that certain second tier suppliers became suppliers for multiple tandems. In this way they increased their share in the total turnover of the second tier supplier, which created a higher leverage advantage for them. In this way the second tier supply base of the organizations was consolidated. With this strategy organizations try to move from situation 1 to situation 2 or 3 in Figure 22.

A complication with this strategy for the organizations is that a first supplier may not be able to switch to another second tier supplier, since the parts supplied by the second tier suppliers have to match the specifications needed by the first tier suppliers. This needs to be investigated first by the organizations before this strategy can be enabled.

**Strategy 3: Value engineering**

A few cases of value engineering with a second tier supplier were described by the case study organizations. In these cases the design teams of an organization and the second tier suppliers came together to make design improvement on a certain product which led to lower production costs. This could either be together with, or without the first tier supplier. With this strategy organizations are able to make use of the expertise of second tier suppliers in order to realize cost reductions. This confirms that organizations do engage in value engineering directly with second tier suppliers, which was a strategy found in literature and described in chapter 2.5.2.

**Strategy 4: Advising first tier suppliers in choosing second tier suppliers**

Organizations can support their first tier suppliers in choosing the best and cheapest second tier suppliers. However, this strategy only applies for leverage parts, since there will be only limited options to switch between second tier suppliers for strategic parts. This is a countering strategy, since it is aimed at enabling cost reductions in the second tier supply base together with the first tier supplier.

With this strategy organizations can ensure that the first tier suppliers buy their parts from the cheapest second tier suppliers. By doing this an organization should be able to buy the products from the first tier supplier for a lower price, since the first tier supplier has reduced costs thanks to the advice of the organization. In this way the organizations can continuously challenge their suppliers to benchmark the second tier suppliers.

Besides that advice is given, they are also forced to become cheaper. An argument used in this discussion by organization B is that if a cheaper alternative is available for one part, other parts can probably be sourced cheaper as well. In other words, organization B wants to make clear it pays its suppliers for finding the cheapest alternatives, since if organization B has to benchmark the second tier suppliers themselves; they are actually doing the work of the purchasing managers of its suppliers.

Another advantage of this strategy is that for some products a focal organization will be in a better position to determine which second tier supplier is the best one. Some first tier suppliers are relatively small organizations with a smaller purchasing department, therefore large focal organizations can have a better view of the total market and all the potential second tier suppliers, since they have more purchasing experts.

**Strategy 5: Price road mapping, an indirect second tier supplier cost reduction strategy**

In this strategy, organizations agree with their first tier suppliers in contracts that the suppliers have to realize annual cost reductions. This forces the first tier suppliers to actively pursue cost reductions in the second tier supply base, since they can only realize a certain amount of cost reductions internally. This has been a very beneficial strategy, for example for organization B, to indirectly realize cost reductions in their second tier supply base.

However, this strategy is actually aimed at realizing cost reductions in the first tier supply base, since it makes no difference for the organizations how the first tier suppliers realize these proposed cost reductions. Therefore cost reductions in the second tier supply base are a beneficial potential side effect of this strategy, which can be used irrespective which kind of parts the second tier suppliers are supplying.

**Strategy 6: Check on specifications of the strategic parts**
This strategy aims at finding out why organizations are dependent on a particular second tier supplier for a strategic part. Organizations therefore have to assess which specifications are responsible for this dependency and check if the specifications opposed to their first tier supplier are really necessary. If the specifications can be changed, there is an opportunity that the adjusted part can be bought from multiple second tier suppliers, which makes it a leverage part. If this is possible, organizations and their first tier suppliers now have a leverage advantage with which they can reduce their costs in the second tier supply base (Schellekens, 2013).

**Concluding on second tier supplier cost reduction strategies**
This conclusion validates step 6*[14]in the preliminary model and confirms proposition 9*, since organizations do have certain strategies to realize cost reductions in their second tier supply base. However, the cost reduction strategies will be split up in strategies for second tier suppliers of strategic and leverage parts, since this conclusion made clear that these suppliers require different strategies. Step 6 will therefore be split up in countering strategies for second tier suppliers of leverage parts and clustering strategies for second tier suppliers of strategic parts.

Given that organizations generally determine which party in the tandem is best able to manage cost reductions in the second tier supply base, confirms proposition 7*. This conclusion also confirms proposition 10*, since first tier suppliers were always involved in second tier supplier cost reduction strategies, because they are part of the triad and the product flow always goes via the first tier supplier. However, it depends on the kind of strategy to what degree the first tier supplier is involved, when an organization for example prescribes a second tier supplier as to increase the leverage advantage, first tier suppliers are not involved but forced to cooperate.

### Sub-conclusion 4.2

*Second tier supplier cost reduction strategies might be too specific and therefore limited useable by other organizations. Thus, a description of situations with the pros and cons for an organization will be better useable, since organizations can then formulate their own strategy for their specific situation.*

A conclusion regarding the applicability of the cost reduction strategies is that even though production characteristics of the case study organizations were generally the same, their supply chains and strategies differed enormously. Organization X and A focused mainly on their first and second tier

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* Step 6: Decide on which strategies to pursue (from a set of second tier supplier cost reduction strategies)
* Proposition 7: Organizations determine who can best manage a second tier supplier in order to realize cost reductions, either the first tier supplier or themselves
* Proposition 9: Organizations have specific strategies to realize cost reductions in their second tier supply base
Proposition 10: When organizations engage in second tier supplier cost reduction strategies, first tier suppliers are involved in executing these strategies

suppliers in managing their supply chain, but the first tier supplier were most important. Organization B focused solely on its first tier suppliers and with some exceptions on their second tier suppliers. Organization C has the scope on its full supply chain, since third and fourth tier suppliers were also particularly important to organization C. This corresponds with the finding from literature in chapter 2.1.1, that it differs per organization and per industry if managing beyond the first tier of suppliers is necessary and important (Fawcett & Magnan, 2001).

This has implications for the second tier supplier cost reduction strategies, since second tier suppliers do not have the same importance for all organizations. Some cost reduction strategies derived from literature and the case studies are not applicable to other similar organizations, since they are too specific and context dependent.

The second tier supplier cost reduction strategies mentioned in sub-conclusion 4.1 can nonetheless still be carried by out by organizations in certain situations, or serve as an inspiration in formulating their own cost reduction strategies.

### Sub-conclusion 4.3

*Organizations only create closed triads when this is necessary for enabling the second tier supplier cost reduction strategy*

Closed triads were generally created by the organizations when certain characteristics of a second tier supplier or its products required direct management. These characteristics are costs, quality and supply risk. For organization C for example, securing the supply of certain parts in the sub-tier supply chain is essential to continue its production process. Closed triads were created with these sub-tier suppliers so the supply risk of these parts could be influenced directly, instead of being dependent for this on the first tier suppliers.

Regarding second tier supplier cost reduction strategies, it depends on the kind of strategy if a closed triad needs to be created. For example when a first tier supplier is in a better position to influence the product costs of a second tier supplier, a closed triad does not have to be created.

This partially validates step 5* in the preliminary conceptual model and partially confirms proposition 8, since closed triads are only created when this is necessary for engaging in a certain second tier supplier cost reduction strategy, thus not for every strategy. Therefore, this step will be placed after deciding which cost reduction strategies to enable in the final conceptual model, since it is then known if a closed triad needs to be created.

* Step 5: Create closed triads with key second tier suppliers
* Proposition 8: Before engaging in second tier supplier cost reduction strategies, organizations create closed triads with key second tier suppliers

## 3.4. Cross case conclusions

The conclusions drawn from the case studies are listed in Table 4. These conclusions will be used to modify the preliminary conceptual model into a final conceptual model in the next chapter. How these conclusions are used to modify the preliminary conceptual model was described per conclusion in the previous sections.

| | Cross case conclusions |
|---|---|
| **1** | **Organizations select the first tier suppliers of strategic products to engage with in second tier supplier cost reduction strategies** |
| | 1.1. Before engaging in second tier supplier cost reduction strategies, organizations have to create supply chain transparency for strategic products from first tier suppliers |
| | 1.2. Organizations use exclusion rather than positive incentives to overcome the hesitance of their suppliers in creating supply chain transparency |
| **2** | **When engaging in second tier supplier cost reduction strategies, organizations structure their approach by classifying second tier suppliers of leverage and strategic parts as their key second tier suppliers** |
| **3** | **Before engaging in second tier supplier cost reduction strategies, organizations assess their customer position as a second tier customer in order to determine their leverage advantage** |
| | 3.1. Organizations have certain strategies to increase their attractiveness as a second tier customer |
| **4** | **Countering strategies best fit for second tier suppliers of leverage parts, clustering strategies best fit for second tier suppliers of strategic parts** |
| | 4.1. The conceptual model should aim at describing situations in which organizations can be together with their second tier suppliers so organizations can formulate their own strategies, since cost reduction strategies are mostly too specific and therefore limited useable by other organizations |
| | 4.2. Organizations have certain strategies to realize cost reductions in their second tier supply base |
| | 4.3. Organizations only create closed triads when this is necessary for enabling the second tier supplier cost reduction strategy |

Table 5: Cross case conclusions

# 4. Conceptual model for second tier supplier cost reduction strategies

The process which is shown in the model in Figure 23 is a modified version of the preliminary conceptual model. The modifications are done according to the cross case conclusions, as explained in the previous chapter. This conceptual model in the form of a process is discussed step by step below.

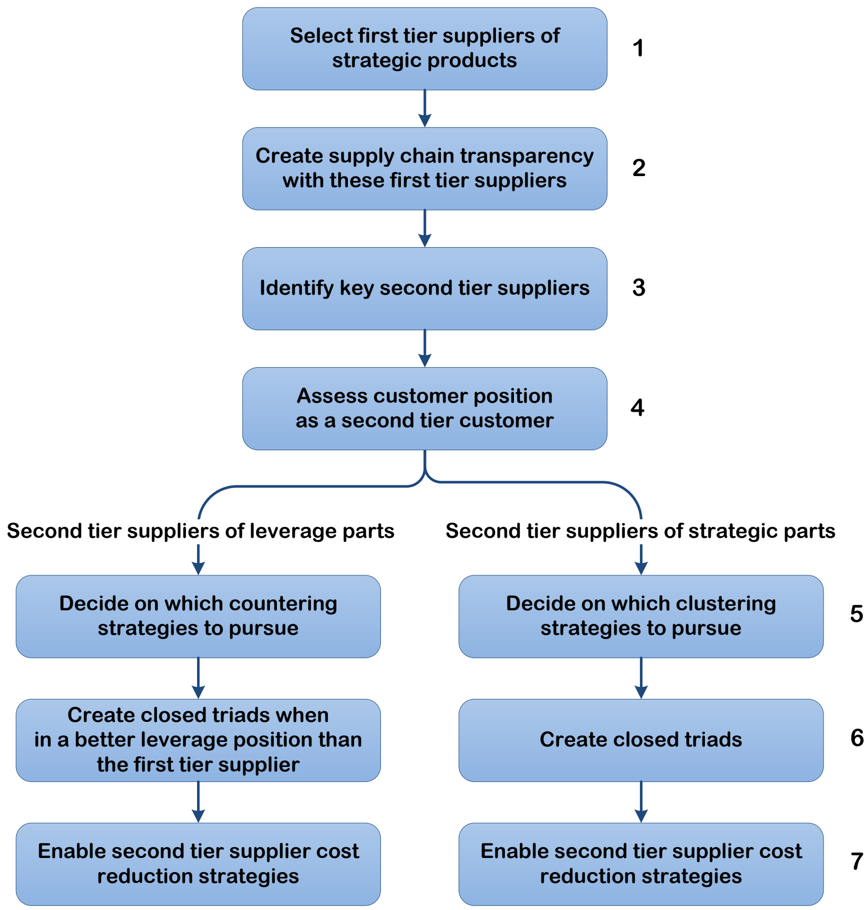



Figure 23: Conceptual model for second tier supplier cost reduction strategies

## Step 1: Select first tier suppliers of strategic products

As was concluded in the case analyzes, organizations should engage in second tier supplier cost reduction strategies with a particular first tier supplier if three conditions are met:

1. Products supplied by the first tier supplier are high-value products
2. An organization is dependent on a first tier supplier or has a long supplier change over time
3. There are none or limited joint cost reduction opportunities left with a certain first tier supplier

The purchasing product portfolio can be used to categorize the first tier suppliers according the first two conditions, which is shown in Figure 24. Strategic products in the matrix comply with condition 1 and 2. To comply with condition 3 has to be assessed if the joint cost reduction opportunities with a first tier supplier are already depleted. Several factors can help in determining if an organization is in some way constrained to a first tier supplier and condition 2 is thereby met, these were listed in Table 2.

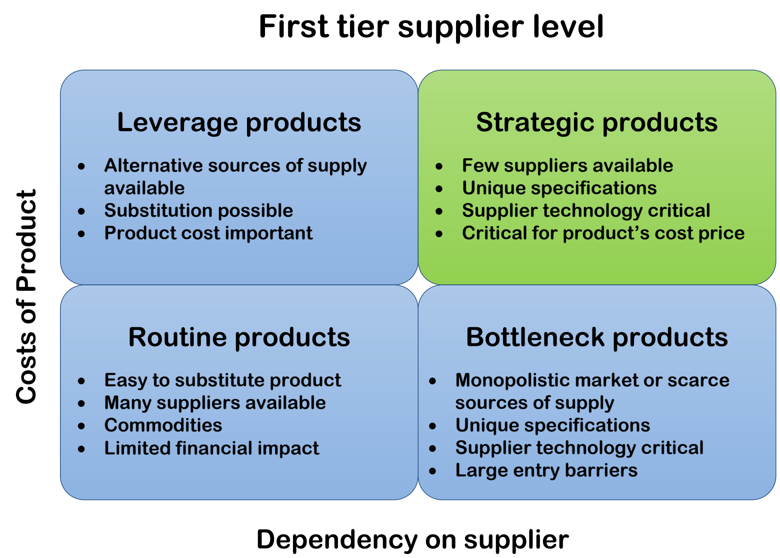



Figure 24: Purchasing product portfolio on a first tier supplier level

When the first tier suppliers of strategic products are identified, a selection has to be made with which of these suppliers to engage in second tier supplier cost reduction strategies, since there will be a limited amount of resources available to the organization. By making this selection, organizations can identify which suppliers have the best prospect of engaging with in these strategies. Some criteria for this selection are elaborated on below.

Firstly, an organization and a supplier should have a good relationship, which will help in the process of creating supply chain transparency and finding joint cost reduction opportunities in the second tier supply base. Factors like mutual trust and the presence of a partnership help in determining how good a relationship is.

Since the selected products are of high-value, this also indicates that spend on these supplier will be relatively large. Organizations could for example start to engage in cost reduction strategies with the first suppliers on which an organization has the highest spend, since these suppliers probably have a higher cost reduction potential.

This step is a first selection of suppliers which might be suitable for second tier supplier cost reduction strategies; unselected suppliers should be put on hold till the next assessment in which the situation might have changed. If suppliers are not selected, this could also be an indication that organizations can best pursue another kind of cost reduction strategy, not aimed at the second tier supply base.

### Step 2: Create supply chain transparency with first tier suppliers of strategic products

Once the strategic products are identified, supply chain transparency has to be created with the suppliers of these products. There are two steps in the process of creating supply chain transparency, which are described below.

**1. Decide on how much and what kind of transparency is needed**

In order to be able to enable second tier supplier cost reduction strategies, this information must be retrieved at least from the first tier suppliers:

- All second tiers supplier must be within the visible hand of the focal organization
- The organization should be able to place the parts supplied by the second tier suppliers in the purchasing product portfolio
    - Costs of the parts from the second tier suppliers should be known
    - Dependency on the second tier suppliers can be determined

**2. Create supply chain transparency with first tier suppliers**

Once decided how much supply chain transparency is required from the first tier supplier, data gathering can be started and the supplier has to be approached with the request of providing data. It is very important that organizations do this with the intention of collaborating with the first tier suppliers as to find joint cost reduction opportunities. If this data is used to increase the pressure on the prices suppliers, this significantly reduces the supplier's relationship satisfaction. Other important factors for organizations to take into account in the process of creating transparency are:

- S*upplier's relationship satisfaction* is negatively related to the degree of cost-data disclosure
- *Trust* between organization and supplier is both a requirement and a consequence of creating supply chain transparency
- *Commitment* of the supplier and focal organization is positively related to successfully creating supply chain transparency
- *Communication* has to be streamlined in order for supply chain transparency to be effective
- *Validity* of information provided by a supplier has to be checked

If suppliers are hesitant to create supply chain transparency, they can be stimulated by emphasizing the shared interest in the supply chain. If the total costs in the supply chain are too high, with as a result that the product prices of the focal organization are too high, this can lead to a decreasing turnover which will also affect the sub-tier suppliers. If an organization emphasizes that creating supply chain transparency is essential for find joint cost reduction opportunities and lower costs, they might be persuaded to give supply chain transparency. This is a strategy used often by the case study organizations.

Another option is to exclude the supplier for future business opportunities, in this way the supplier can be forced to cooperate. If a supplier remains hesitant to reveal their cost structure, they can also be stimulated with several other incentives:

- Knowledge sharing
- Contractual incentives
- Financial incentives
- Support negotiations with second tier suppliers
- Start a co-marketing program

## Step 3: Identify key second tier suppliers

Once supply chain transparency is created and all second tier suppliers are within the visible hand of an organization, they should select the second tier suppliers to engage with in cost reduction strategies based on two conditions:

1. The parts from the second tier supplier end up in a strategic product supplied by a first tier supplier
2. The second tier supplier provides high-value parts and these have a relative large influence on the cost price of the end-product

The purchasing product portfolio can be used to categorize the parts according to condition 2, which is illustrated in Figure 25 together with their characteristics. Parts which have a relatively large influence on the cost price of the end-product are marked as leverage and strategic parts. Second tier suppliers of these parts are key second tier suppliers.

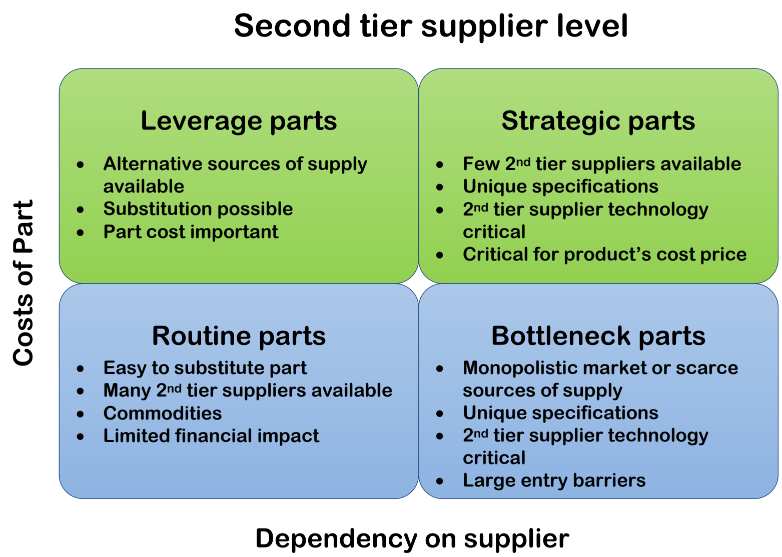



Figure 25: Purchasing product portfolio on a second tier supplier level

An important division has to be made between the leverage and strategic parts, since this will influence the choice for the second tier supplier cost reduction strategy in step 5. Strategic parts have as a characteristic that an organization is in some way dependent on a second tier supplier. The factors summed in Table 6 influence the dependency on a second tier supplier and cause that switching to another second tier supplier by a first tier supplier can be difficult or costly.

| # | Factors which influence the dependency on a second tier supplier |
|---|---|
| 1 | **Quality**: the quality of a part from a second tier supplier is exceptional and critical to the end-product of an organization |
| 2 | **Supply risk:** second tier supplier is a single-source supplier or few alternatives are available, for when a second tier supplier possesses a certain technology or IPR |
| 3 | **Product development**: when a product is developed together with a second tier supplier, it thereby became part of the production process and the organization is constrained to this second tier supplier |
| 4 | **Contracts**: Long term relationships or contracts are in place between the first and second tier supplier |

Table 6: Factors which influence the dependency on a second tier supplier

## Step 4: Assess customer position as a second tier customer

Once the key second tier suppliers are identified, the customer position as a second tier customer has to be assessed for these second tier suppliers. This step is required in order to assess the leverage advantage against the second tier supplier, which can be used to select the right cost reduction strategy in the next step.

From a supplier's point of view, their customers can be classified by two variables, customer attractiveness and relative value of the products sold to these customers, which is also known as the customer portfolio matrix. Organizations have to assess in which quadrant the second tier customer will place them. This matrix and its four quadrants are shown in Figure 26.

The second tier customer position was defined as *the customer position of the tandem in the second tier supplier's customer portfolio,* in which the tandem is the combination of the first tier supplier and a focal organization. This was illustrated in Figure 21. Therefore the customer position of the combination of the organization and the first tier supplier has to be determined, compared to other combinations in the customer portfolio of the second tier supplier. A special case is when a second tier supplier is also a first tier supplier, the customer position is then much easier to determine since the organization is already doing business with the second tier supplier.

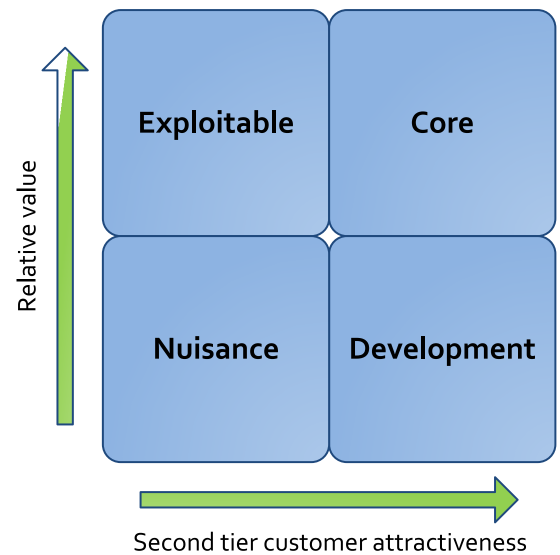



Figure 26: Second tier customer position

Second tier customer attractiveness of an organization can be determined by several factors, these were listed in Table 4. As mentioned earlier, other characteristics of the first tier supplier like their individual customer attractiveness and the relationship between the first and the second tier supplier, also influence the second tier customer position. However, since these are difficult to measure and not easily influenced by a focal organization, they are left out of consideration.

## Step 5: Decide on which strategies to pursue

Once the second tier customer position is determined, organizations can choose which second tier supplier cost reduction strategy is best applicable for their situation.

The second tier supplier cost reduction strategies can be grouped under two kinds of strategies: countering and clustering strategies. As concluded from the case analyzes, clustering strategies best seem to fit with second tier suppliers of strategic parts and countering strategies best seem to fit with second tier suppliers of leverage parts. These two kinds of second tier suppliers are separately dealt with in this step.

## Second tier suppliers of leverage parts

An organization can have four kinds of second tier customer positions which all require a different strategy; this is illustrated in the matrix in Figure 27. The strategies per quadrant of the matrix are discussed below.

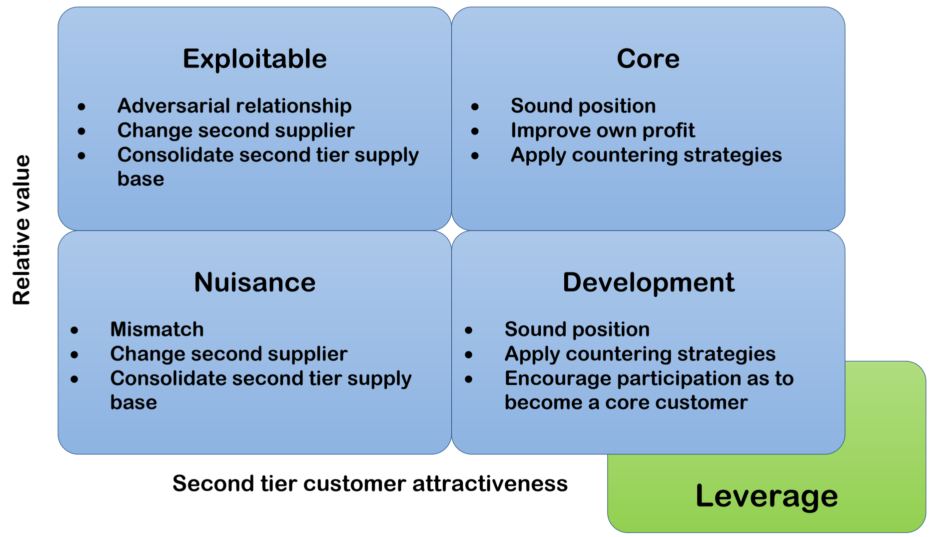



Figure 27: Customer positions for second tier suppliers of leverage parts

**Nuisance & Exploitable**

Even though an organization has a leverage advantage against the second tier supplier in these situations, an organization should make sure the first tier supplier switches to another second tier supplier in which the second tier customer position is development or core. In the development or core quadrant, an organization or its first tier supplier will best be able to utilize the leverage advantage of the tandem.

Since these are leverage parts, other second tier suppliers should be available. Therefore there is no need to invest in these second tier suppliers as to increase the second tier customer attractiveness, since other second tier suppliers are available for which they might already have a higher customer attractiveness.

However, when an organization or its first tier supplier does not want to switch to another second tier supplier, it has several options to increase the customer attractiveness as to become a development or core customer. Firstly, an organization can prescribe a second tier supplier to multiple first tier suppliers. Thereby the second tier supplier will become more dependent on the organization with which its customer position will improve. Secondly, a low cost strategy is to attach the organizational brand to the customer portfolio of the second tier supplier.

With these strategies organizations will have to keep in mind that, since the customer position low, it is not worthwhile to invest a significant amount of resources in increasing the second tier customer attractiveness. The second tier supplier could for example easily exit the market and other second tier suppliers are available.

**Development**

Organizations in this situation already have a good leverage position against the second tier supplier, since their second tier customer attractiveness is on an acceptable level. However, organizations could pursue to increase the relative value, with which the organization can become a core customer and thus even more important. They can for example do this by encouraging participation of the second tier suppliers in future business opportunities, so the relative value will increase. An easier way is to prescribe the second tier supplier to multiple first tier suppliers, with which the relative value can also increase.

**Core**

Once an organization has a development or core second tier customer position, it should determine which party in the tandem has the highest leverage advantage, since that will party will best be able to utilize the leverage advantage. Three situations are possible in which an organization, its first tier supplier or the combination of both have the best leverage position. Clustering strategies apply for these situations, which are described below.

*Situation 1: First tier supplier has the highest leverage advantage*

When the first tier supplier has a better leverage position than an organization itself, the organization should make sure they the first tier supplier does its job as good as possible. Organizations can for example advise their first tier suppliers for all kinds of opportunities to reduce costs in the second tier supply base, or give workshops in for example negotiating or contracting skills.

However, in these cases will first have to be investigated if it is needed that an organization supports its first tier supplier and it can really provide an addition to the knowledge and current practices of the supplier. If a first tier supplier is for example a relatively small organization with a very small purchasing department, a focal organization will very probably be able to support this supplier and enhance the organizational knowledge of its suppliers.

*Situation 2: Focal organization has the highest leverage advantage*

In this situation an organization has a better leverage position against a second tier supplier than the first tier supplier itself. In these cases an organization should try to take over the price negotiations and contracting from a first tier supplier, since it is in a better position to negotiate a lower price. Therefore the first task of organizations in this situation is to get an agreement to take over price negotiations and contracting of the first tier supplier, since the first tier supplier is currently the party which is doing business directly with the second tier supplier.

It is important for organizations in this situation to have a complete map of which second tier suppliers are supplying first tier suppliers; since then the total share in the turnover of the second tier supplier can be determined for all the tandems which the organization is part of. Part of this map is to determine which first tier suppliers are also supplying other first tier suppliers, since these are actually both a first and second tier supplier. With this information organizations will best be able to utilize their leverage advantage.

Another strategy for this situation is to apply the buy/sell strategy, in which an organization buys products directly from a second tier supplier and sells them to the first tier supplier. In this way an organization stays in control of the costs in the supply chain, since first tier suppliers must buy the parts via the focal organization, before processing them into a product.

*Situation 3: Focal organization and the first tier supplier cooperate*

An organization and a first tier supplier also can choose to cooperate as to create a higher leverage advantage than either one of the parties would have apart. This can serve as an additional strategy for situation 2, since involving the first tier supplier would create an even higher leverage advantage. In this way the tandem will be able to bundle their powers and counter the bargaining power of the second tier supplier.

## Second tier suppliers of strategic parts

For strategic parts, an organization is somehow constrained to a certain second tier supplier. Therefore, the organization must first assess why they are constrained to that particular second tier supplier for this part, and check if the specifications opposed to their first tier supplier are really necessary.

If the specifications can be changed, there is an opportunity that the adjusted part can be bought from multiple second tier suppliers, which makes it a leverage part. If this is possible, organizations and their first tier suppliers now have a leverage advantage with which they can reduce their costs. If the specifications cannot be changed, the organization must first determine in which situation the organization currently is in Figure 28.

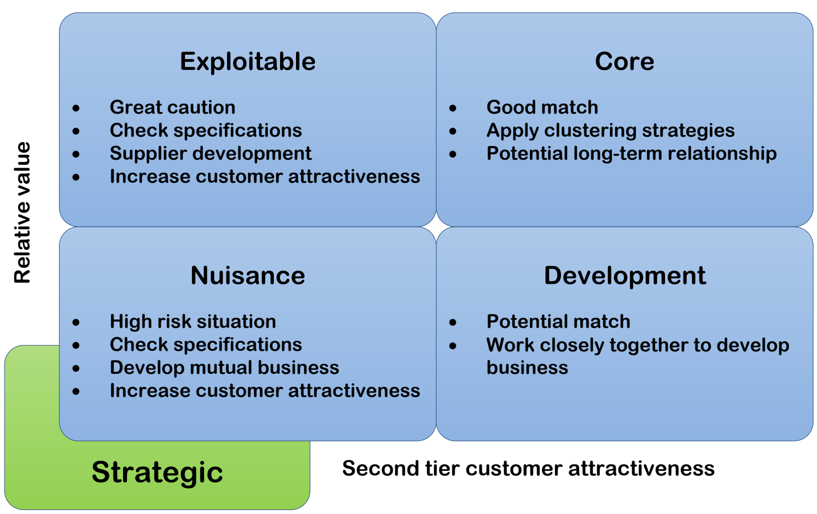



Figure 28: Customer positions for second tier suppliers of strategic parts

Before applying second tier supplier cost reduction strategies, organizations first have to make sure that the tandem is a development or core customer to the second tier supplier. The second tier suppliers have to be worthwhile to invest the clustering strategies in and the second tier supplier has to keep working with the organization and its first tier supplier. Changing specifications is especially preferred for organizations which are in the nuisance and exploitable quadrant, since these are risky situations in which the organization can easily be exploited. The situations are described per quadrant below.

**Nuisance and exploitable**

The main goal of organizations in these situations is to increase the second tier customer attractiveness as to become a development or core second tier customer.

For organization in the nuisance quadrant, changing the relative value is difficult since it represents the value of the products bought from that particular second tier supplier. Organizations will have to find a way to develop mutual business so the relative value will increase. However, the options to enable this are limited; an organization could for example prescribe this second tier supplier to multiple first tier suppliers for other leverage parts.

When organizations are in the exploitable situation, the parts supplied by the second tier supplier are perceived of high relative importance. Therefore this aspect needs no further consideration and organizations can immediately start with increasing the second tier customer attractiveness. Strategies to enable this are listed in Table 7.

| | Strategies for increasing the second tier customer attractiveness |
|---|---|
| **1** | Supplier development |
| **2** | Integrate second tier suppliers with a bright future perspective |
| **3** | Emphasize the purchasing stability of the tandem to the second tier supplier |
| **4** | Attach the organizational brand to the customer portfolio of the second tier supplier |

Table 7: Strategies for increasing the second tier customer attractiveness

**Development**

In this situation the second tier customer attractiveness does not need to be improved, since it is already on an acceptable level. However, organizations should work closely together with the second tier supplier to develop mutual business, as to become increasingly important to the second tier supplier. In this way an organization can become a core second tier customer.

Despite that an organization is not in the situation of a core second tier customer yet, it can already start with applying clustering strategies. The second tier supplier will already be worthwhile to invest the clustering strategies in, since the second tier supplier will very likely keep on working with the organization and its first tier supplier.

**Core**

This is the most preferable situation for organizations to be in for the strategic parts. This situation gives the organization some dominance against the second tier supplier; therefore it will also be limited able to apply some countering strategies discussed in the previous section.

Once the position as a core or development second tier customer is obtained by an organization, can be chosen which clustering strategy should be applied. Since the organization and the tandem are important to the second tier supplier; organizations should look for smart ways to utilize this advantage. The clustering strategies are listed in Table 8.

However, also for these strategies will first have to be investigated if an organization can really provide an addition to the knowledge and current practices of the supplier. It could for example very well be that a supplier has already developed better skills in certain competencies than the focal organization itself.

| Clustering strategy |
|---|
| **Transmit competencies to second tier suppliers via:**<br>• On-site assessments<br>• Training workshops for second tier suppliers<br>• Workshops for exchanging experiences<br>• Initiate a consortium with first and second tier suppliers |
| **Include second tier supplier in value engineering projects** |
| **Integration of second tier suppliers via**<br>• Data standardization throughout supply chain<br>• Implementation of vendor managed inventory systems<br>• Implementation of electronic data interchange systems |
| **Certification of second tier supplier**<br>• Make sure second tier suppliers are keeping up to date on newest techniques and inspection methods |
| **Supplier development**<br>• Make sure cost reductions come in return<br>• Second tier supplier will become a more stable partner which effectively contributes to the supply chain |

Table 8: Clustering strategies

## Step 6: Create closed triads when required for the cost reduction strategy

Now that the key second tier suppliers are identified and the cost reduction strategies chosen, an organization has to assess for every key second tier supplier, with which it wants to engage in cost reduction strategies, if they are in an open, transitional or already in a closed triad.

Initially these key second tier suppliers will only be managed by the first tier supplier, since focal organizations do not have a relationship yet with their second tier suppliers (Open Triad). Organizations must find a way to get in touch with these key second tier suppliers and establish a direct link. However, since the second tier supplier initially managed by the first tier supplier, this has to be done in accordance with the first tier supplier.

Besides that creating closed triads in necessary to enable most second tier supplier cost reduction strategies, creating closed triads also has some other significant advantages which are listed below.

- In the closed triad, the mediating role of the first tier supplier disappears and this reduces the first tier supplier’s power in the triad
- All parties in the closed triad will focus on the complete supply chain to improve planning and cost management, which results in stronger teamwork at all levels in the triad
- Increased sense of interdependence and stability between the parties in the triad
- Increased transparency of information and loyalty between the parties in the triad

Organizations will have to keep in mind that investments in mainly management effort are required to create and maintain closed triads.

It could very well be that an organization does not have enough resources to start managing all their key second tier suppliers and create closed triads, therefore management of these second tier suppliers should be left to the first tier supplier. However, for these second tier suppliers an easier indirect cost reduction strategy is available for which no closed triads are required: *price roadmaps.*

With price roadmaps an organization agrees with a first tier supplier in contracts that the supplier should enable annual cost reductions. This forces the first tier suppliers to actively pursue cost reductions in the second tier supply base, since they can only realize a certain amount of cost reductions internally. Since this strategy is actually aimed at enabling cost reduction in the first tier supply base, cost reductions in the second tier supply base are potential side effects of this strategy, which can be used irrespective which kind of parts the second tier suppliers are supplying.

## Step 7: Enable the second tier supplier cost reduction strategy

After the second tier supplier cost reduction strategies are selected, the strategies can be executed.

A very important aspect is to involve the first tier suppliers in the execution of second tier supplier cost reduction strategies, even though this is not always required for the cost reduction strategy. Previous research has shown that cooperation with the first tier suppliers is essential in this process to keep the first tier suppliers satisfied with the relationship.

# 5. Discussion

In this chapter, the general conclusions of this research project are described first, next the recommendations for organization X are given, after which the limitations of this research are described. This chapter will be concluded with the future research directions which follow from this research project.

## 5.1. Conclusion

In this section is described what the conclusions of this research project are and how the research question is answered. Next to that is made clear what contributions this research made to the current body of knowledge in the procurement profession. The research question was formulated as follows:

*How can the procurement department of organization X identify and deal with cost reduction strategies in their second tier supply base?*

The research question was answered by making a conceptual model which provides high tech organizations with a structured approach to realize cost reductions in their second tier supply base. With this model high tech organizations can assess in which situation they are with their second tier suppliers, after which they can determine which cost reduction strategies best fit their situation.

An important conclusion derived from the case studies, is that second tier supplier cost reduction strategies are mostly too specific and therefore limited useable by other organizations, since second tier suppliers did not have the same importance for all organizations. Therefore the conceptual model aimed at describing situations in which organizations can be together with their second tier suppliers, after which organizations can draw their own specific strategies for these situations.

However, the second tier supplier cost reduction strategies found in literature and derived from the case studies, can nonetheless still be carried by out by organizations in certain situations, or serve as an inspiration in formulating their own cost reduction strategies. Since the second tier supplier cost reduction strategies were found to be mostly too specific and context dependent, the side effects of these strategies were not further investigated in this research.

From the case studies became clear that when organizations want to realize cost reductions in their second tier supply base, they first select the first tier suppliers of strategic products for two reasons. Firstly (1), these products are high value products, which indicates a higher cost reduction potential. Secondly (2), because these products are marked as strategic, organizations are somehow dependent on these first tier suppliers. Therefore it makes sense to dive deeper in the supply chain for additional cost reduction opportunities, since an organization cannot easily switch to other first tier suppliers.

When the first tier suppliers of strategic products are selected, organizations further structure their approach by classifying the second tier suppliers of leverage and strategic parts as their key second tier suppliers. These parts are also high value parts, which indicate a higher cost reduction potential. Dependency is also an important factor to classify second tier suppliers on, since this will determine which cost reduction strategies will be chosen. By analyzing the case studies became clear that countering strategies best seem to fit for key second tier suppliers of leverage parts and clustering strategies best seem to fit for key second tier suppliers of strategic parts.

Another contribution made to the current body of knowledge in the procurement profession is the importance of the customer position as a second tier customer. Since this importance was not known of before this research was conducted, it was not included in the research questions. On this topic can be concluded that organizations should assess their customer position as a second tier customer in order to determine their leverage advantage. However, determining this position is difficult, since an organization is no direct customer of the second tier supplier. Therefore, the customer position of the combination of the organization and the first tier supplier has to be determined, compared to other combinations in the customer portfolio of the second tier supplier. This combination was delineated in Figure 21 and was referred to as a *tandem*. The second tier customer position was therefore be defined as *the customer position of the tandem in the second tier supplier's customer portfolio.*

Organizations should first ensure that the tandem is a core customer for the second tier supplier, since this will give them the best leverage position to utilize in the cost reduction strategies. In order to obtain this customer position, organizations can apply several strategies to increase their attractiveness as a second tier customer; these were listed in Table 7.

## 5.2.Recommendations

In this section, the situation within the procurement department of organization X is reflected on the final conceptual model, from which recommendations are given. This is done according to the steps of the conceptual model, which are described below.

Organization X already has a good mapping of its suppliers, from which becomes clear that many of the top spend first tier suppliers are single source suppliers, which makes them strategic suppliers. Second tier supplier cost reduction strategies are therefore best applicable to these suppliers.

Organization X has already created supply chain transparency with these strategic suppliers to a large extend, which made it possible to determine on which second tier suppliers organization X has a high indirect spend. In this way was determined which second tier suppliers are the key second tier suppliers. However, to be able to make a division between strategic and leverage second tier suppliers, the dependency on these second tier suppliers also has to be assessed. This step has not been taken yet and this should be assessed to determine which cost reduction strategy is best applicable per key second tier supplier later in this process.

Once the key second tier suppliers are identified, the second tier customer position should be assessed for these key second tier suppliers. An important step is to make a division between the second tier suppliers which are also a first tier supplier, and those who are solely second tier suppliers. A result of the supply chain transparency created, was that it became clear that a significant amount of the second tier suppliers is also a first tier supplier. It will be much easier to determine the customer position for these second tier suppliers, because organization X is already directly doing business with these suppliers.

After this step, organization X has to decide which countering and clustering strategies it will pursue for its key second tier suppliers. As mentioned in the model, organization X should preferably make sure that they are a core customer for their key second tier suppliers as to maximize their leverage advantage. As described in step 5 of the conceptual model, several strategies are available to increase their second tier customer attractiveness. After this step, the second tier supplier cost reduction strategies can be enabled and closed triads created when necessary.

These recommendations overlap with some actions already enabled by organization X. They for example already make use of a higher leverage advantage against certain second tier suppliers, for which they have taken over price negotiations of the first tier suppliers. However, this model provides organization X with a tool and guidelines on how to enable a structured approach for realizing cost reductions at all their key second tier suppliers. The absence of this was mentioned as a major impediment for realizing cost reductions in the second tier supply base and strategies already enabled can be part of this bigger program.

## 5.3.Limitations

This research also has some limitations, which have to be taken into account regarding the generalizability of this research. These limitations are discussed per subject below.

Firstly, given that this subject is limited described in current academic literature, this research did not have much research results to build on. Even though that some industries already have extensive experience with second tier supplier management, very little of these experiences are translated into academic literature. Therefore, the nature of this research project was explorative, which had consequences for the deepness of this research on this subject.

Another limitation of this research project is the level of generalizability. This research was conducted in a limited set of high tech organizations, after which a final model was made based on the cross case conclusions. It is therefore unknown if this model is also applicable to a broader set of organizations, for example non high tech organizations. This limits the external validity of this research.

This research focused solely on cost reductions in the second tier supply base, however it was very hard to focus solely on costs, since it is closely related to other aspects such as quality and supply risk. When organizations are somehow able to reduce costs in their second tier supply base, the possibility that this will come without any other drawback is relatively small. However, this choice had to be made in order to delineate the research.

From the case studies became clear that supply chains and the strategies of the organizations differ enormously. If differed per case study organization if managing beyond the first tier of suppliers was necessary and important. This has implications for the second tier supplier cost reduction strategies, since second tier suppliers do not have the same importance for all organizations. Some cost reduction strategies derived from literature or the case studies are not applicable to other similar organizations, since they are too specific and context dependent.

In the case studies became clear that bottleneck parts are of special importance to the organizations. Though the actual costs of bottleneck parts are low, the potential costs of these parts in case of supply failure can be enormous and can cause damage to the reputation of an organization. However, bottleneck parts were not taken into account in this research, since it focused on reducing the costs of goods and bottleneck parts are already low cost products.

During the case studies was found out that the second tier customer position is a very important factor to take into account. However, assessing this position is difficult since the first tier supplier acts as an intervening variable in the triad. Therefore, some oversimplifications and assumptions had to be made in order to be able to assess the second tier customer position. This was done in the form of what was described as a tandem.

Lastly, a limitation is that only a limited amount of documentation was retrieved during the interviews for the case studies, this limits the construct validity of this research. There was only a limited amount of documentation available, since the organizations did not have much documentation available about these subjects. Other documents were confidential and therefore only insight was given in these documents, no copies for further research could be taken away.

## 5.4. Future research directions

During this research project, some interesting directions for future research came up which could not be taken into account in this research.

Firstly, which was also mentioned in the limitations, including the bottleneck products in the conceptual model would help in creating a model which is much broader applicable by organizations. Many organizations are struggling with the supply of their bottleneck products and classified this as one of their top concerns.

A second topic is the second tier customer position of organizations. During this research was found out that this is an essential aspect in this topic, gaining a better understanding of the second tier customer position can support organizations significantly in determining the best suitable second tier supplier cost reduction strategy. Which factors are of influence on this customer position should be investigated further, for example what influence the first tier supplier has in the "tandem" remains largely unknown.

Related to these two topics, it would be interesting to see what influence the relationship between the first and second tier supplier has on several aspects in the triad, such as supply risk and the second tier customer position. What happens in this relationship is mostly outside the managerial view of the focal organizations and is therefore difficult to anticipate on.

Lastly, an interesting research project would be to include the customers of an organization, together with all the lower tier suppliers in a bigger quantitative research. The customer's wishes are very important in this topic, since in the end the customer determines what specifications the products will have. These specifications should influence all the parties in the lower tier supply chain. In this way a much broader aspect of the supply chain could be investigated, together with the influence of all the internal relationships. It could for example occur that a product bought from a second tier supplier is considered a strategic product by a focal organization, but only as a leverage product by the first tier supplier. This would have important implications for the focal organization, since this indicates that a strategic part from a second tier supplier is considered as not important by a first tier supplier.

## Appendix I – Triadic relationships in the extended supply chain

| | Open MSC | Closed MSC | Transitional supply chain |
|---|---|---|---|
| **Characteristic** | *Introduction of supplier has created an intermediary* | *All organizations are formally linked* | *Link between focal organization and second tier supplier is being established* |
| **Structural power** | • Buyer has access to global markets, which are its main source of power<br>• Supplier acts as an intermediary enabling information flows and coordinating physical flows but with no significant competitive gain as prices are controlled by the market.<br>• Supplier's Supplier operates as a commodity provider with limited power. | • Buyer uses its strong brand to create common goal for the supply chain.<br>• Supplier is treated as commodity provider with limited power. However, the supplier's reliability over a long period brings stability to the supply chain.<br>• Supplier's Supplier has a strong impact on product quality, safety and sustainability. | • Buyer sees itself as dominant but depends on the supply chain for market knowledge, product innovation, quality, safety and sustainability.<br>• Supplier intends to protect its power position, which could be undermined by the establishment of a relationship between Buyer and Supplier's Supplier.<br>• Supplier's Supplier has a strong impact on product quality, safety and sustainability. |
| **Interdependence** | • Operational interdependence among companies in supply chain<br>• Members are positive about their relationships. However, this is a relatively new relationship and a degree of uncertainty about the future is present, although tensions have not yet emerged. | • All relationships are positive.<br>• The longevity of the Buyer–Supplier relationship has resulted in stability and interdependence.<br>• Supplier's Supplier is proud of contributing to a strong brand with a reputation for high quality.<br>• Flexible pricing incentivizes Supplier loyalty. | • All parties are interdependent, retailer for quality and innovation, others for access to market.<br>• Possible reduction of power for Supplier has increased tensions and stimulated measures to increase interdependence.<br>• As power positions have softened, interdependence has grown. |
| **Relationship stability** | • Some tensions about length of contract. | • Some tensions about costs. | • Tensions between processor and retailer due to possible loss of influence by processor. |
| **Collaborative performance** | • Collaborative performance managed as independent dyads rather than MSC.<br>• The introduction of intermediary allowed focuses on quality and delivery instead of price. | • The parties increased the transparency of information in the relationships.<br>• Stronger teamwork at all levels of the MSC. | • All parties focused on the complete supply chain to improve planning and cost management. |

# Appendix II – Transmitting competences to second tier suppliers

**Hewlett Packard**

Hewlett Packard has several programs to transmit competences to its first or second tier supply base; these can be summarized in three types: (1) on-site assessments, (2) training workshops, and (3) workshops for exchanging experiences (Grimm et al., 2012). As an example of training workshops, Hewlett Packard trains its second tier suppliers in "going green"', by training them in practices which result in resource efficiency and waste elimination. The exchange-of-experience workshops are meant to be a platform for interactive and open dialogs among sub-tier suppliers in which they learn from and about each other.

**Honda**

The second tier suppliers of Honda usually do not have Honda's full focus, but when necessary Honda trains second tier suppliers directly. An example of this is when Honda goes with a first tier supplier to a second tier supplier, to give a training class and transmit a competence for a certain production process. Another option is to give a training class at their first tier supplier's facility for their second tier suppliers. In these training classes whole teams from a second tier supplier are trained. Honda has achieved a remarkable success in training its second tier suppliers by gaining 30-40% in productivity by directly working with its second tiers (Fitzgerald, 1996).

**FIAT**

Like many other organizations FIAT got more dependent on their supplier capabilities as systems became more complex due to outsourcing. However, to secure the quality delivered by the second tier suppliers, it started to undertake substantial efforts to transmit competencies to the second tier suppliers (Follis and Enrietti, 2001).

To enable this, FIAT initiated a consortium with first and second tier suppliers and part of this consortium was the "guided growth" program of FIAT. This started with a 10 day training course about a definite topic designed to improve quality after which came a one month test run in which sub-tier suppliers had to implement the methodologies and procedures. At the end of the 6 month program the results each sub-tier supplier had achieved were assessed by professionals from the related first tier supplier overseeing the whole improvement process. Despite the that benefits of this program are relatively diffuse, measurable improvements on key manufacturing metrics such as cycle time, productivity, and on-time delivery were shown by FIAT.

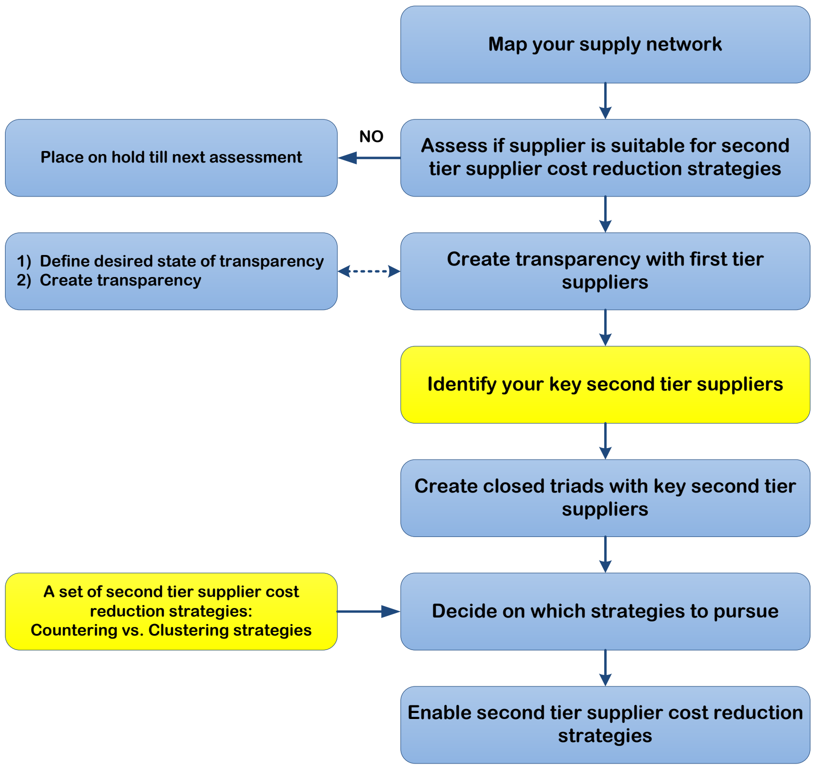
**Harley-Davidson**

Purchasing professionals at Harley-Davidson started up a project to build trust and improve performance of their second and third tier suppliers (Donath et al., 2002), since problems in launching new products came mostly from the sub-tier suppliers, not from the first tier suppliers. Therefore improving sub-tier performance was essential for Harley-Davidson

This project started with a cooperation day: a meeting in which of all the members of the supply chain were present. After this meeting they've met in smaller "links" to identify and discus the concerns they've had and the issues they share. The members of these links looked together at the issues to find a common thread for which they can offer improvement and from which each one can benefit. Goals on which these links had to focus when they got back to their own workplace were for example: reduce the amount of waste by 20% of the total cost; reduce rejected parts by 50% at all inspection areas and shorten the cycle time by 30%.

# Appendix III – The preliminary conceptual model

The preliminary conceptual model which was created after the literature review is discussed step by step below.




## Step 1: Map your supply network

A first step is to map the supply network based on the information already available for the focal organization; with this information can be assessed if a supplier is suitable to consider for second tier supplier cost reduction strategies at all.

The criteria in Table 7 are based on the factors found in the literature review, although there many criteria to assess suppliers on, these are found to be the most important. As shown in Table 7, spend on a supplier is used and the relationship with the supplier is split up in three sub-factors, these can be used to support in deciding how the overall relationship with a first tier supplier is. These factors were discussed in chapter 2.4.1. Lastly, the kind of products bought from the supplier can be used to categorize suppliers, for which the reason was discussed in chapter 2.4.2.

## Step 2: Assess which first tier suppliers are suitable

The data gathered in step 1 can now be used to assess if a supplier is suitable to consider for second tier supplier cost reduction strategies at all, since transparency first has to be created together with the first tier suppliers and they are part of the triad. Unselected suppliers should be put on hold till the next assessment of suppliers in which the situation might have changed. If suppliers are not selected, this could also be an indication that organizations can best pursue another kind of cost reduction strategy, not aimed at the second tier supply base.

| Criteria | Measurement |
|---|---|
| **Relationship with supplier** | **Good** / Mediocre / Bad |
| • Power relationship[16] | **Buyer dominance** / Supplier dominance / Independence / Interdependence |
| • Partnership | **Yes** / No |
| • Trust in supplier[17] | **High** / Low |
| **Spend on supplier** | **High** / Low - or apply 80/20 rule |
| **Kind of products from supplier** | • Product complexity ( **High** / Low )<br>• Spend on product ( **High** / Low ) or apply 80/20 rule |

Table 9: Criteria to assess suppliers on

The criteria marked in bold indicate the favorable outcome, these are shortly discussed here. Ideally, an organization and a supplier have a good relationship, which will help in the process of creating transparency and finding joint cost reduction opportunities in the second tier supply base. The three sub-criteria can help in this assessment. Secondly a supplier on which an organization has a high spend indicates a high cost reduction potential, which makes it more suitable to consider for second tier supplier cost reduction strategies. Lastly, suppliers which sell high complexity, high value products will be more prone to second tier supplier cost reduction strategies, which was explained in chapter 2.4.2.

Organizations could start with the first tier suppliers which score best on all factors, however every organization has to individually decide which first tier supplier will be selected, these criteria can help in this process. Which suppliers are chosen will also depend on the resources available; organizations could for example start with a limited set of suppliers.

## Step 3: Create supply chain transparency with first tier suppliers

The next step is to create supply chain transparency, which was discussed in chapter 2.3. There are two steps in the process of creating transparency:

1. **Decide on how much and what kind of transparency is needed**
   It differs a lot per organization or sector which degree of transparency is favorable and how this kind of transparency is used. However, in order to be able to enable second tier supplier cost reduction strategies, this information must be retrieved at least:
   - All second tiers supplier must be within the visible hand of the focal organization
   - All the data in Table 7 must be able to be applied to the second tier suppliers, thus information on all these criteria must be retrieved

[16] The Power Matrix of Cox et al. (2003) can be used for this assessment
[17] Trust can be measured in both ways, however in this situation the trust in the supplier will be more relevant, since the trust of the supplier in the focal organization is difficult to assess

**2. Create transparency with first tier suppliers**

Once decided how much supply chain transparency is required from the first tier supplier, data gathering can be started and the supplier has to be approached with the request of providing cost data. Previous research has shown that it is very important that organizations do this with the intention of collaborating with the first tier supplier and to find joint cost reduction opportunities. If this data is used to increase the pressure on suppliers, this significantly reduces the supplier's relationship satisfaction. Other important factors for organizations to take into account in the process of creating transparency which were discussed in chapter 2.3.2 are:

- S*upplier's relationship satisfaction* is negatively related to the degree of information disclosure
- *Trust* between organization and supplier is both a requirement and consequence for creating supply chain transparency
- *Commitment* of the supplier and focal organization is positively related to successfully creating supply chain transparency
- *Communication* has to be streamlined in order for supply chain transparency to be effective
- *Validity* of information provided by a supplier has to be checked

If a supplier is hesitant to reveal their cost structure, they can be stimulated with a variety of incentives:

- Knowledge sharing
- Contractual incentives
- Financial incentives
- Support negotiations with second tier suppliers
- Start a co-marketing program
- Exclusion of a supplier

## Step 4: Identify your key second tier suppliers

A high indirect spend on a second tier supplier relative to other second tier suppliers points towards a higher cost reduction potential, therefore key second tier suppliers are defined as *second tier suppliers which are responsible for a significant part of the indirect total cost of an organization and have a high cost reduction potential.*

Which second tier suppliers are key second tier suppliers, must be assessed based on the information provided by the first tier suppliers with which transparency is created. The characteristics from Table 7 can be used to assess whether a second tier supplier is a key second tier supplier or not. However two factors are most important to determine the cost reduction potential:

- High indirect spend on a second tier supplier, which indicates a higher cost reduction potential
- Kind of products from a second tier supplier, which products a second tier supplier sells will influence the cost reduction potential

The result of this step should be a list of key second tier suppliers together with their characteristics acquired from the transparency created.

## Step 5: Create closed triads with key second tier suppliers

Now that they key second tier suppliers are identified, an organization has to assess for every key second tier supplier if they are in an open, transitional or already in a closed triad.

In this step a relation with the key second tier suppliers will be started by creating a closed triad, together with the first and or second tier supplier will be sought for joint cost reduction opportunities. Initially these key second tier suppliers will only be managed by the first tier supplier, since focal organizations do not have a relationship yet with their second tier suppliers (Open Triad).

Besides that creating closed triads in necessary to enable most second tier supplier cost reduction strategies, creating closed triads also has some significant advantages which were shown by the research of Mena et al. (2013):

- In the closed triad, the mediating role of the first tier supplier disappears and this reduces the first tier supplier's power in the triad
- All parties in the closed triad focused on the complete supply chain to improve planning and cost management, which results in stronger teamwork at all levels if the triad
- Increased sense of interdependence and stability between the parties in the triad
- Increased transparency of information and loyalty between the parties in the triad
- Second tier supplier has a strong impact on product costs, quality, safety and sustainability
- Focal organizations can use their brand to create a common goal for the triad

For some key second tier suppliers can also be determined that they can best be managed by the first tier supplier in order to realize cost reductions, for example when a focal organization does not have enough resources to start managing all their key second tier suppliers. Organizations will have to keep in mind that investments in mainly management effort are required to create and maintain closed triads.

## Step 6: Decide on which strategies to pursue

Once closed triads with the key second tier suppliers are created, second tier supplier cost reduction strategies can be selected, which were defined as*: a plan to unlock cost reduction opportunities in the second tier supply base*.

Before an organization starts with enabling the second tier supplier cost reduction strategies, it first has to investigate on which suppliers to focus and which strategy will be best applicable. An organization could for example first apply the 80/20 rule on its suppliers, or place the cost reduction strategies in the cost reduction pay-off matrix of Bragg (2010), which is shown in Figure 29. With this matrix could be estimated if the strategies are cost-efficient.

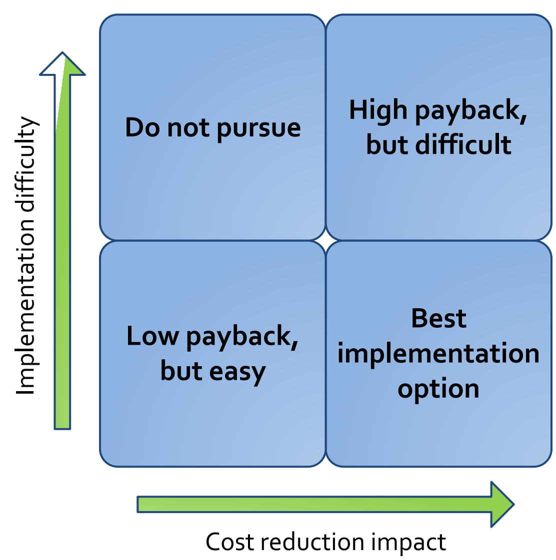



Figure 29: Pay-off matrix

The second tier supplier cost reduction strategies which are found literature and best practices were grouped under two kinds of strategies which are summed up below: countering and clustering. Which strategies are chosen will depend on the situational context of the organization. There is no one size fits all strategy for this, since some organizations may for example be unable to acquire a bargaining position high enough to consider countering strategies at all.

| **Clustering strategy** |
| --- |
| **Transmit competencies to second tier suppliers via:**<br>• On-site assessments<br>• Training workshops for second tier suppliers<br>• Workshops for exchanging experiences<br>• Initiate a consortium with first and second tier suppliers |
| **Include second tier supplier in value engineering projects** |
| **Integration of second tier suppliers via:**<br>• Data standardization throughout supply chain<br>• Implementation of vendor managed inventory systems<br>• Implementation of electronic data interchange systems |
| **Certification of second tier supplier**<br>• Make sure second tier suppliers are keeping up to date on newest techniques and inspection methods |

| **Countering strategies** |
| --- |
| **Buy / Sell strategy** |
| **Supply base consolidation at second tier supplier level**<br>• Encourage your first tier suppliers to become suppliers to other first tier suppliers |
| **Transmit competencies to first tier suppliers in order to realize cost reductions in the second tier supply base via training workshops.**<br>• First tier suppliers could for example be trained in negotiating or contracting skills |

## Step 7: Enable the second tier supplier cost reduction strategies

After the second tier supplier cost reduction strategies are selected and their profitability is estimated, the strategies can be executed.

A very important aspect is to involve the first tier suppliers in the execution of second tier supplier cost reduction strategies, since it became clear that cooperation with the first tier suppliers is essential in this process to keep the first tier suppliers satisfied with the relationship.

## Appendix IV - Propositions

| # | Proposition | Motivation for the proposition | Organization X | Organization A | Organization B | Organization C |
|---|---|---|---|---|---|---|
| | **Supply base of the organization** | | | | | |
| **1** | Organizations deliberately chose first tier suppliers with which they want to engage in second tier supplier cost reduction strategies, based on several criteria | Validate step 2 of the preliminary model, test findings of chapter 2.4.1 and 2.4.2: Supplier and sourced product categorizations | *Yes* | *Yes* | *No* | *Yes* |
| | **Supply chain transparency** | | | | | |
| **2** | Before engaging in second tier supplier cost reduction strategies, organizations have to create supply chain transparency | Validate step 3 of the preliminary model, test findings of chapter 2.3: Creating supply chain transparency | *Yes* | *Yes* | *Yes* | *Yes* |
| **3** | Organizations use incentives to overcome the hesitance of first tier suppliers in creating supply chain transparency | Test findings of chapter 2.3.3: Strategy for creating transparency: Incentives for suppliers | *Yes* | *Yes* | *Yes* | *Yes* |
| | **Key second tier suppliers and closed triads** | | | | | |
| **4** | When engaging in second tier supplier cost reduction strategies, organizations structure their approach by identifying key second tier suppliers | Validate step 4 of the preliminary model, test findings of chapter 2.4.3: Key second tier suppliers | *Yes* | *Yes* | *No* | *Yes* |
| **5** | In order to identify key second tier suppliers, organizations categorize their second tier suppliers on several criteria | Test findings of chapter 2.4.3: Key second tier suppliers | *Yes* | *Yes* | *No* | *Yes* |
| **6** | Non key second tier suppliers are left out of focus by organizations when regarding second tier supplier cost reduction strategies | Test findings of sub chapter of chapter 2.4.3: Managing key second tier suppliers | *Yes* | *Yes* | *Yes* | *Yes* |
| **7** | Organizations determine who can best manage a second tier supplier in order to realize cost reductions, either the first tier supplier or themselves | Test findings of chapter 2.4.3: Managing key second tier suppliers and chapter 2.5.4: Strategies for non-key second tier suppliers | *Yes* | *Yes* | *Yes* | *Yes* |
| **8** | Before engaging in second tier supplier cost reduction strategies, organizations create closed triads with key second tier suppliers | Validate step 5 of the preliminary model, test findings of sub chapter of chapter 2.2.2: Relationships in the extended supply chain: Triad 2 | *No** | *No** | *No* | *No** |
| | **Second tier supplier cost reduction strategies** | | | | | |
| **9** | Organizations have specific strategies to realize cost reductions in their second tier supply base | Validate step 6 of the preliminary model, test findings of chapter 2.5: second tier supplier cost reduction strategies | *Yes* | *Yes* | *Yes* | *Yes* |
| **10** | When organizations engage in second tier supplier cost reduction strategies, first tier suppliers are involved in executing these strategies | Test findings of chapter 2.5.2: Clustering strategies | *Yes* | *Yes* | *Yes* | *Yes* |

* There are exceptions; these are elaborated on in chapter 4.3

# Appendix V – Interview Questions

In this appendix the interview questions are given which were used during the interviews for the case studies. The sequence of questions matches the order of steps in the preliminary model; this order is also used in the case study descriptions.

### Introduction

*In the introduction was asked for a short introduction of:*

- The interviewee
    - *Background of the interviewee*
    - *Function and responsibilities of the interviewee within the organization*
- The organization
    - *Background of the organization*
    - *What is the organizational structure*
    - *What kind of products is the organization selling*
    - *What kind of customers does the organization have*
        - *What kind of second tier supplier cost red does the organization have*
- The purchasing department within the organization
    - *How is the purchasing department in the organization built up*

### The supply base of the organization

- How is determined which kind of first tier suppliers are most interesting regarding second tier supplier cost reduction strategies?
    - *Otherwise, what makes them uninteresting?*
    - *Is the most interesting first tier supplier chosen first, when second tier supplier cost reduction strategies are considered?*
    - *Are first tier suppliers able to block this whole process?*
- What can be the influence of the following factors on this process?
    - *Kind of relationship with the first tier supplier*
    - *Spend on supplier*
    - *Kind of products from first tier supplier*

### Supply chain transparency

- Do you think creating supply chain transparency is essential for enabling second tier supplier cost reduction strategies?
- How transparent is the supply chain of your organization?
- How did the organization create supply chain transparency?
    - *Were any incentives used to overcome the hesitance of first tier suppliers?*
- Which factors are important in the process of creating transparency?
- What are essential aspects to create supply chain transparency for regarding second tier supplier cost reduction strategies?

### Key second tier suppliers and closed triads

- Does the organization deliberately identify key second tier suppliers?
- What characteristics of key second tier suppliers do you think are important regarding cost reduction strategies?
- Are non-key second tier suppliers also managed?
- What is the influence of the relationship between the first and second tier supplier?
- Does the organization have a direct link with the key second tier suppliers?
  - *If yes, how was this enabled? Did the first tier supplier approve this?*
- What kind of contact does the organization have with the second tier supplier? And how well is this going?
- Does the organization deliberately make a choice which party is best able to realize cost reductions in the second tier supply base, either the organization or its first tier supplier?

### Second tier supplier cost reduction strategies

- What does the organization do to realize cost reductions in the second tier supply base?
  - Does the organization have specific strategies for this?
  - What are the results of these strategies?
- Are the first tier suppliers involved in this strategy? And if yes, how?
- What consequences do these strategies have for the relationship with the first tier supplier?
- Discuss preliminary model and the strategies derived from literature with the interviewee
  - *See if these strategies are recognized and if the model can be improved*

# Appendix VI – Case studies

In this Appendix the case studies performed at high tech organizations are described in detail. Here is described which actions are currently taken to realize cost reductions in the second tier supply base of the case study organizations and organization X. A description of organization X and its purchasing department were already given in chapter 1.1.

This order of sections in the case study descriptions corresponds with the sequence of steps in the preliminary conceptual model, which is illustrated in Figure 30. Therefore in every case study, first the supply base of the organization will be described in more detail (step 1 and 2), after which their supply chain transparency is discussed (step 3). Next the key second tier suppliers and closed triads are described (step 4 and 5); each section will be concluded with the strategies enabled by the organization to realize cost reductions in their second tier supply base (step 6 and 7).

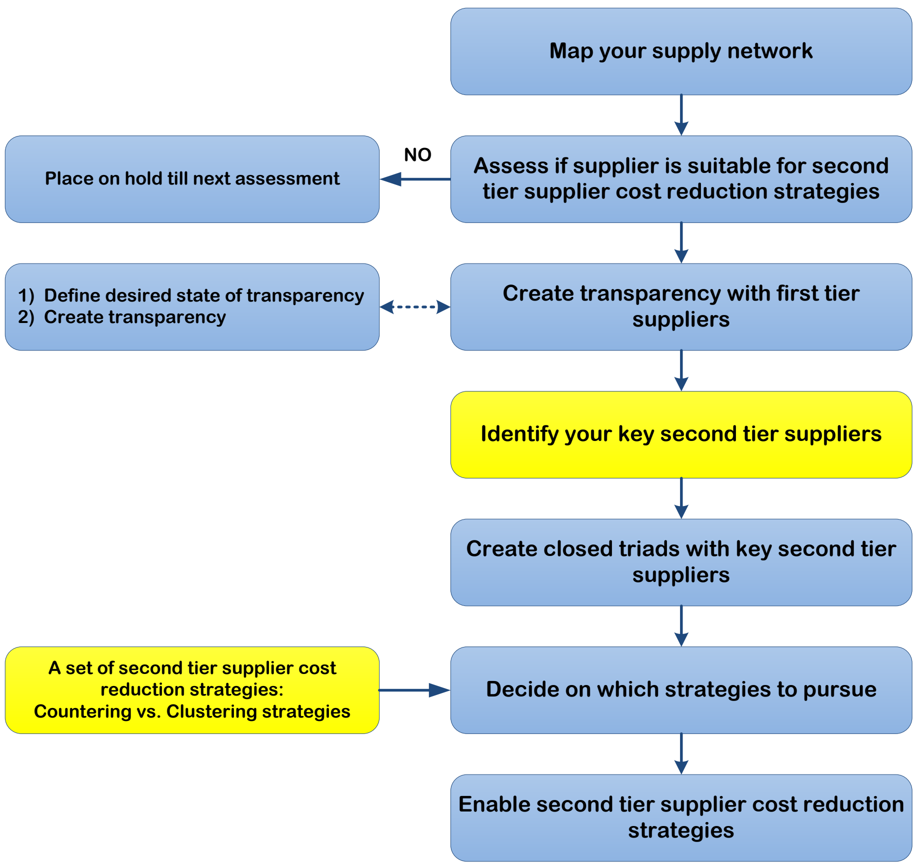



Figure 30: Preliminary conceptual model

# Second tier supplier cost reduction strategies within the purchasing department of organization X

## The supply base of the organization X

Production of organization X is characterized by low volume, high mix and high complexity products and the bill of material of organization X is approximately 75% of the organizational costs. Organization X has outsourced many of its activities in the past decades and also moved some of its activities to low cost countries in order to reduce costs. This enhanced the importance of managing the first tier suppliers and the role of the purchasing department within organization X. Suppliers are also providing an increasingly higher level of assemblies, so organization X can provide the same product with less internal production.

The supply base of organization X is roughly characterized by the 80/20 rule and has mostly single source suppliers, which makes most suppliers strategic suppliers. Some factors make it more difficult to switch to other first tier suppliers for organization X (and thus other second tier suppliers), which are possibly cheaper or have other benefits over the current supplier, these are elaborated on below.

- The first factor is that organization X is complying with industry specific regulations; therefore organization X must be able to show objective evidence of by organization X approved suppliers, purchased parts, manufacturing locations, etc. This forces organization X to invest a considerable amount of time and effort in the investigation of these suppliers to comply with these regulations, making it less attractive to switch between suppliers.
- Second factor is supplier consolidation, which has resulted not only is less suppliers but also in closer relationships with the remaining suppliers. As a result of these closer relationships, organization X is less likely switch to other suppliers and became more dependent on these suppliers.
- Third factor is that most products of organization X are high tech and require intensive R&D before manufacturing of the actual product takes place. This has led to early supplier involvement in the design process of the products, which has as a consequence that the relationship with suppliers is stronger and organization X became more dependent on its suppliers.
- The last factor is the long life-cycle time of their products; therefore suppliers are required to give long after service, which requires long term relationships with these suppliers.

Mainly because of these reasons, the changeover time to another supplier is generally more than a year and requires extensive management and engineering support. A consequence is that suppliers get more power in the relationship with organization X. Besides that, most products of organization X have a high content of prescribed parts and are therefore constrained to certain second tier suppliers.

All these factors make the supply base of organization X very rigid and enhance the importance of extensive optimization of the sub-tier supply base to realize additional cost reductions.

### Supply chain transparency

As in most industries, the industry is in which organization X is operating is characterized by low transparency and mostly closed-book practices, which makes it more difficult to find additional optimization opportunities within the sub-tiers of the supply chain. This means that for some products it is not known what the second tier suppliers are, where they are located, what prices they charge, etc. Since the bill of materials is approximately 75% of the organizational spend, there is a large cost reduction potential in the bill of materials. Thus it is very important for organization X to understand their full bill of material in detail in order to identify and realize cost reduction opportunities in the second tier supply base. Without this information, it is nearly impossible to find second tier supplier cost reduction opportunities.

The purchasing department of organization X therefore initiated a process to create transparency with its top spend suppliers as to find joint optimization opportunities in the second tier supply base. This process is briefly described in the next section. Organization X did not have all information before this initiative for a reason, this information could open up information which first tier suppliers rather not share with organization X, for example questionable second tier suppliers or very high profit margins on certain products. In some cases transparency was already created, for example for prescribed parts or products which were developed together with a first tier supplier. In this cases was jointly decided which second tier suppliers should supply the parts for the products. Another case is when a first tier supplier is also supplying other first tier suppliers, for these cases supply chain transparency was also already available to a certain degree.

Since organization X is complying with industry specific regulations, they must be able to show objective evidence of organization X approved suppliers, purchased parts, etc. As mentioned in the previous section, this forces organization X to invest a considerable amount of time and effort in the investigation of these suppliers to comply with these regulations. Therefore, if a supplier wants to change a part for its product or switch to another supplier, they must first ask permission to organization X. In this way a certain degree of transparency was already obtained. However, this data is not aggregated in one database, so there is no overview of the transparency.

#### Creating transparency with the top spend suppliers

The purchasing department of organization X initiated a process to create transparency with its top spend suppliers as to find joint optimization opportunities in the second tier supply base. First the suppliers had to be chosen with which to create transparency with; the top spend suppliers were chosen for this project since they are responsible for the biggest part of the bill of material of organization X. As mentioned in the previous section, most suppliers are single source and strategic suppliers; therefore organization X is often in long term relationships with these suppliers. Since in these long-term relationships a certain degree of mutual trust was present, it made sense to create transparency for finding joint optimization opportunities.

After the suppliers to create transparency with were chosen, a management letter was send to the top management of these suppliers to announce that this project was coming. In this letter was described what the purpose of this project was and also served as an invitation for an information session. In this information session, in which all the selected suppliers were present, was explained that is was necessary to create transparency in order to find joint optimization opportunities. Emphasizing that these cost reductions are essential to compensate for the market price erosion of their products served to create buy-in from the top management of the suppliers to engage in creating transparency.

Transparency was actually created by sending a request for information, in which was asked for detailed cost information of the bill of material of the suppliers. In this way supply chain transparency was created on a bill of material level. No internal transparency of either the production process of the first or second tier supplier was created, since it was aimed at reducing the bill of material of the first tier supplier.

Creating transparency was a difficult and sensitive process, which required time and effort of the suppliers. This did not go without hesitance of the suppliers, but suppliers eventually did cooperate in this process by emphasizing that creating supply chain transparency was essential to find joint cost reduction opportunities. Incentives were not used in this process.

## Key second tier suppliers and closed triads

After supply chain transparency was created, key second tier suppliers were identified based on spend of first tier suppliers on the second tier suppliers. In other words, if organization X has a high indirect spend on a particular second tier supplier; this indicates that this second tier supplier is more important than other second tier suppliers. Supply chain transparency also made clear that a significant amount of second tier supplier were also first tier suppliers, which implies organization X also has an indirect spend on some first tier suppliers next to a direct spend on that supplier, which was illustrated in Figure 16.

However, key second tier suppliers were already identified before the process of creating transparency, but based on other criteria. These second tier suppliers were mostly prescribed suppliers with which organization X mostly created closed triads. The reasons for prescribing and creating closed triads are summed up below:

*Leverage advantage*

Some second tier suppliers sell their products to multiple first tier suppliers of organization X. All these first tier suppliers have a relative small spend on that particular second tier supplier, however if all spend of these first tier suppliers is combined, this larger total spend creates a higher leverage advantage for organization X than for the first tier suppliers apart. To utilize this leverage advantage closed triads were created so organization X could engage in price negotiations directly with the second tier suppliers.

*Quality standards*

Some second tier suppliers provide a certain quality in their products, which can be essential for organization X. Therefore these suppliers or products can be prescribed as to make sure the first tier supplier buy their products at those particular second tier suppliers and other second tier suppliers which might be cheaper or provide less quality are left out of consideration. Closed triads are not always created in these cases, since it is not strictly necessary to stay in direct contact with these second tier suppliers, since prescribing is sufficient.

*IPR*

Organization X is dependent on certain second tier suppliers, since they possess an IPR on a production technique which is essential for a product of organization X. Creating closed triads with these second tier suppliers is important, since these are mostly bottleneck products and organization X needs to secure the flow of products from this sub-tier supplier and reduce the supply risk.

*Joint developed product with the second tier supplier*

If a product is developed together with a second tier supplier, organization X wants to make sure that the first tier supplier buys this product at this second tier supplier, these are therefore prescribed. Since these products are jointly developed with the second tier supplier, closed triads are already created in the development process.

## Second tier supplier cost reduction strategies

In most organizations like organization X is little knowledge and experience with second tier supplier cost reduction strategies, which impedes enabling cost reduction strategies in the second tier supply base. What is currently missing within organization X is a tool or guidelines how to identify and deal with second tier supplier cost reduction strategies.

However, a few initiatives were taken within the purchasing department of organization X to realize cost reductions in the second tier supply base before the process of creating transparency was initiated. These initiatives are described first below.

*Advising first tier suppliers in choosing second tier suppliers*

For those products bought from the first tier suppliers of which a cost break down is available, organization X helps the first tier supplier choosing the best second tier suppliers for high value and essential parts. If a cost breakdown is not available, organization X uses the expertise and knowledge of its cost engineers to make a cost break down. Organization X than first identifies the cost drivers of the product, after which the second tier suppliers are benchmarked. In this way organization X makes sure that the first tier suppliers buy their products from the cheapest second tier suppliers. By doing this organization X should be able to buy the products from the first tier supplier for a lower price, since the first tier supplier has reduced costs thanks to the advice of the organization. In this way organization X continuously challenges its first tier suppliers and benchmarks its second tier suppliers.

*Make use of a higher leverage advantage against the second tier supplier*

For some second tier suppliers, organization X has a bigger leverage advantage than a first tier supplier itself. This mostly occurs in two kinds of situations, in first situation a second tier supplier is actually also a first tier supplier to organization X. In this case the share of the total turnover of the second tier supplier for organization X is higher than share of the first tier supplier. In the second situation, a second tier supplier supplies to multiple first tier suppliers, with which organization X also has a higher share in the turnover than the first tier suppliers apart. In this strategy, it takes over the price negotiations and contracting of the first tier supplier, after getting an agreement to negotiate for the first tier supplier, since it has a bigger leverage advantage.

*Create a leverage advantage against the second tier supplier*

Some projects were initiated aimed at reducing the total number of second tier suppliers for specific commodities, for example for plastic and metal parts. Part of this project was to prescribe some second tier suppliers as to increase a leverage advantage against a second tier supplier. This is a strategy for leverage parts, in which was investigated if some parts bought from second tier suppliers could be replaced by parts from other second tier suppliers, as to reduce the second tier supply base. However, these projects are still going on therefore it is not possible to determine the outcome.

*Cost reduction strategies after supply chain transparency was created*

Once supply chain strategy was created as described in the previous section, the cost drivers in the second tier supply base were investigated and identified. The goal of investigating these cost drivers was to find leverage and cost reduction opportunities in the second tier supply base. These opportunities were only identified at the time of writing this master thesis, actions to unlock these opportunities still had to be enabled. Therefore cannot yet be described what the results of these initiatives are.

By creating supply chain transparency, two interesting facts came up. Firstly, the transparency made clear that many first tier suppliers are also supplying other first tier suppliers; in other words, these second tier suppliers are already doing business directly with Organization X. Therefore organization X could start negotiating a better pricing for these parts, which can lead to cost reductions. Transparency also made clear that some second tier suppliers were supplying multiple first tier suppliers, which were not previously known of. This makes these second tier suppliers an important link in the supply chain. For these cases was investigated which party has the highest leverage advantage against the second tier supplier. This could either be organization X itself, the first tier supplier or the combination of both. For these cases will be determined which party can best take place in the price negotiations, but first agreements to negotiate for the first tier supplier will need to be made.

# CASE 1 (Organization A)

## The supply base of organization A

Organization A has a relatively high bill of materials compared to the Dutch average of 68% and a significant portion of what buy are high level assembly products. Because of increased wages in the past decades, organization A has outsourced many of their operations to suppliers positioned all over the globe. This has enhanced the importance of managing their first tier suppliers and the role of purchasing department within the organization.

Organization A has a build-to-order strategy for its products, which requires the supply chain to be carefully coordinated as to make sure all the products come in when they are needed. This reduced the lead time of organization A's products with 30% in the last 8 years, but also increased the pressure on its supplier's performance.

Therefore, organization A has an active supplier development program and requires of its suppliers to continuously improve itself. They have several programs in place to achieve this, for example 6 Sigma[18], ISO certifications, waste reduction and they are mostly in long-term relationships with suppliers. Organization A has an ISO certificate specifically for its sector and also requires of its suppliers to acquire this certificate. This certificate ensures that suppliers have certain procedures for their internal processes which are better aligned with the requirements of organization A. These supplier development strategies have as a consequence that a considerable amount of time and resources are invested in the suppliers. Organization A therefore prefers long-term relationships with suppliers with contracts of at least 5, or even 10 years. They do not change very often between suppliers and this causes the supply base of organization A to be very stable.

Organization A has three kinds of sourced product groups which all have their own kind of supply chain. The first group are the make-to-spec products (MTS), for which organization A designs the whole product and provides very detailed designs and specifications to the supplier. The second group are the style-sensitive products, these concern mostly the parts on which organization A has a patent or which are developed by organization A together with a particular first or second tier supplier. Last product group are the design-to-spec products (DTS), for which organization A only provides the technological specifications, but the supplier is free to make his own design. Most of the high spend products bought by organization A are DTS products.

## Supply chain transparency

The degree of supply chain transparency of organization A differs per product and per supplier, but creating a high degree of transparency is generally preferred. Supply chain transparency of organization A will first be elaborated on by discussing the three product groups, after which the influence of the suppliers on transparency is discussed.

[18] 6 Sigma is a management strategy aimed at improving the quality of business processes and all the suppliers of organization A are also expected to use this strategy

The previously discussed MTS and Style-Sensitive products mostly consist of parts which are prescribed and or developed by organization A. They have to carefully assign the parts and second tier suppliers for these products, since they are largely responsible for the end-product. This requires a thorough investigation of the sub-tier suppliers and therefore a high transparency for these products is created. Organization A has a limited supply chain transparency for DTS products, since the first tier suppliers developed these products themselves and are therefore like a black box.

Generally, organization A assesses per product if it is worthwhile to create transparency and this depends on several factors: cost of the product, quality of the product and whether it contains bottleneck parts. If organization A knows that the quality of the product from a first tier supplier depends largely on the quality of its parts, organization A wants to make sure that its suppliers chose the right second tier suppliers for these parts. Lastly, if products require large joint investments with the supplier, organization A also requires transparency of the supplier regarding the second tier suppliers. Besides, when suppliers have obtained their ISO certificate, they are required to inform organization A about changes in the composition of their products, which includes where they source it. In this way organization A also obtains some transparency.

Several factors cause that organization A is not always able to enforce its suppliers to give full supply chain transparency. Some suppliers of organization A are for example larger than organization A itself, which gives a leverage advantage to the suppliers. This was mentioned as an important factor and impediment for organization A when trying to create supply chain transparency. The only way for organization A to create some kind of transparency is to make a should cost analysis[19], since engineering professionals within organization A know from their expertise pretty well where their DTS suppliers buy their parts.

Some suppliers of organization A don't want to give transparency since a significant part of their profit is made in the after-market, which often has high profit margins. Giving transparency could give organization A the opportunity to buy the products directly at the second tier suppliers and cut away the profit margin of the first tier supplier.

Organization A does not use any financial or contractual incentives to elicit suppliers in giving supply chain transparency, however if suppliers do not agree on giving transparency to organization A, organization A's policy is to gradually diminish the business with that particular supplier.

## Key second tier suppliers and closed triads

Organization A actively manages those second tier suppliers which are particular important to organization A and which sell essential parts to the first tier suppliers. With these second tier suppliers, organization A has mostly closed triads; they have direct contact. The importance of second tier suppliers to organization A is measured in four ways: costs, quality, prescribed parts and bottleneck parts.

[19] Approximation of a contract-price, developed by the customer's accounting, engineering, procurement, and other costing staff. The staff conducts a thorough, in-depth review of the contractor's plan to identify and eliminate inefficiencies and diseconomies, and quantifies their effect on the total cost of the project. The resulting cost figure is the should-cost estimate.
http://www.businessdictionary.com/definition/should-cost-estimate.html#ixzz2ki0hFuBU

Important second tier suppliers are those suppliers which sell very quality sensitive parts and have a relatively big influence on the quality of the end-product of the first tier supplier. The reason for managing these second tier suppliers is that organization A found out that quality issues mostly originate from the second tier suppliers, instead of their first tier suppliers.

Another aspect is if a second tier supplier supplies prescribed parts; prescribing parts to first tier suppliers can have several reasons. As mentioned above, quality can be a reason for prescribing parts, another reason can be that organization A developed a product together with a second tier supplier. Many of the styling sensitive parts are developed and extensively tested by organization A together with a second tier supplier. These parts are essential for organization A and therefore it is important that the first tier supplier buys these products at that particular second tier supplier. Organization A usually agrees on the price for these parts with the second tier supplier, without interference of the first tier supplier. Operational arrangements like Minimum Order Quantities, Order lead times, etc. are agreed between the first and second tier supplier, without interference of Organization A.

An important aspect regarding prescribed parts is responsibility. When organization A prescribes parts to a first tier supplier, it takes over a portion of the responsibility for that part. Responsibility can be expressed in terms of for example quality, delivery time, but mostly liability. If a second tier supplier, which provides prescribed parts, delivers faulty products or increases its prices, the first tier will point the liability for this to organization A. Organization A therefore tries to find the right balance between prescribing parts and reducing responsibility. The policy of organization A is to leave the responsibility for the second tier supplier mostly at the first tier supplier, so the first tier supplier consciously has to deal with this responsibility.

A last aspect which makes second tier suppliers important to organization A are bottleneck parts. If a second tier supplier supplies bottleneck parts to a first tier supplier, organization A wants to secure the supply of products, since a supply failure will directly influence organizations A's production process.

In case of emergencies, like product availability, quality issues, etc. organization A can decide to interfere and directly discuss problems with the second tier supplier. This is only done when it appears that the first tier supplier cannot solve the problem themselves and decision for this is made case by case.

### Second tier supplier cost reduction strategies

In general, organization A holds its first tier suppliers responsible for managing the second tier suppliers, except for those situations described above. Strategies for these second tier suppliers are discussed below.

*Advising first tier suppliers in choosing second tier suppliers*

For non-prescribed products bought from the first tier suppliers of which a cost break down is available, organization A supports the first tier supplier choosing the best second tier suppliers for high cost parts. If a cost breakdown is not available, organization A uses the expertise and knowledge of its engineers to make a should cost analysis. Organization A then first identifies the cost drivers of the product, after which the second tier suppliers can be benchmarked. In this way organization A continuously challenges its suppliers to benchmark the second tier suppliers.

*Make use of a higher leverage advantage against the second tier supplier*

In this strategy organization A determines which party has the most leverage against the second tier supplier, organization A itself or the first tier supplier. However, for most products and suppliers, the first tier suppliers have a better leverage position against the second tier suppliers than organization A. Therefore organization A only takes over price negotiations with the second tier suppliers in a few cases when they have a better leverage position, or when a first tier supplier is somehow not able to buy products from a particular second tier supplier anymore. This can for example be due to a disrupted relationship.

*Create a leverage advantage against the second tier supplier*

In addition to this strategy, organization A sometimes prescribes a particular second tier supplier to multiple first tier suppliers. By doing this, organization A has a relatively big share of the total turnover of that second tier supplier, via several first tier suppliers. This creates a leverage advantage for organization A with that second tier supplier if it engages in direct price negotiations. A beneficial side effect of this strategy is that none of the first tier suppliers will become too powerful in the triad, since the activities are spread across multiple first tier suppliers.

*Integrating second tier suppliers with a bright future perspective*

When new products are developed by organization A, they try to involve the second tier suppliers of some parts in this process with the prospect of growing mutual business in the future. An argument used to increase the attractiveness of participating in these projects is that this to be developed product can also be sold to other customers. In this way these parts could become strategic parts for the second tier suppliers themselves, organization A will thereby potentially become a strategic customer.

*Linking the organizational brand to the customer portfolio of the second tier supplier*

A beneficial side effect of this strategy is that the second tier suppliers sometimes use the brand of organization A as an addition to their customer portfolio. This creates extra buy-in of the second tier suppliers, since there are also producing parts for organization A. If organization A has a more well-known brand that the first tier supplier, this creates valuable addition to the customer portfolio of the second tier supplier.

*Choosing which supplier in the triad will be the second tier*

Some products of organization A are developed together with the first and second tier supplier. For these products, organization A can sometimes make the choice of either supplier A buying the parts from supplier B, after which it is processed, or vice versa. For example, when organization A buys a painted body part, organization A can arrange this process such a way that he buys the painted part directly from either the steel manufacturer or the paint jobber. This choice is made based on several KPI’s of the suppliers and for example their added value and location. In this strategy the best option can be chosen, which involves the lowest total costs and has the most benefits for organization A in terms of responsibility.

A side effect of this strategy is that organization A forces these suppliers to work together, which can cause some difficulties if they for example are also competitors of each other. In these cases organization A meets together with both parties before the development of the product to make sure they are on the same page and assess what possible difficulties in the future might occur.

*Second tier suppliers approaching organization A*

Some second tier suppliers approaches organization A when they see opportunities for increasing sales to organization A, via the first tier supplier. In these cases A investigates what opportunities for mutual business in the future is was and how they can both profit from this. However, in these cases organization A carefully has to determine whether they want to increase business with the second tier supplier itself, or to leave that decision with the first tier suppliers. Since when they take this decision itself, they will also take over responsibility of the first tier supplier.

# CASE 2 (Organization B)

## The supply base of organization B

Organization B also has a production characterized by low volume, high mix, high complexity and has a relatively high bill of materials. Organization B buys mostly high level assembly products from its first tier suppliers, which ensures that they have a short lead time of approximately 3 weeks. The dynamic market in which they operate requires also this, since they have a concrete sales forecast of only 3 to 4 weeks ahead. Organization B has a relatively small supply base and therefore also a very small purchasing department, compared to similar organizations.

This organization actively uses a dual-source strategy where possible, the leverage advantage created by this strategy led to significant reductions in their BOM. By using this strategy, they can benchmark the products easily with the other dual-source supplier and balance the load between the suppliers based on price results in continuous price-pressure. Due to the success of this dual-source strategy for organization B, there is currently no need to dive deeper in the supply chain for additional cost reduction opportunities. Applying the dual-source strategy moves their suppliers from strategic to leverage suppliers and they thereby already force their suppliers to reduce their costs, since they can only realize a certain amount of cost reductions internally. This way it makes sure that the first tier suppliers manage the second tier suppliers to their best ability.

## Supply chain transparency

Organization B has a certain degree of transparency of its supply chain, but most suppliers resist in giving transparency but organization B also does not actively pursue creating transparency with their suppliers. Like other organizations, organization B prescribes some parts or second tier suppliers to the first tier suppliers, so for these parts and products some degree of transparency is present.

Organization B does not actively dig deep into their supply chain when they are satisfied with the current price the first tier suppliers ask. Only when they suspect the price is too high and they don't have other alternatives, they'll try to convince the supplier to become transparent or do a should cost analysis.

According to organization B, a good partnership between organizations is based upon transparency. Giving transparency and maintain open communications results into confidence and a constructive dialogue about price elements with the suppliers. When a supplier becomes hesitant to be transparent, organization B generally suspects that the supplier has something to hide.

## Key second tier suppliers and closed triads

As mentioned before, this organization does not activily manage its second tier suppliers and claims its first tier suppliers are fully responsible for this, which includes cost reductions. Therefore they haven't identified any key second tier suppliers and also didn't create any closed triads with second tier suppliers.

In some cases, when there is an escalation between the first and second tier supplier, organization B gets in direct touch with the second tier supplier. This can either be together with the first tier supplier to increase the leverage, or without the second tier supplier but to underscore the shared interest of all three parties in the triad.

## Second tier supplier cost reduction strategies

Organization B interferes as less as possible with the second tier suppliers, since their belief is that they pay their first tier suppliers to find the best and cheapest second tier supplier. However, organization B has several strategies to make sure their first tier suppliers actually do use the best and cheapest second tier suppliers, in this way they indirectly manage their second tier suppliers. These strategies are elaborated on below.

*Price road mapping*

They agree with their first tier suppliers in contracts that the suppliers should realize annual cost reductions; this is incorporated in a price road map. This forces the first tier suppliers to actively pursue cost reductions in the second tier supply base, since they can only realize a certain amount of cost reductions internally. This has been a very beneficial strategy for organization B.

Negotiating a price road map is not always easy for organization B. Suppliers mostly argue that further cost reductions are not possible. In such a case the availability of a dual source supplier and concrete benchmark information helps to convince the supplier that they need to actively start to work on a price roadmap to realize cost reductions.

*Advising first tier suppliers in choosing second tier suppliers*

Organization B benchmarks the second tier suppliers when they presume the price of the first tier supplier is too high, based on the expertise and knowledge within organization B. They first create transparency with the first tier supplier or do a should cost analysis for that particular product, after which a cheaper alternative is then presented if one is found. In this way advice is given to the first tier supplier, but they are also forced to become cheaper. An argument used in this discussion by organization B is that if a cheaper alternative is available for 1 part, other parts can probably be sourced cheaper as well. In other words, organization B wants to make clear it pays its suppliers for finding the cheapest alternatives. If organization B has to benchmark the second tier suppliers themselves, they are actually doing the work of the purchasing managers if its suppliers. This strategy can also be used to determine whether a price increase of the first tier supplier can be justified, since first tier suppliers should be able to justify a price increase.

Organization B doesn't have a structured approach for this; they monitor developments and immediately act on incidents which they run in to it. However, if organization B is somehow able to realize cost reductions at their second tier suppliers themselves, they've contractually agreed with the first tier suppliers that organization B gets a share of the benefits.

*Second tier suppliers approaching organization B*

Sometimes organization B was approached by second tier supplier with propositions to increase business, mostly related to after sales. Usually after sales takes place via the first tier supplier, in which sometimes the product goes directly from the first tier supplier to organization B without any processing. In these cases, the second tier supplier proposed to deliver the products directly to organization B. In this way organization B was able to cut out the first tier supplier together with its profit margin and the second tier supplier moved up a little bit in the supply chain.

*Value engineering*

A few cases of value engineering with the second tier suppliers have occurred, but this only happened when it was initiated by organization B itself. If they knew that a product could be cheaper, but the first tier supplier didn't want to cooperate in investigating cost reduction opportunities, they directly approached the second tier supplier to jointly look for cost reduction opportunities. Although they usually do not approach the second tier suppliers, this strategy is necessary for organization B when the first tier supplier does not want to cooperate and it cannot make use of its dual-source advantage.

# CASE 3 (Organization C)

## The supply base of organization C

Organization C has as high bill of materials like many other high tech organizations and its production is characterized by low volume, high mix and high complexity products. Their products mostly have a long life cycle, which puts high demands on these products but also on the suppliers, since they are required to provide after service for a long time after the product is sold. Organization C buys mostly high-level assembly products from their first tier suppliers and their sub-tier supply chain is especially important to manage for two reasons, the customer market dynamics and supply risk. These factors are elaborated on below.

Organization C finds itself in a rapidly changing market with a high innovation rate, therefore organization C has to stay on top of new developments in the sub-tier supply chain. The parts of the sub-tier suppliers will end up in the products of organization C, therefore new developments in the sub-tier supply chain will directly affect organization C. Because of this organization C has a deep technology driven supply chain strategy with a pro-active supplier development program.

Since organization C has a supply base characterized by very linear supply chains, a disruption in the sub-tier supply chain will directly affect organization C. Since some parts supplied by the sub-tier suppliers are essential to organization C, not only the first and second tier suppliers are important, but also the third or even sub-tier suppliers are important. Because of this reason organization C views their suppliers not solely as suppliers, but as suppliers together with their supply chain. Since the sub-tier suppliers can for example possess a technology or scarce parts, on which organization C is dependent for its products.

To respond to the market dynamics and secure the supply of the sub-tier suppliers, organization C has a pro-active supplier development program in which they try to maximize their value as a customer towards its direct and sub-tier suppliers. Organization C is therefore mostly in long-term relationships with its suppliers and has closed triads with its suppliers, first or sub-tier, which are important to organization C.

## Supply chain transparency

As mentioned, organization C categorizes its suppliers mainly based on supply risk. For strategic products with a high supply risk, organization C has created a high degree of supply chain transparency and they actively pursue this. For these parts is assessed which sub-tier suppliers supply these parts and on which sub-tier suppliers they are dependent. These parts are considered as essential to organization C and therefore they have to be actively managed, for which transparency is necessary. For these cases is investigated which sub-tier supplier owns the production technology of the products which they buy, what the supplier transfer time is and if it is even possible to switch from supplier.

For non-essential products creating transparency does not have a high priority. These are mostly leverage products for which organization C could easily switch to another supplier when for example the supply risk is considered too high.

When transparency is created with the suppliers, very detailed information is obtained by organization C about the sub-tier suppliers: margins, costs, locations etc. Transparency is mostly creating by emphasizing the shared interest in the chain, since when organization C eventually increases its turnover by creating transparency and securing its supply, the whole chain will benefit as well.

## Key second tier suppliers and closed triads

Organization C deliberately identifies key second tier suppliers based on their supply risk, as mentioned before. These can either be low cost or high cost parts. Since there aren't many real strategic suppliers for these parts and organization C is dependent on these suppliers, they must stay in close touch with these suppliers. Therefore closed triads are created with these sub-tier suppliers, as to secure the supply of these strategic parts. For this reason many parts are prescribed to the (sub-tier) suppliers, as to make sure parts are bought from those suppliers which have a low supply risk.

They do not pay attention the non-strategic sub-tier suppliers of leverage parts, they consider it the responsibility of the first tier supplier to manage them and only act when it is necessary.

## Second tier supplier cost reduction strategies

The main pillar for cost reduction strategies in the sub-tier supply chain of organization C is supplier development.

*Supplier development*

Supplier development is aimed at increasing their attractiveness as a customer to the supplier. When they improved their position as a customer and become more important than other customers to their suppliers, organization C can utilize this advantage by leveraging a better pricing. Rationale behind this strategy is that when organization C would put too much emphasis on reducing costs of the suppliers without offering them some benefits in return, they can also switch to other customers. By offering the suppliers a business perspective for the future, they create an incentive to keep working with organization C.

Several aspects are important in this strategy, firstly an important difference is made between leverage and strategic suppliers. Leverage suppliers are not taken into account for supplier development programs, simply because organization C can easily switch other cheaper or better suppliers for these parts. Another important aspect in their strategy is to link the sourced products to the customers of organization C. Their products eventually end up at these customers and therefore must comply with their demands. When these demands are known to organization C, they can better manage their suppliers in order to comply with their customer's demands.

Organization C assesses per supplier how they can develop and support their suppliers in both reducing their costs and improve their relationships, with which their attractiveness will also increase. Organization C has several strategies for this; a few examples of this strategy are elaborated on below.

Organization C supports or trains its suppliers or sub-tier suppliers in several competences when necessary. They view their efforts towards the suppliers as an added value to the supply chain. They can for example support their suppliers in improving their logistics, contracting, reducing waste, cost reductions, etc. However, by supporting their suppliers, they also help themselves, since their suppliers will become a more stable partner which effectively contributes to the supply chain. Supplier development does not stop at the first tier suppliers, organization C goes as deep in the supply chain as long as there are strategic sub-tier suppliers.

Another strategy is to involve the (sub-tier) suppliers in new development programs, in which they can for example be supported in developing a new production technique. In this way they create a mutual dependency with which they reduce the supply risk and ensure that they remain stable suppliers for the future.

*Linking the organizational brand to the customer portfolio of the second tier supplier*
By being in direct contact with the sub-tier suppliers, organization C can link its brand to the sub-tier suppliers, which is also a way to increase its attractiveness as an indirect customer. In this way the sub-tier suppliers can add organization C to their customer portfolio, which is a nice addition for most customers given the reputation of organization C.

*Investigate the cost drivers in the supply chain*
A last strategy of organization C, which is not related to supplier development, is to investigate what the added value of the suppliers and the cost drivers are in the supply chain. For example, sub-tier suppliers can have high margins on their products because of uncertainty in their selling market. By emphasizing their stability as a customer for these sub-tier suppliers, their uncertainty will be reduced and they should be able to reduce their margins. In general organization C looks at the margins of the sub-tier suppliers, if they are known, and determines whether these are reasonable margins in comparison with their added value to the supply chain. It can either be decided to try to reduce the margin of the sub-tier supplier, or take efforts to switch to another supplier.

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