

University of Twente
Faculty of Behavioural, Management
and Social Sciences

Lappeenranta University of Technology
School of Business and Management

Double Degree

MSc Business Administration
MSc Economics and Business Administration

Purchasing and Supply Management

Master Thesis

2018

Topic: **Supply Base Reduction – Development and Application of a possible Reduction Process**

Submitted by: Jennifer Schönau

Student Number: s1355147/ 0511673

Supervisors: Prof. Dr. habil Holger Schiele University of Twente
Prof. Dr. Veli Matti Virolainen Lappeenranta University of
Technology

Number of pages: 81 pages in total/ 63 text pages

Number of words: 23.662 in total/ 20.983 on text pages

Oberhausen, 16th August 2018

Acknowledge

This thesis is part of my master studies in Economics and Business Administration with a focus on purchasing and supply management at the University of Twente and Lappeenranta University of Technology. Herewith, I would like to thank everyone who has supported me during my student life and encouraged me to be curious, open-minded and critical. Special thanks are owed to those persons who have supported me in the process of this thesis.

First, I would like to thank both my universities, University of Twente and Lappeenranta University of Technology, for the time during my studies. With this double degree, I was able to experience two completely different cultures, enabling me to get to know myself better. Furthermore, both universities always supported me in my studies and helped whenever a problem arose. Both my supervisors, Prof. Dr. habil Schiele and Prof. Dr. Veli Matti Virolainen supported me during the thesis project and gave valuable insights and feedback that helped me to create and improve this thesis over time.

Secondly, I would like to thank the company Schuler Pressen GmbH, especially the technical purchasing department in Weingarten for their commitment and support.

Thank you.

Jennifer Schönau

Management Summary

With the increased importance of the purchasing department, supply management has evolved into a strategic function that has an important stake at the company's success. For an efficient purchasing department, the supply base needs to be managed carefully and wisely and thus, many companies have concluded to keep the supply base small but qualitative. Thus, the term supply base reduction has increased its awareness in the past years. This study aims to create a supply base reduction process for the case company Schuler Pressen GmbH.

Schuler Pressen GmbH is a high-quality press manufacturer and the industry leader. Currently, the company is facing a too large supply base with the associated disadvantages, like high administrative cost and an unclear structure. Consequently, Schuler Pressen GmbH tries to reduce its supply base in an efficient way but struggles in finding a solution. The purpose of this master thesis is hence to create a process guideline that explores the possibility of a supply base reduction based on the example of one sub commodity group. As only few suppliers control 80 percent of the total purchasing volume and value, many listed suppliers only deliver low values and volumes and thus, there is a chance of improving the situation. The chance of reducing the supply base offers advantages, among others a restructuring of the supply base, so that the purchasing department can work in a more efficient way. Moreover, cost and quality advantages can be realised.

This case study consists of a critical literature review, a group discussion and interviews as well as data gathering via the ERP system of the case company. The process guideline was developed with the help of the above-mentioned parts and then applied to a sub commodity group to visualise a possible reduction process. Finally, a possible supply base reduction of approximately 14 percent has been detected, offering the case company the opportunity to cut its supply base down. Moreover, top-performing suppliers have been identified and categorised.

List of Abbreviations

07	Commodity Group “Machined Parts and Machining”
0709	Sub-Commodity Group “Small Parts Machining”
e.g.	exempli gratia
ERP	Enterprise Resource Planning
i.e.	id est
KPI	Key Performance Indicator
Schuler	Schuler Pressen GmbH

List of Figures

Figure 1	Production and Service Map of Schuler Group	p.3
Figure 2	Corporate Procurement Divisions	p.4
Figure 3	Systematic Elimination Approach	p.21
Figure 4	Supplier Categorisation	p.22
Figure 5	Tiering Process	p.23
Figure 6	Pareto Classification	p.26
Figure 7	4-Step Supplier Categorisation	p.43
Figure 8	Summary of the Supply Base Reduction Process	p.47
Figure 9	Order Quantity and Order Value Distribution	p.53
Figure 10	Overview of Supplier Categorisation	p.54
Figure 11	Supply Base Reduction Process in Numbers	p.60

List of Tables

Table 1	Summary of Spend Analysis Steps	p.25
Table 2	Overview of Supply Base Reduction Processes	p.27
Table 3	Similarities between Supply Base Reduction Processes	p.49

List of Appendices

Appendix A	Questionnaire Group Discussion Technical Purchasing
Appendix B	Semi-Structured Interview Questions
Appendix C	Interviews and Group Discussion

Table of Contents

Acknowledge	I
Management Summary	II
List of Abbreviations	III
List of Figures	III
List of Tables	III
List of Appendices	IV
1. Introduction: From Traditional to Strategic Purchasing	1
2. Case Company	2
2.1. Introduction to Schuler Group and the Corporate Procurement	2
2.1.1. Schuler Group	2
2.1.2. Corporate Procurement Organization	3
2.2. Technical Purchasing Machined Parts and Machining	5
3. Research Problem and Research Question.....	5
4. Theoretical Background: Supply Base Management.....	6
4.1. Introduction to Supply Base Management.....	6
4.2. Sourcing Strategies: Single Sourcing vs. Multiple Sourcing	7
4.3. Supplier Selection: Choosing the best Suppliers	11
4.4. The Preferred Customer Status: Cooperating with the best Suppliers	13
5. Theoretical Background: Supply Base Reduction	14
5.1. Introduction to Supply Base Reduction	14
5.2. Benefits and Risks related to Supply Base Reduction	16
5.3. Critical Success Factors: Making the Supply Base Reduction a Success	19
5.4. Approaches of Supply Base Reduction.....	21
5.5. Tools for Supply Base Reduction	23
5.5.1. Spend Analysis.....	23
5.5.2. Pareto Classification	25
5.6. Supply Base Reduction Processes: Comparing different Processes	26
6. Methodology	30
6.1. Research Design.....	30
6.2. Data Collection	33
6.2.1. Group Discussion – Operative Purchasing	33
6.2.2. Semi-Structured Interviews within Team Meeting – Lead Buyers.....	37
6.3. Theoretical Framework: Supply Base Reduction Process	39
6.4. Comparison of the proposed Process and the reviewed Processes	48
7. Schuler Pressen GmbH – Supply Base Reduction.....	50

7.1.	Introduction to the Supply Base Reduction of Schuler Pressen GmbH.....	50
7.2.	Preparation Phase.....	50
7.3.	Information Phase	52
7.4.	Action Phase	56
8.	Discussion and Conclusion: How to successfully reduce the Supply Base?	58
9.	Limitations	62
10.	Further Research	63
11.	References.....	i
12.	Appendix.....	vi

1. Introduction: From Traditional to Strategic Purchasing

Today's business environment has changed over the past years and the level of global competition has increased, leading to demanding customers and a harsh business environment.¹ Moreover, the global market place is changing and evolving enormously and companies started concentrating on their core competencies in order to create competitive advantage. As companies reduced their scope, the role of purchasing transformed from operative to strategic and thus, strategic purchasing became more important than ever since products and services that are not the core competencies of a firm are sourced from suppliers.² Consequently, strategic purchasing became a significant part of the overall business strategy and requires careful preparation and evaluation. Nevertheless, strategy creation and "implementation is often not that simple"³.

With the strategic orientation of the purchasing function the role of purchasing managers has changed as well. Instead of having a large supply base and buying required items from any possible supplier, nowadays it is aimed to develop close long-term relationships with a limited number of suppliers.⁴ Consequently, "purchasing managers need to understand and analyze the suppliers' market and develop connections with them"⁵. Hereby, the decision of the right supply base size and which suppliers to keep is of great importance as, according to Ogden (2006), preferred suppliers should be responsible for 95 percent of the spend.⁶ However, many businesses still have large supply bases and aim to optimise their supply base to reduce their administrative cost and pool their demand to less suppliers.⁷ As this is a huge undertaking with many issues to consider, many firms are not sure how to exactly tackle the supply base reduction process.⁸ Subsequently, this research focuses on analysing a possible supply base reduction of the case company Schuler Pressen GmbH and giving a guideline on how to reduce the company's supply base.

The thesis is structured as follows. First, a short introduction to the overall topic was presented. The next section will introduce the case company and the specified department. Followed by this, the problem and the resulting research question as well as sub questions

¹ see Handfield & Nichols Jr. (2004), p. 29.

² see Berger et al. (2004), p.14.

³ Hesping & Schiele (2016), p.101.

⁴ see Sakar & Mohapatra (2006), p.148.

⁵ Úbeda et al. (2015), p.181.

⁶ see Ogden (2006), p.34.

⁷ see Choi & Krause (2006), p.640.

⁸ see Interview A, Appendix C.

are given. Section four focuses on a literature review, summarising the current state-of-art literature regarding supply base management and supply base reduction. Fifth, the methodology applied to this research will be outlined and defined. After this, the results of the study are presented and analysed. The seventh part of this thesis discusses the findings and a conclusion will be drawn. Finally, the thesis closes with limitations and suggestions for further research.

2. Case Company

2.1. Introduction to Schuler Group and the Corporate Procurement

2.1.1. Schuler Group

The case company Schuler Pressen GmbH, in the following Schuler, is the “technological and global market leader in the metalforming industry”⁹ and worldwide the largest manufacturer of presses. Founded 1839 in Göppingen, Germany, nowadays, the company employs more than 6.000 employees in 15 countries. The main offers are high-tech press systems, automation, and services for the metal forming industry while the main customers are located in the area of car manufacturing, packaging, aerospace, and minting.¹⁰ With the two slogans “innovation by technology: our key to success”¹¹ and “forming the future”¹², Schuler shows that the company’s focus lies on being an innovative firm that aims to set market standards and being a big part of creating the new tomorrow.

The company is positioned in the premium price segment offering high-end solutions. As a result, Schuler was lacking market share in the mid-price segment and thus, acquired in 2015 the Chinese press manufacturer Yadon.¹³ This acquisition offers access to over 1000 new customers in China as well as new customers interested in presses with lower forces.¹⁴

As shown in figure one, service facilities are located around the world while the production plants are located in Germany, China, and Brazil. Moreover, there are no service or production sites in Australia and Africa. The service sites are close to important customer regions to be able to react fast in case of service needs. Production takes mainly place in

⁹ Schuler Group Company Presentation (2017), p.3.

¹⁰ see Schuler Group Company Presentation (2017), p.3.

¹¹ Schuler Group Company Presentation (2017), p.3

¹² see Schuler Group (2018).

¹³ see Schuler Group (2017).

¹⁴ see Schuler Group Company Presentation (2017), p.9.

Germany due to the focus of delivering high quality products. The Chinese production plants are mainly responsible for producing parts for the acquired company Yadon.



Figure 1: Production and Service Map of Schuler Group.
Source: Schuler Group Company Presentation (2017)¹⁵.

2.1.2. Corporate Procurement Organization

The corporate procurement of Schuler is divided into three different areas – division procurement management, category management, and location procurement – each area with different orientations to guarantee the best outcomes¹⁶, as can be seen in figure 2. Each area has its own role and responsibility towards a successful course of business.

The division procurement management “ensures early and close involvement of procurement competencies in the product and project creation process”¹⁷. The main task is to assure a stable and economical supply chain within a corresponding division. Additionally, this department is responsible for make-or-buy decisions, design-to-cost optimisation, definition of material costs targets and budgets, and the creation of transparent material forecasts.¹⁸

¹⁵ Schuler Group Company Presentation (2017), p.7

¹⁶ see Schuler Group Intranet (2018) (not publicly available).

¹⁷ Schuler Group Intranet (2018) (not publicly available).

¹⁸ see Schuler Group Intranet (2018) (not publicly available).

The area of category management provides the global procurement strategy for the company and thus, the main task lies in supplier relations. “It is oriented towards the supplier market and is responsible for proactive and comprehensive management of the costs of materials for one or more material groups, taking into account the total cost.”¹⁹ Consequently, the main areas of responsibility are the international material group strategy, sustainable supplier management, utilisation of key performance indicators, and the definition and implementation of the corresponding procurement leverages in cooperation with the relevant departments.²⁰

The third area of the corporate procurement is the location procurement which is the service provider for production. This department is “responsible for provisions of the required materials or services on time and at a required quality level”²¹. Guidelines and the action framework for the location procurement are defined by the category management. The main tasks of this department are the efficient order processing, the development of a cost-effective and quality-controlled supplier portfolio, the secure of supply, and the supplier development in collaboration with the quality assurance department.²²

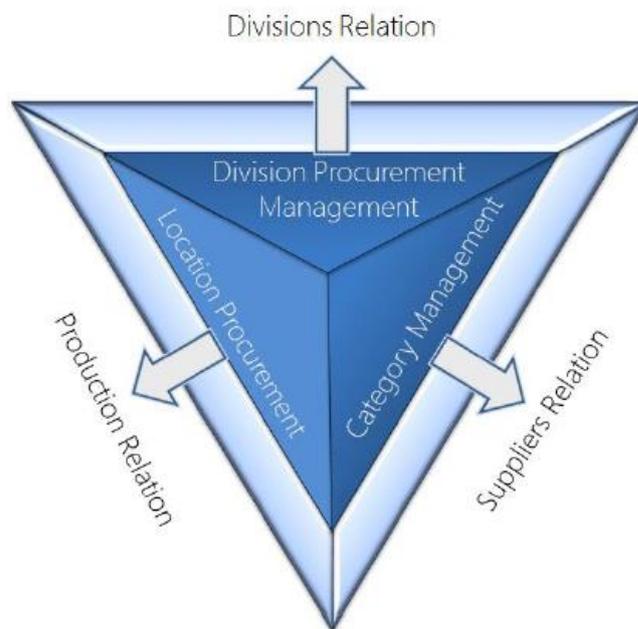


Figure 2: Corporate Procurement Division.
Source: Schuler Group Intranet (2018a)²³.

¹⁹ Schuler Group Intranet (2018a) (not publicly available).

²⁰ see Schuler Group Intranet (2018a) (not publicly available).

²¹ Schuler Group Intranet (2018a) (not publicly available).

²² see Schuler Group Intranet (2018a) (not publicly available).

²³ Schuler Group Intranet (2018a) (not publicly available).

2.2. Technical Purchasing Machined Parts and Machining

The department most relevant for this research is the Technical Purchasing and the managed commodity group “07 – Machined Parts and Machining” as the focus of this research will be on this commodity group, focussing on the sub category “0709 –Small Parts Machining”, in the latter referred to as 0709. The technical purchasing of machined parts and machining is located in Weingarten, Germany and consists of seven purchasers, each of them having a technical background and experience in production and engineering. The team is responsible for the whole ordering process, technical expertise and the purchase of service parts that are required from the after-sales service. Each member of the team is responsible for a different sub category of the commodity group. In total, the commodity group machined parts and machining consists of ten sub categories, namely (1) control blocks, (2) ledges, (3) gear parts, (4) milling, (5) bar machining, (6) weldments, (7) sheet metal work parts, (8) special operations, (9) small parts machining, and (10) signs. The focus of this research will be on this commodity group, especially for the sub category small parts machining as the accompanying internship is executed in this commodity group and thus, best insights are given. Furthermore, the head of location procurement sees here the first tackling point since the supply base of this commodity group and sub group is the largest.

3. Research Problem and Research Question

As consequence to industrywide changes, Schuler was forced to close its production site in Weingarten, Germany. Thus, required materials are not internally produced anymore and need to be purchased from external suppliers. Accordingly, the supply base increased as each possible supplier has less available production capacity than the production site of Schuler and thus, more suppliers needed to be contracted. Today, the company has handled the additional purchase volumes and got back to daily business and orders from a variety of suppliers. Still, the supply base has increased drastically, and key suppliers are not identified yet. As a next step, Schuler wants to reduce its supply base and get back to a decent number of vendors per commodity. As a matter of fact, the supply base reduction should be efficient and create additional benefits for the firm. The company is aiming for less administrative work and a consistent quality of materials.

The above-mentioned problem set leads to the following research question:

“How can the company Schuler Pressen GmbH efficiently reduce its supply base, especially in the area of machined parts and machining?”

To find an appropriate solution for the supply base reduction problem, the following sub-questions aim to support the research question.

1. What is the current state of the supply base at Schuler Pressen GmbH?
2. What is the desired future state of the supply base at Schuler Pressen GmbH?
3. How can the desired state be reached?

4. Theoretical Background: Supply Base Management

4.1. Introduction to Supply Base Management

In recent years, supply base management has become one of “the most strategic areas of responsibility in the purchasing and supply function”²⁴ as it is an essential part of the overall purchasing strategy and enables a company to successfully manage its suppliers.²⁵ According to Ogden and Carter (2008), the creation, management and development of the supply base are connected to the most fundamental decisions in supply management.²⁶ Consequently, managing the supply base makes or breaks the success of the purchasing function as a firm can only produce high quality products with high quality supplies that are delivered in time. Choi and Krause (2006) defined the supply base as “the total number of suppliers that are actively management by the focal firm, through contracts and purchase of parts, materials and services”²⁷. Here, it is important to note that only active suppliers are considered to belong to the supply base, not those who are listed but are inactive.²⁸

To successfully manage the supply base, Gadde and Hakansson (1994) divided the supply base into two dimensions – the number of suppliers and how these suppliers are organised.²⁹ Depending on the size of the supply base, different strategies and targets can be set as smaller supply bases have different complexities than larger ones. The aspect of

²⁴ Ogden (2006), p.29.

²⁵ see Ates et al. (2015), p.204.

²⁶ see Ogden & Carter (2008), p.5.

²⁷ Choi & Krause (2006), p.639.

²⁸ see Choi & Krause (2006), p.650

²⁹ see Gadde & Hakansson (1994), p.29.

the suppliers' organisation needs to carefully be considered as well as depending on the working style and company structure the future relationship is determined. Choi and Krause (2006) found similar dimensions in their research. Next to the number of suppliers, the authors added the differentiation of each supplier and the level of relationships between suppliers.³⁰ The differentiation of each supplier needs to be considered in supply base management as similar suppliers need to be categorised into the same area. If the company wants to keep similar suppliers, strategies can be developed that concentrate on how to manage those comparable suppliers. On the other hand, the supply base could be reduced by some suppliers if there are many similar ones. The last dimension, relationships between suppliers, determines whether there are possible partnerships or agreements between suppliers. Rivals might have secret agreements in terms of price or customer segmentation while other suppliers might be in a cooperation with suppliers that produce supporting products.

Not only is supply base management of great strategic importance but it also leads to many benefits and helps a company to advance and progress. Ziggers and Henseler (2006) mention that with the help of strong suppliers, the focal company can reposition itself in the competitive surrounding, increase customer responsiveness with the help of close cooperation with suppliers, and increase long-term relationships with knowledge exchange and mutual interests.³¹ Moreover, closer relationships and cooperation lead to deeper trust and thus, even closer cooperation. This in turn, encourages suppliers to increase their efforts in terms of resources and thus, quality and flexibility might increase leading to greater innovation as vendors and the focal firm work more closely together.³² However, the most important benefit of a strategically managed supply base is that the focal firm gets a "greater understanding of how to coordinate and synchronize activities within its network of suppliers and [creates] a context that fosters collaboration."³³

4.2.Sourcing Strategies: Single Sourcing vs. Multiple Sourcing

³⁰ see Choi & Krause (2006), p.641.

³¹ see Ziggers & Henseler (2016), p.19.

³² see Zeydan et al. (2011), p.2741.; see Li (2013), p.1389.

³³ Ziggers & Henseler (2016), p.19.

In the last decades, different sourcing strategies and how to use them has been in the focus of researchers.³⁴ Sourcing itself is diverse, complex as well as complicated and thus, issues arise when companies start deciding on their sourcing strategies. The most important difficulty is to decide from whom the required products should be obtained, i.e. the identification of possible suppliers, the quantity of suppliers per category and the order volumes per supplier.³⁵ Most commonly, single and multiple sourcing strategies are used by companies, each approach having different benefits and drawbacks. Moreover, a variety of aspects influence the execution of the chosen strategy and its outcome.³⁶

The first approach, single sourcing, evolved with the growing usage of the just-in-time principle³⁷ and is used when “firms have consolidated their supply bases”³⁸. According to Wetzstein et al. (2016), the goal of single sourcing is to find “one supplier [who] meets all buyer demands and executives have to make only one decision: Which supplier is the best?”³⁹. Subsequently, this sourcing strategy identifies only one supplier per product and the company engages in a long-term strategic relationship with the particular supplier.⁴⁰ Generally, there are three central reasons for choosing single sourcing rather than other sourcing strategies. First, the buyer decides to single source the required product because the item is of great strategic importance.⁴¹ Being of strategic importance, quality standards and delivery times need to be considered and thus, companies might decide to single source this specific product to ensure the quality and continuous supply. The second reason for single sourcing is that the product is highly specialised and thus, there is only one supplier who is able to produce the item.⁴² In this case, the company is forced to single source the specific products as no other possibility exists. Lastly, the final customer of the end-product “has explicitly required the firm to work with a particular sub-supplier’s product”⁴³. Having mandated suppliers for particular products leaves no space for other sourcing strategies than single sourcing and consequently, is not chosen by the company itself. However, Song et al. (2014) proposes that this sourcing approach should only be

³⁴ see e.g. Berger & Zeng (2006); Burke et al. (2007); Heese (2015).

³⁵ see Song et al. (2014), p.522.

³⁶ see Cousins et al. (2008), p.47.

³⁷ see Berger et al. (2004), p.10.

³⁸ Heese (2015), p.125.

³⁹ Wetzstein et al. (2016), p.306.

⁴⁰ see Cousins et al. (2008), p.52; see Wetzstein et al. (2016), p.306.

⁴¹ see Cousins et al. (2008), p.52.

⁴² see Cousins et al. (2008), p.52.

⁴³ Cousins et al. (2008), p.52.

used when the capability of one single supplier is sufficiently better than the capacity of several suppliers.⁴⁴

Three areas of benefit have been identified by several authors – reduced total cost, higher quality, and an increased level of cooperation.⁴⁵ As Heese (2015) recognised, there are three explanations for the reduction of the total cost. First, the administrative costs can be minimised since orders are automatically sent to only one supplier. Therefore, searching for suppliers and the whole tendering process are obsolete. The second reason for cost reduction is economies of scale as the order volume is pooled to one supplier. The third reason is the learning effect of the supplier.⁴⁶ Moreover, increased quality is a second benefit of using single sourcing. Here, continuous improvement and cooperative redesigning of the product or process are the main influencing factors for the enhanced quality.⁴⁷ Next to this, the quality is constant as only one supplier is responsible for the production and thus, the same raw materials, production facilities and processes are utilised. Lastly, using single sourcing leads to a higher level of cooperation between the focal firm and the supplier. Through the close partnership, communication and responsiveness increases which makes it easier to discuss ideas regarding possible redesign and improvement as well as new product development.⁴⁸

However, single sourcing has two main disadvantages that need to be considered when choosing this strategy. The key argument against this sourcing type is that the focal firm is dependent on the supplier which might lead to a weak position and the longer the relationship lasts, the more dependent the focal firm becomes.⁴⁹ This occurs as comparative suppliers are ignored over time and hence, the focal firm is not in the focus of these vendors anymore. Moreover, choosing just one supplier to cooperate with might lead to a lock-in situation, limiting the focal firm's ability to get into contact with new technologies and innovations within the broader network of suppliers.⁵⁰

The second major form of sourcing is called multiple sourcing and is a more tactical than strategic approach. Cousins et al. (2008) defined multiple sourcing as a way of using

⁴⁴ see Song et al. (2014), p.535.

⁴⁵ see e.g. Berger et al. (2004), p.10.; Choi & Krause (2006), p.647; Cousins et al (2008), p.53; Heese (2015), p.125.

⁴⁶ see Heese (2015), p.125.

⁴⁷ see Cousins et al. (2008), p.53; see Heese (2015), p.125.

⁴⁸ see Choi & Krause (2006), p.647; see Cousins et al. (2008), p.53.

⁴⁹ see Cousins et al. (2008), p.53; see Heese (2015), p.126.

⁵⁰ see Cousins et al. (2008), p.53.

several suppliers to order identical parts.⁵¹ This includes the negotiation with a number of suppliers and splitting the order quantities among them.⁵² However, different suppliers have different qualities, prices and production capabilities. Consequently, purchasers have to carefully balance these constraints when placing their orders. Multiple sourcing is used to maintain the “continuity of supply in the short term, whilst enabling the buyer to achieve price reductions.”⁵³ As numerous suppliers offer the same product, buying companies are able to negotiate heavily and decrease the purchasing price. It is proposed that multiple sourcing is mostly used to prevent supply uncertainty and ensure a continuous supply as well as to maintain and increase competition among suppliers.⁵⁴

Literature has found four major areas of benefits when using multiple sourcing, which can be categorised into (1) purchasing price, (2) performance improvement, (3) independence, and (4) continuous supply.⁵⁵ As several suppliers are offering the same product they are competing against each other to be the chosen supplier. Therefore, prices and shipping cost drop leading to cheaper purchasing prices for the focal company.⁵⁶ Another important benefit of the increased competition is that the performance of competing suppliers improves and the quality of products increases.⁵⁷ As suppliers want to make sure to get the order, they are improving their products and processes in order to compete against their rivals. As a result, the overall quality of the product increases as most of the suppliers do the same. Thus, the buying company gets a better quality with lower prices. A third advantage of having multiple suppliers per product is that emergency situations and shortages can be avoided.⁵⁸ As the product is sourced from different suppliers and accordingly different production plants, the continuous supply is guaranteed and natural disasters, strikes, or production shortages in one plant do not lead to a complete disruption.⁵⁹ Finally, the greatest benefit of multiple sourcing is that the focal firm is not dependent on one supplier but can choose among a variety of suppliers.⁶⁰ Thus, suppliers can be interchanged or deleted from the supply base without losing whole product lines.

⁵¹ see Cousins et al. (2008), p.53; see Wetzstein et al. (2016), p.306

⁵² see Wetzstein et al. (2016), p.306.

⁵³ Cousins et al. (2008), p.54.

⁵⁴ see Cousins et al. (2008), p.54; see Song et al. (2014), p.522.

⁵⁵ see e.g. Berger et al. (2004), p.10; Cousins et al. (2008), p.54; Sarkar & Mohapatra (2009), p.124; Heese (2015), p.126.

⁵⁶ see Berger et al. (2004), p.10; see Cousins et al. (2008), p.53-54.

⁵⁷ Heese (2015), p.126.

⁵⁸ see Sarkar & Mohapatra (2009), p.124.

⁵⁹ see Heese (2015), p.125.

⁶⁰ see Heese (2015), p.126.

On the other hand, multiple sourcing offers some disadvantages that need to be considered when deciding for this strategy. Even though the purchasing price decreases, the total cost might increase or do not change but stay at the same level. Due to more suppliers, the administrative workload increases, e.g. quality management, supplier relationship management or keeping track of the master data which leads to higher fixed costs.⁶¹ Another administrative disadvantage is that more and longer negotiations are necessary as different offers need to be compared and discussed to find the best deal. This requires more workforce and might lead to delays in production schedules when negotiations take longer than expected.⁶²

4.3. Supplier Selection: Choosing the best Suppliers

After a company decided that it does not produce a required material or product but buys it from a supplier, an adequate supplier needs to be selected. Supplier selection is a “decision-making process to select the best supplier(s) from a prequalified pool based on predefined objectives and decision criteria”⁶³. This process has always been of great strategic significance and due to globalisation and thus, increased competition, it became even more important to work together with high quality vendors to create a competitive advantage. Already Lewis (1937) discussed the importance of the correct supplier selection and stated that “it is probable that of all the responsibilities which may properly be said belonging to the purchasing managers, there is none important than the selection of suppliers.”⁶⁴ This indicates that even before purchasing was seen from a strategic perspective, it was known that the right supplier is key to a high-quality product and thus, competitive advantage. According to Zeydan et al. (2011), choosing the right supplier is crucial for increasing the quality, reducing operational expenditures and shaping the company’s future.⁶⁵ However, the supplier selection process is both complicated and complex as many different factors have an impact on the decision-making process, making it risky for companies to use this process without careful preparation and research.⁶⁶

⁶¹ see Sarkar & Mohapatra (2009), p.124; see Song et al. (2014), p.523.

⁶² see Berger et al. (2004), p.10.

⁶³ Wetzstein et al. (2016), p.306.

⁶⁴ Lewis (1937), p.186.

⁶⁵ see Zeydan et al. (2011), p.2741.

⁶⁶ see Cousins (1999), p.153; see Zeydan et al. (2001), p.2742.

According to Cousins et al. (2008), the supplier selection process can be subdivided into four different categories – the initial supplier identification, determination of measurement criteria, information gathering, and the final selection.⁶⁷ Nevertheless, defining and measuring the appropriate selection criteria are the most important steps as these are the outcome of the strategic identification of the key activities, processes and values that are expected from a company's suppliers.⁶⁸

When companies want to engage in the supplier selection process, literature suggests different factors that need to be considered. First of all, there are two different types of selection criteria, quantitative and qualitative criteria.⁶⁹ Both types have different forms of measurement systems whereas it is easier to measure quantitative criteria as those are easier to visualise and analyse. Usually both measurement types are combined during the selection process in order to get the best result possible. Next to measurable criteria, some companies have minimum standards that need to be reached by suppliers in order to be considered for the selection process at all. One example of these minimum standards is the sustainability of a vendor. According to Reuter et al. (2010) companies expect certain standards in sustainability from their suppliers to ensure that these suppliers are in line with the company's guidelines and rules. If a supplier does not follow those predefined standards, he will not be considered for any cooperation at all.⁷⁰ After a supplier fulfils the ethical requirements, the focal company needs to decide on measurement criteria to evaluate the suppliers fit to the firm. The eleven most common and important criteria are 1) quality, 2) price, 3) delivery standards, 4) degree of flexibility, 5) service, 6) certificates, 7) level of know-how, 8) production volumes, 9) equipment, 10) commitment, 11) trust and communication.⁷¹ However, next to each criterion, the whole performance should be considered during the measurement process.⁷²

Reuter et al. (2010) propose in their research different approaches for new and already established suppliers. New suppliers should be asked to hand in a self-assessment questionnaire, consisting of semi-structured and structured questions, to evaluate whether the supplier is eligible to be considered in the selection process. If the supplier is eligible, an auditing team with internal and external experts should visit the suppliers' facilities and

⁶⁷ see Cousins et al. (2008), p. 60.

⁶⁸ see Nair et al. (2015), p.6264-6265/6271.

⁶⁹ see Ho et al. (2010), p.16; see Wetzstein et al. (2016), p.309.

⁷⁰ see Reuter et al. (2010), p.54.

⁷¹ see Lemke et al. (2000), p.45/53; see Handfield & Nicholas Jr. (2014), 30.; see Nair et al. (2015), p.6272.

⁷² see Nair et al. (2015), p.6264.

ensure that the supplier fits in terms of quality, safety and regulatory standards.⁷³ For already established suppliers, Reuter et al. (2010) has another method towards supplier selection. Here, the suppliers are categorised into non-critical, critical, and very critical vendors depending on their previous performance. While non-critical suppliers should sign a self-declaration that company guidelines and rules are followed, critical and very critical suppliers have to answer a similar questionnaire as new suppliers. When the questionnaire provides a satisfactory outcome, the supplier will still be considered for selection. If any issues arise, audits are required to re-evaluate the supplier. Very critical suppliers should directly be audited where then it will be decided whether to develop or delete the supplier from the supply base.⁷⁴ These audits include several areas to be reviewed, e.g. the manufacturing process or how raw materials are sourced.

4.4. The Preferred Customer Status: Cooperating with the best Suppliers

As companies nowadays tend to focus on their core activities and increase their outsourcing, the best suppliers possible need to be contracted.⁷⁵ However, as buying firms are competing for those suppliers the dynamics between suppliers and buyers have changed.⁷⁶ Consequently, suppliers are able to decide about their resource division between their customers and thus, define for themselves less and more important customers. As Bemelmans et al. (2015) mention, “a supplier should treat all customers equally, [yet,] some customers are business-wise clearly more important than others”⁷⁷. These preferred customers are mostly treated better by the supplier than their competitors, e.g. in prices, support or material availability.⁷⁸ Here, mutual interest, long-term partnerships as well as the strategic importance are factors that decide on the suppliers’ decision. Generally, customers are positioned as preferred customer when the supplier is more than satisfied with the relationship, e.g. when the buying firm is highly attractive, however, if better matches arise, suppliers might drop the status again.⁷⁹ Consequently, buying firms constantly need to put effort in this relationship to be able to continue

⁷³ see Reuter et al. (2010), p.54.

⁷⁴ see Reuter et al. (2010), p.54

⁷⁵ see Nollet et al. (2012), p.1191.

⁷⁶ See Nollet et al. (2012), p. 1186.

⁷⁷ Bemelmans et al. (2015), p.179.

⁷⁸ See Nollet et al. (2012), p.1187.

⁷⁹ See Schiele et al. (2012), p.1181.

successfully. To be acknowledged as preferred customer, a shift from an analytical to a network perspective needs to happen within the buying company as they need to understand that the preferred customer status is about relationship and mutual trust rather than pure numbers.⁸⁰ Once this shift has happened, buying companies are more open for changes in their behaviour and strategic decisions, which might lead to an increased attractiveness for the targeted supplier. Schiele et al. (2012) found that both supplier satisfaction and customer attractiveness are factors that have a great impact on the preferred customer status and its retention. While supplier satisfaction is related to the outcomes of the relationship, customer attractiveness is related to hard facts of the buying company, e.g. future growth potentials, payment reliability or the company's success.⁸¹ Once the status is achieved, several advantages are created and can be utilised by the buying firm as well as the supplier. According to Nollet et al. (2012), the main advantages are an increased product quality, increased collaboration in innovation, higher level of support and communication, greater reliability as well as lower prices in total.⁸² These advantages are supported by Bemelmans et al. (2015) who found that suppliers tend to offer new innovations firstly to their preferred customers before offering them to anyone else.⁸³

5. Theoretical Background: Supply Base Reduction

5.1. Introduction to Supply Base Reduction

In the past, most companies used to have large supply bases with many suppliers on stock and only minor reductions within the supply base occurred when necessary.⁸⁴ However, nowadays, research has emphasised on the necessity of supply base reduction and optimisation.⁸⁵ Literature has focused on this topic and consequently, consultancies adopted the theme and started using it in the early 1990s to “enable a leveraging strategy”⁸⁶. The issue of supply base reduction can be categorised into purchasing and supply chain management, more in depth to supply management, and is one of the first

⁸⁰ See Schiele et al. (2012), p.1183; see Hüttinger et al. (2014), p.705.

⁸¹ See Schiele et al. (2012), p.1181; see Tanskanen & Aminoff (2015), p.135.

⁸² See Nollet et al. (2012), p.1187.

⁸³ See Bemelmans et al. (2015), p.193.

⁸⁴ see Lemke et al. (2000), p.46.

⁸⁵ E.g. see Cousins (1999), p.146; see Talluri & Narasimhan (2005), p.130

⁸⁶ Cousins et al. (2008), p.44.

steps, i.e. belongs to the prequalification stage.⁸⁷ Nevertheless, “empirical evidence for the reduction in the supplier base is rare”⁸⁸ and thus, companies are not sure whether and how to implement and use this approach.⁸⁹ Generally, the idea for supply base reduction is based on the premise that resources are limited and with a reduced supply base, companies are able to better manage their own resources.⁹⁰

Literature has many different definitions for the term supply base reduction. According to Ogden (2006), “supply base reduction is defined as the process of and activities associated with reducing the number of suppliers that an organization utilizes.”⁹¹ Moreover, supply base reduction is concerned with retaining the best suppliers out of a large base and is thus, a highly strategic approach.⁹² When it is seen as a strategic long-term approach, there are three key activities associated with supply base reduction – reduction of the number of suppliers, reconfiguration of the existing supply base, and involvement in supplier development.⁹³ On the other hand, supply base reduction can be seen as a one-time strategy that aims to reduce the number of suppliers in the short-term to realise cost reductions and strategic targets.⁹⁴ Consequently, two different goals can be reached with the reduction of suppliers – long-term strategic issues and short-term cost reductions. Depending on what the organisation focuses on, different approaches are necessary, however, the short-term reduction is easier manageable as suppliers are reduced according to prices and delivery times. Reducing the supply base over the long-term on the other hand, needs more preparation and careful selection and management. Nevertheless, it is not an easy decision as these choices cannot be turned back easily.⁹⁵ The process puts pressure both on suppliers and the company itself. Suppliers need to improve their performance to stay competitive and in the supply base as otherwise they might be excluded, while the organisation might face extra cost and the burden of deciding which supplier to terminate the partnership with.⁹⁶ Once the buying company has successfully minimised its supply base, the selected suppliers might be taken into a contractual relationship to ensure that the

⁸⁷ see Sarkar & Mohapatra (2006), p.150/153; see Song et al. (2014), p.524

⁸⁸ Lemke et al. (2000), p.46.

⁸⁹ see Ogden & Carter (2006), p.8.

⁹⁰ see Cousins et al. (2008), p.44.

⁹¹ Ogden (2006), p.29.

⁹² see Talluri & Narasimhan (2005), p.130; see Sarkar & Mohapatra (2006), p.150.

⁹³ see Talluri & Narasimhan (2005), p.130.

⁹⁴ see Cousins (1999), p.147; see Sarkar & Mohapatra (2006), p.150.

⁹⁵ see Cousins (1999), p.153.

⁹⁶ see Talluri & Narasimhan (2005), p.130

determined goals are reached.⁹⁷ As a result, many businesses are nowadays engaged in long-term relationships with fewer suppliers even though the “term ‘supply base reduction’ is to an extent a misnomer.”⁹⁸ The company itself has reduced its number of suppliers but many of the excluded suppliers are now indirect suppliers, leading to an extended supply network.⁹⁹

5.2. Benefits and Risks related to Supply Base Reduction

Reducing the number of suppliers has several advantages as well as drawbacks a company needs to consider and evaluate. Both risks and benefits can be found in the literature; however, companies tend to not measure the achieved benefits.¹⁰⁰ There are six key areas of benefits and four key areas of risks that are most mentioned by literature which will be highlighted in this section.

The identified key benefits are: 1) cost-effectiveness, 2) negotiation power, 3) logistical improvement, 4) information sharing and cooperation, 5) increased quality, and 6) benefits for suppliers.¹⁰¹ Having fewer responsible suppliers’ cuts different cost types and thus, the overall costs are decreasing, leading to a better cost-effectiveness and cost reduction. Reasons for this cost reduction are varied and both connected to specific suppliers and the focal company. According to Song et al. (2014), suppliers are able to reduce their unit costs as volumes are bundled and thus, more quantities are ordered from one supplier.¹⁰² When more quantities are ordered, suppliers normally offer lower prices than when less items are ordered as it is as well easier and more profitable for a supplier to produce more pieces. Lower unit costs lead to lower ordering cost in general, which decreases the overall cost. Another source of cost reduction are the administrative costs. With less suppliers, less administrative work needs to be handled, e.g. sourcing for suppliers, tendering or negotiations, and thus, less resources of the focal company are required.¹⁰³ Consequently, better ordering conditions due to larger volumes and less administrative cost decrease the overall cost when using a reduced supply base. Another advantage of using fewer suppliers

⁹⁷ see Ogden (2006), p.36

⁹⁸ Cousins et al. (2008), p.46.

⁹⁹ see Berger et al. (2004), p.10; see Cousins et al. (2008), p.46.

¹⁰⁰ see Lemke et al. (2000), p.54; see Ogden & Carter (2006), p.7.

¹⁰¹ e.g. see Cousins (1999), p.153; see Lemke et al. (2000), see p.45/52-52; see Nam et al. (2011), p.333; see Song et al. (2014), p.524/526.

¹⁰² see Song et al. (2014), p.524.

¹⁰³ see Lemke et al. (2000), p.45/52.

is that the negotiation power increases. As one supplier produces a higher volume for the company, the focal company might become more important for the supplier.¹⁰⁴ Hence, the focal company has a greater impact and is able to better negotiate its terms regarding e.g. prices, delivery or ordering schemes. Next to cost-reduction and an increased negotiation power, the logistical improvement is of great importance. Logistical issues can be standardised when products are regularly ordered from specific suppliers. Here, advantages in the logistics occur as each person involved knows the process and deliveries can be forecasted.¹⁰⁵ Moreover, deliveries are more reliable as the ordering and delivery process will change into an improved, continuous process.¹⁰⁶ Additionally, information sharing and cooperation between the buying firm and supplier will increase. There is according to Lemke et al. (2002) a “more intense and direct contact”¹⁰⁷ with the supplier which enables cooperation and information sharing. This information sharing is accompanied by “a desire for continuous improvement and innovation”¹⁰⁸ where supplier and buyer engage in shared innovation projects to increase the quality of the product or innovate new products. Additionally, information sharing offers the transfer of know-how and enables the supplier to increase his performance, or the other way around, the focal firm to increase its quality and performance.¹⁰⁹ The increased quality results from the previous mentioned advantages. As the logistics can be improved as well as information sharing and collaboration increase, the quality of different factors increases, too. First, the quality of the components increases which in turn increases the quality of the end product. Second, the coordination quality increases, leading to an enlarged overall performance of the company.¹¹⁰ An increased quality of the product and the overall performance leads to more efficiency, less defective goods and a better image of the company. When taking a look at the supplier side, there are some benefits related to the suppliers who were not excluded from the supply base. According to Song et al. (2014), the selected suppliers get larger orders and thus, higher sales.¹¹¹ This increases the suppliers’ revenues and might lead to a better financial

¹⁰⁴ see Lemke et al. (2000), p.51.

¹⁰⁵ see Lemke et al. (2000), p.52.

¹⁰⁶ see Nam et al. (2011), p.333; see Song et al. (2014), p.525.

¹⁰⁷ Lemke et al. (2000), p.52.

¹⁰⁸ Nam et al. (2011), p.333.

¹⁰⁹ see Lemke et al. (2000), p.52.

¹¹⁰ see Lemke et al. (2000), p.45; see Nam et al. (2011), p.333.

¹¹¹ see Song et al. (2014), p.524/526.

performance of the supplier. Additionally, demands can be forecasted more easily leading to better production planning and thus, a more efficient workflow for the supplier.¹¹²

Even though the reduction of the supply base offers many benefits for the focal firm, there are as well drawbacks that need to be carefully considered. The main issues to reflect on are 1) supplier opportunism, 2) reduced flexibility, 3) increased dependency, and 4) increased supply risk.¹¹³ According to Nam et al. (2011), some suppliers could try to take advantage of the situation and show an opportunistic behaviour.¹¹⁴ This risk needs to be taken seriously as opportunistic suppliers might damage the production, quality or relationship between themselves and the focal company. Moreover, this behaviour leads to a lack of trust which in turn might terminate the relationship with this supplier and a new supplier needs to be sourced which is both time and cost intensive. Another issue is the reduced flexibility. Fluctuating demand occurs suddenly and companies with few suppliers might not be able to respond accordingly. Here, flexibility cannot be guaranteed as the chosen suppliers might not have enough capacities to meet the changing demand.¹¹⁵ This lack in flexibility might lead to the situation that the focal firm is not able to produce anymore and thus, misses potential revenues and customers. Moreover, with a smaller supply base, the dependency on each supplier increases for the focal firm.¹¹⁶ As suppliers are reduced and thus, only few suppliers are responsible for the product, the focal firm depends on these suppliers to meet the required demands in terms of quality, delivery and capacity. Here, suppliers might again show opportunistic behaviour as they know that the focal firm is to some degree dependent on them. However, relationship management and partnerships can decrease this risk. Another problem of the increased dependency is a possibly lock-in situation. Suppliers might lock the focal company into certain technologies that are only available from specific providers.¹¹⁷ This lock-in situation leads to high dependency as well as high switching cost and needs to be prevented. The last possible risk, the increased supply risk, occurs as there are chances of shortages due to demand fluctuations, sudden failures or other disruptions.¹¹⁸ In these situations, the capacities of the selected suppliers are not large enough to meet the demand and thus,

¹¹² see Song et al. (2014), p.524.

¹¹³ e.g. see Talluri & Narasimhan (2005), see Choi & Krause (2006), p.640; see Sarkar & Mohapatra (2009), p.124-125; p.130; see Nam et al. (2011), p.333; see Ates et al. (2015), p.205.

¹¹⁴ see Nam et al. (2011), p.333.

¹¹⁵ see Cousins (1999), p.147; see Nam et al. (2011), p.333.

¹¹⁶ see Choi & Krause (2006), p.640.

¹¹⁷ see Ates et al. (2015), p.205.

¹¹⁸ see Sarkar & Mohapatra (2009), p.124-125.

continuous supply is not guaranteed.¹¹⁹ Each of these risks needs to be carefully considered and evaluated and back-up plans need to be developed to ensure the continuous supply of the nominated suppliers.

5.3.Critical Success Factors: Making the Supply Base Reduction a Success

When a company aims to reduce its supply base, it has to consider specific factors that help achieving sufficient results. These so-called success factors are next to benefits and risks of great importance and need to be carefully considered. According to Ogden (2006), only few academic literatures are available about critical success factors of supplier base reduction and the available literature is rather conceptual and general.¹²⁰ However, some critical success factors have been identified by literature. The identified key issues are 1) information systems, 2) involvement of key personnel, 3) supplier evaluation, 4) relationship management, and 5) slow change of supply base.¹²¹

One of the most important success factors is an effectively working information system.¹²² All supply base management efforts depend on the correctness and completeness of data and the underlying information systems.¹²³ Information systems deliver, save and communicate important data and information which are required for the decision making in the supply base reduction process. Furthermore, communication and data exchange with suppliers as well as capability issues of suppliers can be managed via these information systems.¹²⁴ Consequently, having an efficiently working information system in place is the first step to start with the reduction of a company's supply base. The second key success factor is to involve all the important key personnel. Each employee who might be vital should be involved to be able to hand in information, critical thoughts or experiences. Though, key personnel "may not necessarily be top managers within the organization, but those with influence"¹²⁵. Without the involvement of crucial employees, important insights are missed or information are misunderstood and wrong decisions might be made. Trent and Monczka (1999) mention in their paper that persons with experience in contract

¹¹⁹ see Choi & Krause (2006), p.640.

¹²⁰ see Ogden (2006), p.30.

¹²¹ see Cousins (1999), p.146; see Trent & Monczka (1999), p.938; see Talluri & Narasimhan (2005), p.130; see Ogden (2006), p.33-34/36.

¹²² see Ogden (2006), p.34.

¹²³ see Ogden (2006), p.33.

¹²⁴ see Trent & Monczka (1999), p.938.

¹²⁵ Ogden (2006), p.34.

management, quality management, total cost management, negotiation, and value analysis should definitely be included in the supply base reduction process.¹²⁶

Starting with the actual supplier reduction process, the first critical success factor is the supplier evaluation. As suppliers are reduced and the remaining ones get larger volumes to produce, a company has to make sure that the possible chosen suppliers are able to produce the required volumes in both quality and quantity in the required lead times.¹²⁷ To evaluate suppliers correctly, Talluri and Narasimhan (2005) determined that the supplier evaluation has to be of strategic nature and using quantitative and qualitative measures.¹²⁸ As both short and long-term issues need to be fulfilled, the supplier evaluation factors should focus on both the long and short-term. Evaluation factors that should be included in the performance process are the total cost of supplier quality, checking historical supplier performance data and doing an extensive supply chain benchmarking.¹²⁹ After suppliers have been evaluated and categorised, the relationship management needs to be critically reviewed. According to Cousins (1999), “a reduced supply base requires a different supplier management style”¹³⁰ as the scope of the supply management changes to a more strategic direction rather than operative. Consequently, more cross-functional thinking is required for the management and development of key suppliers.¹³¹ Thus, it is essential that the relationship management is adapted to the planned supply base reduction. Lastly, Ogden (2006) identified that one of the most important factors in supply base reduction is to not change the base too fast and abruptly.¹³² Taking more time for this process allows both the focal company and the suppliers to adapt to the new situation and change their management habits. Moreover, production capabilities can be increased by the supplier and improvements can be done. Another factor of not rushing through the reduction process is that fast changes could result in quality and capacity problems as the remaining suppliers did not have enough time to re-plan their production schedule accordingly.¹³³

¹²⁶ see Trent & Monczka (1999), p.938.

¹²⁷ see Ogden (2006), p.34.

¹²⁸ see Talluri & Narasimhan (2005), p.130.

¹²⁹ see Trent & Monczka (1999), p.938.

¹³⁰ Cousins (1999), p.146

¹³¹ see Cousins (1999), p.146; see Trent & Monczka (1999), p.938.

¹³² see Ogden (2006), p.36.

¹³³ see Ogden (2006), p.36.

5.4. Approaches of Supply Base Reduction

As already mentioned in the previous chapter, the process of reducing the supply base should be done carefully and thought through where both short-term and long-term issues are evaluated.¹³⁴ To reach this, Ogden and Carter (2008) state that it is of great importance to identify potential suppliers and then, evaluate those carefully.¹³⁵ This process is supported by Sarkar and Mohapatra (2006) who determined in their paper that the two most important phases are the identification of the optimal number of suppliers and the selection of suppliers that should stay in the supply base.¹³⁶ In order to take actions, several approaches have been suggested by literature. In the following, the three most known approaches of supply base reduction will be highlighted. These are namely systematic elimination, standardisation, and tiering.¹³⁷

The approach of systematic elimination of suppliers works with the underlying principle of “gradually phasing out suppliers”¹³⁸. Consequently, suppliers are eliminated over a certain period of time according to several selection criteria. Here, suppliers are not eliminated all at once but in several steps, as can be seen in figure 3.

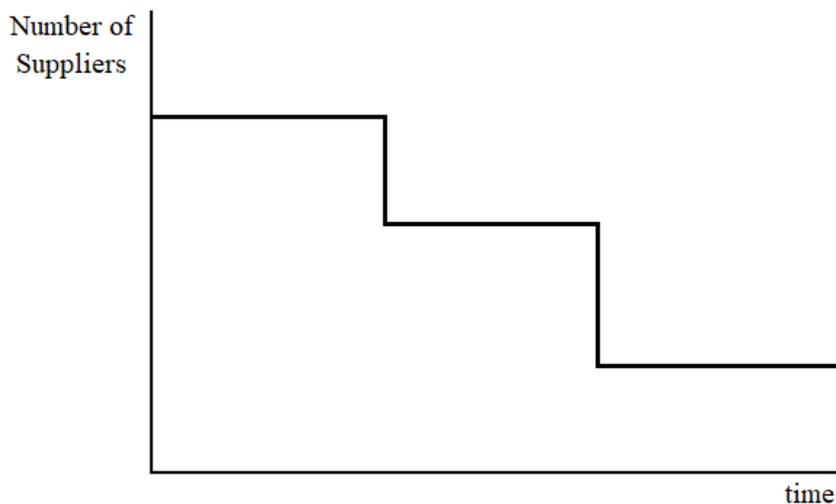


Figure 3: Systematic Elimination Approach.
Source: Based on Ogden (2006)¹³⁹.

¹³⁴ see Sarkar & Mohapatra (2006), p.151.

¹³⁵ see Ogden & Carter (2008) p.15.

¹³⁶ see Sarkar & Mohapatra (2006), p.150.

¹³⁷ see Ogden & Carter (2008), p.8.

¹³⁸ Ogden (2006), p.36.

¹³⁹ See Ogden (2006), p.36.

Within the systematic elimination, Ogden and Carter (2008), divide the supply base into three different categories – red, yellow and green suppliers.¹⁴⁰ While suppliers who are categorised into red are eliminated directly at the beginning of the reduction process, yellow and green suppliers stay in the supply base. However, yellow suppliers are also meant to be eliminated while the green category shows suppliers that are meant to stay in the supply base in the long-term. This process is visualised in figure 4.

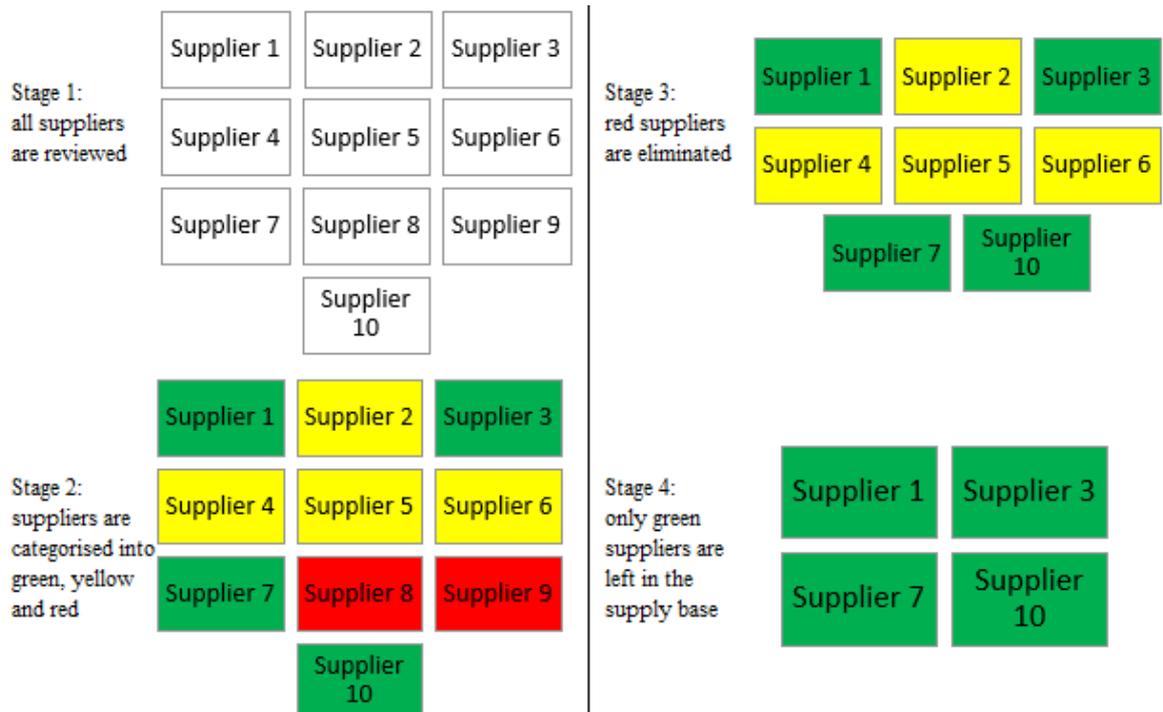


Figure 4: Supplier Categorisation.
Source: Based on Ogden & Carter (2008)¹⁴¹.

The second approach, standardisation, decreases the number of suppliers by reducing the complexity of products, i.e. standardising several similar parts into one part. This helps creating a consistency in the perception between the focal firm and the supplier and homogenises the demand of the focal company.¹⁴² During the standardisation process, suppliers can actively help the focal firm and provide necessary input on how to improve or standardise certain parts.¹⁴³ This in turn gives the buying company hints on which

¹⁴⁰ for the subsequent description see Ogden & Carter (2008), p.13.

¹⁴¹ see Ogden & Carter (2008), p.13

¹⁴² see Ulkuniemi et al. (2015), p.60.

¹⁴³ see Ogden (2006), p. 35.

suppliers to keep in the supply base. Furthermore, processes need to be redefined and can be at the same time improved which leads to better efficiency and lower costs.

The third approach is called tiering and “involves restructuring the supply base into direct and indirect suppliers.”¹⁴⁴ As can be seen in figure 5, the focal firm reduces its direct suppliers, however, the number of indirect suppliers increases as suppliers are simply shifted in the supply chain.¹⁴⁵ Even though the total number suppliers in the whole supply chain did not decrease, the focal company created a smaller and thus, easier manageable supply base for itself.

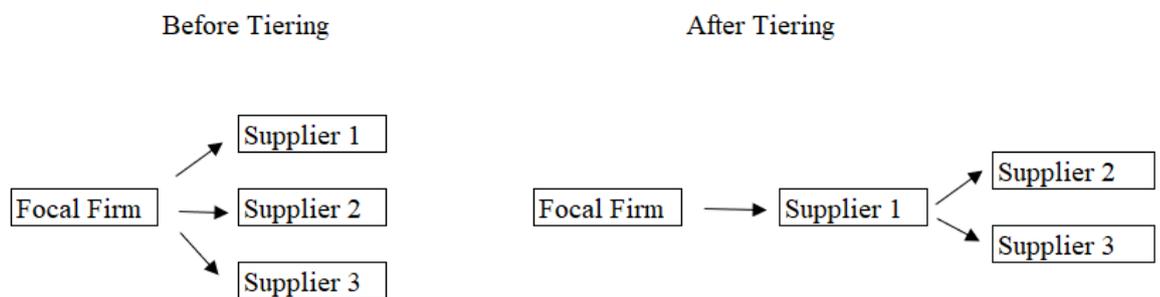


Figure 5: Tiering Process.
Source: Based on Ogden & Carter (2008)¹⁴⁶.

5.5. Tools for Supply Base Reduction

5.5.1. Spend Analysis

All expenditures a company has can be categorised into direct and indirect spending, i.e. spending that has an impact on the product and expenses that are not related to the product.¹⁴⁷ Direct spending is managed by the procurement or purchasing department and the spends can “run into billions of dollars for Fortune 500 companies to hundred of millions for mid size organizations.”¹⁴⁸ Consequently, it is of great interest for each firm to get an overview of what is paid and where it is spent. Nevertheless, getting the right information through these spends is highly complicated and depends on the ability to

¹⁴⁴ Cousins et al. (2008), p.46.

¹⁴⁵ see Ogden & Carter (2008), p.9.

¹⁴⁶ see Ogden & Carter (2008), p.9

¹⁴⁷ see Chowdhary et al. (2011), p.139.

¹⁴⁸ Chowdhary et al. (2011), p.139.

effectively organise and analyse the available data.¹⁴⁹ This organisation and analysis of the available data is called spend analysis and is of existential importance for the purchasing department. The goal of this analysis is to get a better overview what a company actually spends as well as to improve this expenditure and identify possible opportunities for cost savings.¹⁵⁰ According to Renge (2005), the result of a spend analysis is “a complete, documented understanding of the organization’s past and future purchases for supplies and services, segregated by users and suppliers”¹⁵¹.

Literature has identified several key processes and steps in undertaking a spend analysis. Three of these key processes have been reviewed and they are all similar to each other but differ to some extent. Makhija (2006) selected four key processes while undertaking a spend analysis while White (2012) summarised the key steps into three categories and Limberakis (2012) found six steps.¹⁵² A summary of the three different approaches can be found in table 1. Generally, data needs to be collected from various different sources and cleansed, so that only trustworthy and reliable data is used. This collected and cleaned data needs to be classified and analysed to get the needed information. Finally, cost saving opportunities can be identified and realised.¹⁵³ According to White (2012), there are three different forms of opportunities – short-term, medium-term, and long-term opportunities. Consequently, there are issues that can be changed and implemented relatively quickly, contracting requirements take some more time and are thus, medium-term goals and finally, strategic issues that influence the sourcing strategy and need to be changed in the long-term.¹⁵⁴

Benefits of this approach are various as a spend analysis helps the purchasing department highlighting areas of cost savings, improvement and changes. Generally, a correctly performed spend analysis can lead to cost savings from 20 to 35 percent and gives valuable insights for sourcing decisions.¹⁵⁵ Furthermore, buying power can be capitalised, spending patterns found, and a constant improvement is made.¹⁵⁶ Accordingly, when used in the supplier base reduction process, this analysis helps to get an overview of the actual

¹⁴⁹ see Limberakis (2012), p.10.

¹⁵⁰ see Makhija (2006), p.1; see Limberakis (2012), p.17.

¹⁵¹ Renge (2005), p.10.

¹⁵² see Makhija (2006), p.1; see White (2012), p.1; see Limberakis (2012), p.14.

¹⁵³ see White (2012), p.1.

¹⁵⁴ see White (2012), p.1.

¹⁵⁵ see Limberakis (2012), p.10/14.

¹⁵⁶ see Makhija (2006), p.1.

situation of suppliers, ordering volumes and expenses per supplier. Thus, it is the first step that needs to be undertaken when a company wants to reduce its supply base.

Author Steps	Makhija (2006)	White (2012)	Limberakis (2012)
1	Data Collection	Data Collection and Cleanse	Definition of Spend Scope
2	Cleanse	Classification and Manipulation	Data Collection
3	Classification	Analysis and Opportunity Identification	Cleanse and Categorisation
4	Analysis		Creation of Spend Profile
5			Analysis
6			Opportunity Identification

Table 1: Summary of different Spend Analysis Steps.
Source: Own elaboration.

5.5.2. Pareto Classification

In order to classify a company's suppliers and sourced products into categories, the pareto method is one of the most used strategies. This classification method is quickly visualised and an inexpensive way to gather data and create summaries of information regarding critical items and suppliers.¹⁵⁷ Pareto's method is also called 80/20 rule and is based on the idea that 20% of a company's suppliers or sourced products are responsible for 80% of the cost.¹⁵⁸

Generally, suppliers are categorised into three different classes – A, B and C. While A-suppliers represent the strategically important vendors who account for approximately 80% of the cost, B-suppliers are in the middle and C-suppliers account for high volumes with low ordering cost.¹⁵⁹ Aim of this classification is to be able to concentrate on the strategically important few and spend less time with low-cost suppliers.¹⁶⁰ According to Grosfeld-Nir et al. (2007), A-suppliers account for 80% of the cost and B-suppliers as well

¹⁵⁷ see Grosfeld-Nir et al. (2007), p.2317/2320

¹⁵⁸ see Cousins et al. (2008), p.49/52; see Chen et al. (2008), p.3281.

¹⁵⁹ see Grosfeld-Nir et al. (2007), p.2317; see Cousins et al. (2008), p.50.

¹⁶⁰ see Flores & Whybark (1986), p.79.

as C-Suppliers for 10% of the cost while A-suppliers only deliver 20% of the products, B-suppliers 30% of the supplies and C-suppliers deliver 50% of the needed resources.¹⁶¹

As can be seen in figure 6, the distribution differs highly between the left and the right pie chart, i.e. the distribution of total costs and total ordered products. With this categorisation, companies can easily identify their key and weak suppliers, which is supportive for supply base reduction efforts.

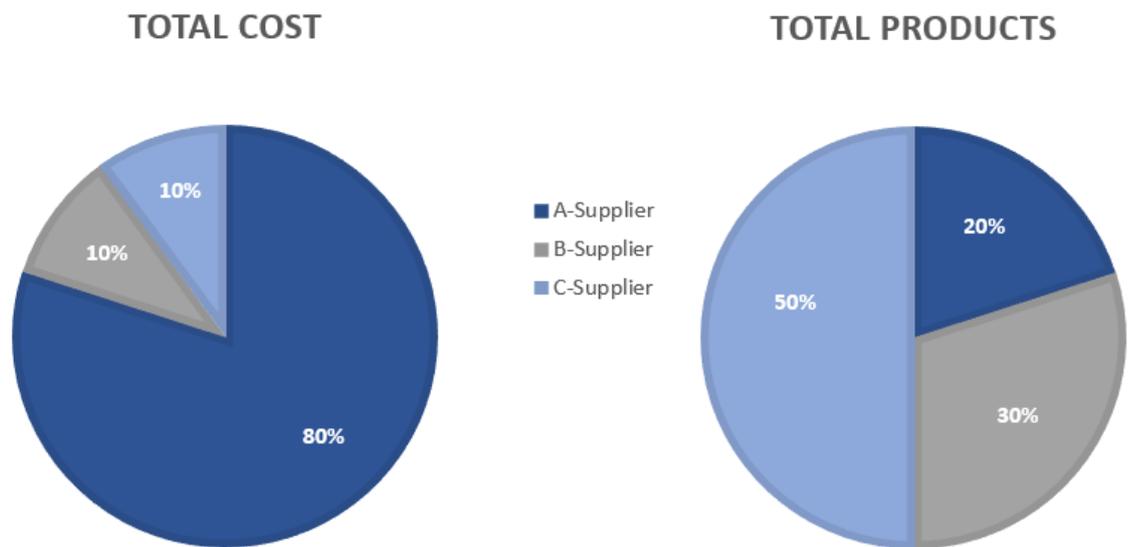


Figure 6: Pareto Classification.
Source: Based on Grosfeld-Nir et al. (2007)¹⁶².

5.6. Supply Base Reduction Processes: Comparing different Processes

To be able to conduct a supply base reduction, companies need to establish a process of how to proceed, so that all issues are covered, and nothing is left out. Literature has conducted several researches to define such a process.¹⁶³ In the following, the processes from Sarkar and Mohapatra (2006), Carter and Ogden (2008), Pryjma (2011) and Nafie (2012) will be highlighted. An overview of these four different processes can be found in table 2. What can be seen at the first glance is that the first process found by Sarkar and

¹⁶¹ see Grosfeld-Nir et al. (2007), p.2317.

¹⁶² see Grosfeld-Nir et al. (2007), p.2317

¹⁶³ see e.g. Sarkar & Mohapatra (2006), p.155; Carter & Ogden (2008), p.15; Pryjma (2011), p.46; Nafie (2012), p.35.

Mohapatra in 2006 has three steps while Carter and Ogden defined six different steps in 2008. Further, both Pryjama (2011) and Nafie (2012) shortened the process back to four steps.

Author Steps	Sarkar & Mohapatra (2006)	Carter & Ogden (2008)	Pryjama (2011)	Nafie (2012)
1	Problem Definition	Cross-Functional Team	Supplier Data Base Analysis	Preparatory Phase
2	Formulation of Criteria	Development of Commodity Sourcing Strategy	Analysis of Components	Framework Developmet Phase
3	Qualification	Identification of Potential Suppliers	Supplier Replacement	Implementation Phase
4		Supplier Selection	Final Supplier Selection	Evaluation Phase
5		Implementation of Changes		
6		Continuous Improvement		

Table 2: Overview of Supply Base Reduction Processes.
Source: Own elaboration.

Sarkar and Mohapatra (2006) developed a three-step process within their research and defined several sub missions within each stage.¹⁶⁴ The first step is the problem definition, where the focal company should conduct an in-depth analysis of the supply market and the nature of the firm's purchases. Furthermore, objectives and goals need to be defined. The second step, the formulation of criteria, is about identification and classification. Here, the focal firm has to identify the different factors that might have an influence on the defined objectives. The second sub step is the classification of the identified factors into capability and performance factors. The final step, the qualification, is the main part of the supply base reduction process and includes several sub steps to conduct. In this phase, potential suppliers are screened and identified, and supplier data is collected. Moreover, a cross-functional team is established in this phase, where experts from different departments are brought together to discuss the importance of the defined factors, possible problems, and the conducted supplier evaluation. This cross-functional team should then create two separate rankings of all suppliers – one ranking for the suppliers' performance and another one for their capabilities. Based on these two rankings, a capability-performance matrix should be created where suppliers are ranked accordingly. The final sub step of the

¹⁶⁴ for the subsequent description see Sarkar & Mohapatra (2006), p.155.

qualification phase is to eliminate the low-performance suppliers and retain the best suppliers.

A second process to reduce a company's supply base was created by Carter and Ogden in 2008 and consists of six different phases, each with several sub steps.¹⁶⁵ These steps are 1) establishment of cross-functional team, 2) development of commodity sourcing strategy, 3) identification of potential suppliers, 4) supplier selection process, 5) implementation of changes, and 6) continuous improvement. The first step is highlighted by Carter and Ogden (2008) as valuable input is given from different perspectives. When creating a cross-functional team, firstly the project manager needs to be announced and then, a team has to be selected and established. When all members of this team are informed and gave their approval, the different roles and their responsibilities need to be discussed, defined and distributed. After these steps, the team can start with their work, i.e. create a preliminary plan, state their mission and define objectives and targets to be reached. When this is accomplished, the second step, the development of a commodity sourcing strategy, can be targeted. For this, opportunities and possible risks need to be identified, analysed and prioritised. Additionally, existing suppliers need to be visited and then benchmarked against each other to be able to create a ranking. If possible, product parts should be standardised to create higher volumes, however, for this, the team needs to understand the requirements of the service and each product. After these steps, a commodity sourcing strategy should be developed that includes baseline measurements, the desired future state as well as benefits and drawbacks. The third step, identification of possible suppliers, consist of several sub steps. At this point, potential suppliers need to be listed and their profiles completed, i.e. historical data needs to be checked and missing information need to be added. Then, pre-screening criteria can be defined, and a short-list of suppliers developed. The fourth step is all about selecting the best suppliers and thus, the first sub step is to develop criteria for the supplier selection. After measuring these suppliers accordingly, the qualified suppliers need to be visited and negotiations should start. After this, qualified suppliers can be selected. Then, the implementation phase starts, where barriers are identified and tried to be overcome. In this step, an implementation plan, supplier exit plan and new supplier plan needs to be created so that the change occurs without interruptions. All suppliers need to be informed whether they stay in the supply base or are eliminated. Suppliers who stay in the supply base should additionally receive

¹⁶⁵ for the subsequent description see Carter & Ogden (2008), p.15-18.

information about future expectations and targets. Finally, the last step in Carter and Ogden's (2008) supply base reduction process is the continuous improvement, where suppliers are constantly measured, opportunities analysed, and supplier relationship management is implemented.

The process developed by Pryjama (2011) is divided into four different steps – 1) supplier data base analysis, 2) analysis of components, 3) supplier replacement, and 4) final supplier reduction.¹⁶⁶ In the first phase, the basic conditions are discussed and determined, i.e. the scope is determined, pre-screening data of suppliers is evaluated and opinions from different departments are obtained. The second step is then the analysis of the components where the project team studies the technical specifications of the sourced products and determines specific supplier evaluation criteria. After this, the supplier replacement takes place. Here, the project team evaluates all available data and creates a shortlist of suppliers, possible replacement suppliers, and possible product substitutes. These shortlists need to be accepted by the responsible departments, e.g. R&D for the product substitutes, and when the approval is given, the project team can continue with the last step, the final supplier reduction. This step includes the selection and elimination of suppliers, replacement of old material numbers, documentation of the whole process and the follow up.

The last reviewed supply base reduction process was developed by Nafie (2012) and consists of four different stages – 1) preparatory phase, 2) framework development phase, 3) implementation phase, and 4) evaluation phase.¹⁶⁷ In the first phase, all activities that are not directly related to the supply base reduction are conducted. This includes the creation of a project team, the conduction of a spend analysis, and the decision-making regarding the supply base reduction approach. When these prearrangements are done, the second phase starts where supplier elimination and selection criteria are developed to create a framework for the process. The third phase, the implementation phase, is about the product analysis, supplier selection and supplier elimination. In this phase, all decisions are taken and suppliers are eliminated as well as selected according to the previously determined measures and selection criteria. As a last step, the results are analysed and feedback is provided by the focal firm and the suppliers. The process continuous with continuous evaluation and improvements.

¹⁶⁶ for the subsequent description see Pryjama (2011), p.46/49/50/52-53.

¹⁶⁷ for the subsequent description see Nafie (2012), p.35.

6. Methodology

6.1. Research Design

According to Babbie (2011), a researcher needs to use both quantitative and qualitative measurements to be able to understand a problem completely.¹⁶⁸ Consequently, this thesis uses a combination of both analysis types. Qualitative analysis is defined as the “nonnumerical examination and interpretation of observations, for the purpose of discovering underlying meanings and patterns of relationships.”¹⁶⁹ On the other hand, quantitative research uses numerical illustrations to describe and explain observations.¹⁷⁰

The research design of this thesis consists of four different parts. Firstly, a literature review was conducted to establish the baseline and a theoretical foundation. For the research itself, semi-structured interviews, group discussions and data enquiries via the ERP system are used. Furthermore, it needs to be mentioned that the data collection process did not stop after the interviews and rollout of the questionnaire as the researcher is situated at the same location as the participants and is thus, able to ask spontaneously for more information if needed. Hence, more data might be gathered through constant exchanges and as a consequence of the daily interaction. Ethical approval for this research was given on 16th of March 2018 by the Ethics Committee Behavioural Science of the University of Twente, Enschede.

In the beginning of this study, a literature review has been conducted in order to get an overview of the current state-of-the-art literature, theories and models. The used key words to find appropriate literature are 1) supply base, 2) supply base reduction, 3) supplier base reduction, 4) sourcing strategy, and 5) supply base reduction process and only articles in English language were supposed to be shown. The first search had the limitation of being published since 2014 where 1.1 million articles were found. The second round with articles published since 2010 offered 1.5 million results and then the last round with no time restriction offered 4.4 million results. After identifying relevant articles and books, cross-referencing was used to find more appropriate literature and sources.

As a starting point of the data gathering, so-called semi-structured interviews are conducted. Interviews in general are “a verbal interchange where one person, the

¹⁶⁸ see Babbie (2011), p.470.

¹⁶⁹ Babbie (2011), p.552.

¹⁷⁰ see Babbie (2011), p.552.

interviewer, attempts to elicit information from another person by asking questions”¹⁷¹. Moreover, an interview is a “planned conversation to collect data”¹⁷² and subsequently, requires pre-planning, considerations and excellent preparation. The chosen interview method, semi-structured interviews are slightly different from standard interviews as they are not strictly planned. They rather “unfold in a conversational manner offering participants the chance to explore issues they feel are important”¹⁷³, i.e. there are predefined questions, but the interviewee can decide to highlight the topics from different angles and decide which topics are of greater importance than others. According to Knox and Burkhard (2009), this interview style creates a certain flexibility, so that a greater picture can be collected compared to using other interviewing methods.¹⁷⁴ This is supported by Babbie (2011) who mentions that semi-structured interviews offer the possibility of changing the set of questions, allowing to find new and unexpected areas of the research topic as well as seeing new patterns.¹⁷⁵

The semi-structured interview was conducted within a team meeting with the lead buyers of the targeted commodity group. Here, five persons were interviewed within a discussion round. Topics of interest included the general state of the supply base and the purchasing department, sourcing strategies, supplier evaluation and selection, as well as specific questions regarding the targeted sub commodity. Each participant was encouraged to highlight important issues and tell an own story that is related to the open questions as the data gathering was meant to provide a deep understanding of the current situation and critical issues.

In total, there are three different main themes during the interview – background information about the interviewee, questions regarding the purchasing department and strategy, and questions about the specified commodity group. Background information about the person are among others, the name and age, position within in the company, or how long the interviewee already works for Schuler. The second main theme includes six different blocks, consisting of questions about the procurement function in general, the purchasing department, supplier strategy, supplier selection, supplier evaluation, and spend analysis. The last main theme asks about the specified commodity group this master thesis concentrates on. In this part, specific questions about the commodity group are asked, e.g.

¹⁷¹ Clifford et al. (2016), p.143.

¹⁷² Knox & Burkhard (2009), p.15.

¹⁷³ Clifford et al. (2016), p.143.

¹⁷⁴ see Knox & Burkhard (2009), p.3.

¹⁷⁵ see Babbie (2011), p.181.

information about preferred suppliers, sourcing strategies and product groups within the commodity group. The interview questions can be found in Appendix B. As these interviews are confidential, only the questions are available.

Next to the semi-structured interviews, a group discussion was conducted with the technical operative purchasing department. Here, a questionnaire was developed beforehand which was debated during the session. The aim of this group discussion is to create a general understanding of the current situation in the purchasing department and of the supply base. The questionnaire consists of 58 different questions which are separated into seven different blocks, each with a different focus. Furthermore, the questionnaire is split into two parts – questions regarding the company and questions about the own perception of importance. Consequently, the measurement scales differ slightly. For simplicity, only closed ended questions are asked which have to be answered on a 5-point Likert scale. The first part has to be answered with a 5-point Likert scale (fully agree, agree to some extent, neutral, disagree to some extent, disagree) and the second with a 5-point Likert scale (very important, important, neutral, less important, unimportant). The first part consists of five blocks – questions regarding the procurement strategy, the operative procurement, the supply base, and the satisfaction regarding the current suppliers. The second part consists of two blocks where the purchasers have to rate the importance of several factors regarding general facts about purchasing departments within a company and important factors that need to be considered for supplier selection. The full questionnaire can be found in Appendix A.

The last form of data collection is the usage of ERP systems of Schuler. These systems are information systems that cover all business functions and processes of a company, including among others the functions sales, procurement, finance, and human resources.¹⁷⁶ According to Haddara (2014), “its ability to automate and integrate an organization’s data and business processes across the entire enterprise in a real-time environment”¹⁷⁷ is one of the most important functions of an ERP system. The case company Schuler mainly uses the provider SAP where all transactions are conducted and recorded. As the researcher has free access to the relevant parts of the ERP systems, required information can easily be collected at any time. Mainly data regarding statistics, profits and volumes is gathered via the ERP systems. All data is quantitative and numeric.

¹⁷⁶ see Haddara (2014), p.394.

¹⁷⁷ Haddara (2014), p.395.

6.2. Data Collection

6.2.1. Group Discussion – Operative Purchasing

The group discussion was conducted with five employees of the technical purchasing department. As a foundation of the discussion, the previously developed questionnaire was used to lead the discussion into the right direction, however, the researcher did not interrupt digressions if they were related to the main theme. In the following, the blocks of the questionnaire and the results will be highlighted.

The first part of the discussion focused on the embedded guidelines and purchasing strategies. Basically, it was discussed how the strategic and operative purchasing departments work together and whether communication is clear and effective. Generally, guidelines for both the strategic and operative purchasing are in place and all participants agreed that these guidelines are useful and communicated clearly. Nevertheless, these guidelines should be flexible enough to allow own discretionary and be adapted if necessary. Regarding the purchasing strategy, the participants agreed that purchasing strategies are used, however, the operative purchasers kept struggling with the communication of those. According to the discussion, purchasing strategies are not communicated clearly enough from the strategic to the operative purchasing department. Moreover, the operative purchasers discussed that reality and strategic goals differ to some extent and are often not in line with each other. However, if a purchasing strategy is known, the operative purchasers comply to these strategies.

After the guidelines and strategies theme, the discussion continued with the operative purchasing itself. The underlying principle was to generate a feeling for the working behaviour of the operative purchasing department. The discussion showed that the operative purchasers are distracted by issues related to communication and time management both from internal and external sources. The key problem here was that requisitions for materials are sent out too late or the lead times are calculated too short-dated. Consequently, the purchasers are forced to quickly react and sometimes use less qualitative suppliers as more qualitative suppliers have no more capacities available. Moreover, deliveries are not in time as suppliers are not able to produce and deliver the required materials in time. Another key point of this part of the discussion was the extent of the own capacity of acting the operative purchasers have. While the strategic purchasers

define the purchasing strategy and handle the relationship management as well as the negotiations for contracts, the operative purchasing department executes these strategies. However, within the supply base, the operative purchasers have the freedom to take their own decisions regarding the supplier selection if there is not a preferred customer agreement in place. This means that the operative purchaser decides with the help of his or her experience and knowledge which of the listed suppliers are able to offer the best prices and qualities. Nevertheless, decisions regarding the supply base and new suppliers is the task of the strategic purchasing. During the discussion, it became clear that depending on the commodity group and the required materials, the usage of preferred suppliers differs. While some of the group members mentioned that they work a lot with preferred suppliers and have thus, no real decision power, other group members mentioned that they barely have any preferred supplier in their commodity group.

Questions regarding the supply base in general showed that the operative purchasers do not see the need of a supply base reduction. They admitted that there are many listed suppliers and many available suppliers for the same products but still were resistant to a possible change. It was especially mentioned that more suppliers mean a bigger variety and more back-up suppliers if the normally used suppliers have bottlenecks. In general, the same range of suppliers per product or material is chosen for the bidding process and the supply base includes suppliers that are not used by the operative purchasers. Those are not used for several reasons, but the main reasons are quality and delivery issues as well as too high prices. The suppliers that are used on a constant basis fulfil mostly the quality, price and reliability requirements from the operative purchasers and are thus, used on a constant basis. In fact, new or unknown suppliers face difficulties to persuade the purchasing department from themselves as there are already bonds to established suppliers. Here, the discussion led to the result that there might be a missed opportunity – finding new and better suppliers but sticking to the old and known suppliers. Another issue that arose in the discussion is the way, the purchasers decide which of the suppliers is finally chosen for the order. All members of the discussion round agreed that the quality is more important than the price, but that the price needs to be in accordance with the quality as well. Here, one of the purchasers mentioned an example on how the supplier is chosen:

There are three suppliers – A, B and C. Supplier A and B differ in their quality levels but are both accepted while supplier C offers a quality level that is not accepted. Supplier A has a better quality than supplier B but is

*also notably more expensive. Depending on the product, but ensuing from normal and not strategic materials, supplier B would be chosen because the price is better while the quality still fulfils the company's requirements.*¹⁷⁸

Consequently, quality and price are pondered against each other when the qualities are still within the company's quality requirements. However, sometimes the more expensive supplier is chosen when the orders are for example urgent and this supplier has faster delivery times than the other ones. Otherwise, the purchasers have the target to get the best price possible. Of course, each purchaser has as well personal preferences regarding their suppliers based on their experience with the vendors and the required materials. As mentioned previously, all participants stated that they often ignore suppliers with too high prices as these are not within the targeted price area. However, there are as well suppliers listed in the supply base who do not fulfil the quality requirements for the materials. In this case, these suppliers often supply products for more commodity groups and are lacking skills in the commodity group of the purchaser. Another factor is that there are materials which can only be sourced from few suppliers, and thus, the suppliers are still listed in the supply base as back-up suppliers.

The second part of the group discussion aimed to find out which factors the purchasers rank and value as important or unimportant for the purchasing department in general and for the selection of suppliers to list in the supply base. During the discussion it became clear that there is a general lack of communication between the different departments within the case company. Often, miscommunication happens or there is a lack of information because something is not communicated at all or only partly which in turn leads to problems for all departments. The participants concluded that it is of great importance to increase the level of communication and transparency between the different departments so that more people know, what the other departments are doing and why. Moreover, the synergy between the departments lacks awareness leading to misunderstandings between the departments. For this case, an example of the lacking synergy was mentioned:

When ordering, the purchasing department prepones the delivery dates to ensure that the required materials are available in time – basically, a time buffer is created. Few days later, the supplier informs the purchasing

¹⁷⁸ see Group Discussion, Appendix C.

*department that another department asked to prepone the delivery date even though it already is preponed, and the supplier will not be able to deliver earlier.*¹⁷⁹

This outcome is the result of the fact that the different departments do not know what the others are exactly doing and thus, the same things are done by different departments, leading to confusion and misunderstandings. As a result, it was discussed that areas of responsibility should be defined more clearly and often to avoid double work. On the other hand, the communication with the suppliers is rated as very important, too. The participants mentioned that they all are already communicating quite efficiently with their suppliers and that there is no problem area known. Apart of the communication, it was highlighted that sending out requests for proposals to more than one supplier is important to create a benchmark and thus, get an overview of current prices and availabilities. It was mentioned that with the help of asking several suppliers, prices can be decreased, and savings can be created through evaluating each order new. Moreover, next to regular benchmarks, suppliers should be audited and evaluated on a more regular basis to be able to determine which suppliers should and should not be chosen for orderings. Regarding supplier audits it was mentioned that there is once a year a supplier evaluation, but for the operative purchasing department the evaluation is not expressive enough. Additionally, suppliers should be audited more in depth and more often, so that low performing suppliers can be excluded or developed earlier and thus, delivery or quality problems decrease in the future. However, the idea of incorporating the feedback from suppliers was not seen as very important. It was mentioned that it would be nice to get feedback from suppliers about capacities and complexity but apart from this, supplier feedback is not as important as other factors.

The last discussion point was which factors are evaluated as important for the selection of new suppliers and/or retention of suppliers. Generally, the most important factors according to the participants are price, low error rate, quality, and flexibility. Obviously, the price and quality must be in line with the strategy of the focal company. As Schuler is a high-quality press manufacturer, suppliers must deliver a corresponding quality. Moreover, a low error rate is essential as materials with errors need to be sent back and newly produced which in turn delays the whole production of Schuler itself leading to late deliveries to Schuler's customers and thus, bad reputation. In the same light, the suppliers'

¹⁷⁹ see Group Discussion, Appendix C.

delivery reliability is of great importance. However, as the operative purchasers mostly schedule a time buffer in their orders, suppliers can have small delays in their deliveries even though it has negative impacts for the relationship with the supplier. As relatively often requisitions are sent out on short-notice, the participants of the group discussion defined that suppliers who have a certain flexibility for orders with short-notice are preferable over others that have no flexible capacities available. Additionally, the willingness to accept special requests was evaluated as a very important factor for the supplier selection. Surprisingly, long-term partnership and cooperation was rated as rather unimportant when selecting suppliers, however, this was seen from the ordering perspective that only because a supplier is delivering over a long period of time it does not mean this supplier is the very best supplier available.

6.2.2. Semi-Structured Interviews within Team Meeting – Lead Buyers

After a first visual conceptualisation of a possible framework and process guideline a meeting with the lead buyers of the commodity group 07 was scheduled in the headquarter in Göppingen, Germany. This meeting was not recorded due to confidentiality issues. The main findings were that the targeted commodity group is a special case as it is categorised into the special engineering area and thus, consists of one-off production rather than mass production. Accordingly, supplier relationship management cannot be handled easily as forecasting is rarely possible. This led to the fact that the original framework is not applicable, however, it would be applicable to other commodity groups within the company and was thus, seen as value-adding. Thus, the framework has been adapted after the meeting. The main issues discussed within the meeting were (1) the special case of commodity group 07, (2) inclusion of service purchasing, (3) key performance indicators.

According to the lead buyers, the targeted commodity group is a special case (1) as most products are specially designed and requested and thus, differ in every order. Moreover, most of the suppliers are small enterprises with only five to 40 employees and a very small machine park which leads to small production capacities. Hence, the lead buyers did not see an advantage in establishing a preferred customer/supplier status but rather preferred to spread the orders more equally over the reduced supply base to create a more diversified delivery schedule and less dependence from few suppliers. Additionally, establishing cooperation's and preferred treatment by suppliers via a preferred customer status is not

possible due to the low forecasting possibility and the small production capacities of the suppliers. As the suppliers simply do not have enough capacities, these suppliers do not wait for specific customers but accept every order possible to stay in production. This and that forecasting is hardly possible, it is not likely to block capacities from the suppliers.

Another issue mentioned during the meeting was that it is difficult to eliminate suppliers that are inactive or low-performing as the service might require these suppliers for service orders in the future as the service is included in the commodity group (2). It was discussed whether it would be possible to open a new commodity group for the service, but all lead buyers were quite unsure about this and thus, this thought was not continued. However, it was argued whether it would be possible to open these suppliers only for the service, but here, the ERP-system responsible must check this issue. However, one of the lead buyers mentioned that suppliers cannot be eliminated completely due to the service business:

These suppliers are not needed in the normal business. But what happens when a customer has a machine breakdown or needs spare parts? Then, the service needs the required materials in a very short period. And obviously, the service will buy from already known suppliers where they know, that these suppliers can produce the items in the right quality and time. That's why those suppliers cannot simply be deleted from the supply base, even though they are not really used and should be eliminated.¹⁸⁰

Consequently, a solution needs to be found that incorporates the needs of the service purchasing. For this, it was mentioned whether it would be possible to find system suppliers that can deliver the service items.

The last point of discussion was (3) the KPI's for a possible supply base reduction. As this commodity group has no strategic importance, KPI's are more focussed on statistics rather than qualitative factors. In general, it was agreed that there are five KPI's that are of great importance – the quality, lead time, delivery reliability, flexibility and, openness for special requests. These factors should be crucial during the evaluation of the targeted suppliers for a supply base reduction.

¹⁸⁰ see Team Meeting Lead Buyers, Appendix C.

6.3.Theoretical Framework: Supply Base Reduction Process

The theoretical framework was established with the help of the above-mentioned data gathering methods, i.e. literature review, group discussion and a meeting with the lead buyers. The literature review offered interesting insights in already existing processes regarding the optimal supply base reduction and thus, the later introduced framework evolved from these. Furthermore, the meeting with the lead buyers as well as the group discussion with the technical operative purchasing department helped to further develop the framework, so that all important points are covered. Each involved person offered different insights as everyone holds a different position in the company and has thus, different approaches and points of view.

The proposed process manual consists of four different phases – preparation, information, action, and long-term. Each step has several sub steps that need to be undertaken to make the supply base reduction a success. A summary of the process can be found at the end of the description in figure 8.



In the first stage, the preparation phase, all theoretical and organisational issues must be tackled as this is the foundation of the whole process. This stage consists of five different steps, that define the scope and success of the supply base reduction

Cross-Functional Team

After the decision to minimise the supply base was taken, a cross-functional project team needs to be selected that is responsible for the whole process. The team members should have different background and experiences and, according to the group discussion, should have technical knowhow and knowledge about the processes within the company and at the suppliers' site.¹⁸¹ Moreover, analytical and strategic thinking are key skills of possible group members. Within the team, the responsibilities should be clearly defined and tasks shared according to the expertise of the corresponding team members. Moreover,

¹⁸¹ see Group Discussion, Appendix C.

it was added by one of the lead buyers that not all members have to be direct members but could be indirect members, i.e. being available for advice and consulting purposes without directly being involved in the process.¹⁸²

Current State of Supply Base

Once the team is set up, the group should get a first overview of the current state of the supply base, including the total purchasing values and volumes of all commodity groups as well as the targeted commodity group. Moreover, the total number of suppliers as well as the number of suppliers of the targeted commodity group should be known. If there is a separation between suppliers and service suppliers, the same overview should be created for the service suppliers. This overview allows the project team to identify problem areas and areas of improvement and helps focussing on the next steps.

Problem Definition

With the overview of the current state, the team gets a rough overview and can thus, concentrate on the problem definition according to the situation. Within the problem definition, several issues can be tackled if needed and wished by the company. Generally, a problem statement should be generated that states what the main problem is and how the problem could arise. Furthermore, smaller problems might be connected to the overarching problem and should be stated in the problem definition as well as they could have an influence on the outcome and description of the main problem. Additionally, the project team might want to think about possible hampering factors as these can lead to future problems within the process.

Goal and Target Definition

Once the problem is recognised and defined, targets and goals can be described. At this point, the team should fix what the overall objective of the supply base reduction is, e.g. volume bundling or cost reduction. To reach the overarching goal, several intermediate goals and targets need to be identified as these build the foundation of the tasks that must be done. Both the problem and goal definition define the scope, the resources and time

¹⁸² see Team Meeting Lead Buyers, Appendix C.

needed. Additionally, issues that help reaching the goal might be identified and added to the goal and target definition.

Action Plan and Timeline

The final step of the preparation phase is to create an action plan and the timeline that determines the deadlines for each task. The team needs to start planning the next steps, including the distribution of tasks and time needed. This plan helps to create a process overview that can measure the progress.



The second phase, the information phase, is all about gathering the required data to be able to start with the actual reduction process.

Collection of Supplier Information, Spend Analysis and Pareto Segmentation

To start the whole process of reducing the number of suppliers, all available information about the listed suppliers need to be collected, cleaned and ordered. That data includes all important aspects that can be used to get a first overview of a supplier on a quantitative basis. Missing information need to be gathered from the suppliers or other sources. Once all information is collected, a spend analysis should be conducted with which the team can “further define the approach”¹⁸³ as a greater picture is created that gives an overview of all bought materials, prices, and quantities per supplier for the recent years.¹⁸⁴ After conducting the spend analysis, the project team should continue the data collection and create a pareto segmentation of the targeted commodity group. Most likely the ERP system will have a function for creating a pareto segmentation, otherwise, the project team needs to use the information from the spend analysis to conduct the pareto analysis. With the pareto segmentation, high and low performing suppliers can be identified and categorised, giving hints on possible preferred suppliers.

¹⁸³ Nafie (2012), p.62.

¹⁸⁴ see Karlsson & Eriksson-Ritzén (2011), p.37.

Supplier Categorisation and Creation of Short-List

With the information from the spend analysis and the pareto segmentation, a ranking of suppliers can be created which is based on Ogden and Carter (2008) that can be found in figure 4. While Ogden and Carter (2008) established a categorisation into three groups – red, yellow and green – this framework considers four groups.¹⁸⁵ A visualised form of the categorisation can be found in figure 7. This categorisation segments suppliers into red, orange, yellow and green, whereby red suppliers are those who are inactive or have very low order volumes and values. Suppliers with low order volumes and values are segmented into orange while regular suppliers are categorised into the yellow category. Lastly, the top performing suppliers with very high order volumes as well as values or a strategical importance are identified as green suppliers.

Red suppliers are meant to be eliminated very fast without special evaluation while orange suppliers are targeted for elimination. However, red suppliers need to be cross-checked for suppliers who are only required every few years, e.g. for special equipment. Yellow suppliers should not be targeted directly in the first reduction process but should be re-evaluated in a second reduction process while green suppliers can be evaluated for possible preferred customer statuses. According to this segmentation into four different categories, a short list can be created with all suppliers that are targeted for evaluation and a possible elimination, i.e., red and orange suppliers. When this list is created it needs to be sent out to all decision-makers and persons involved to check whether there are any suppliers who need to be retained in the supply base for several reasons, e.g. bottleneck suppliers, single sourcing or suppliers that are only required every few years.

¹⁸⁵ see Ogden & Carter (2008), p.13.

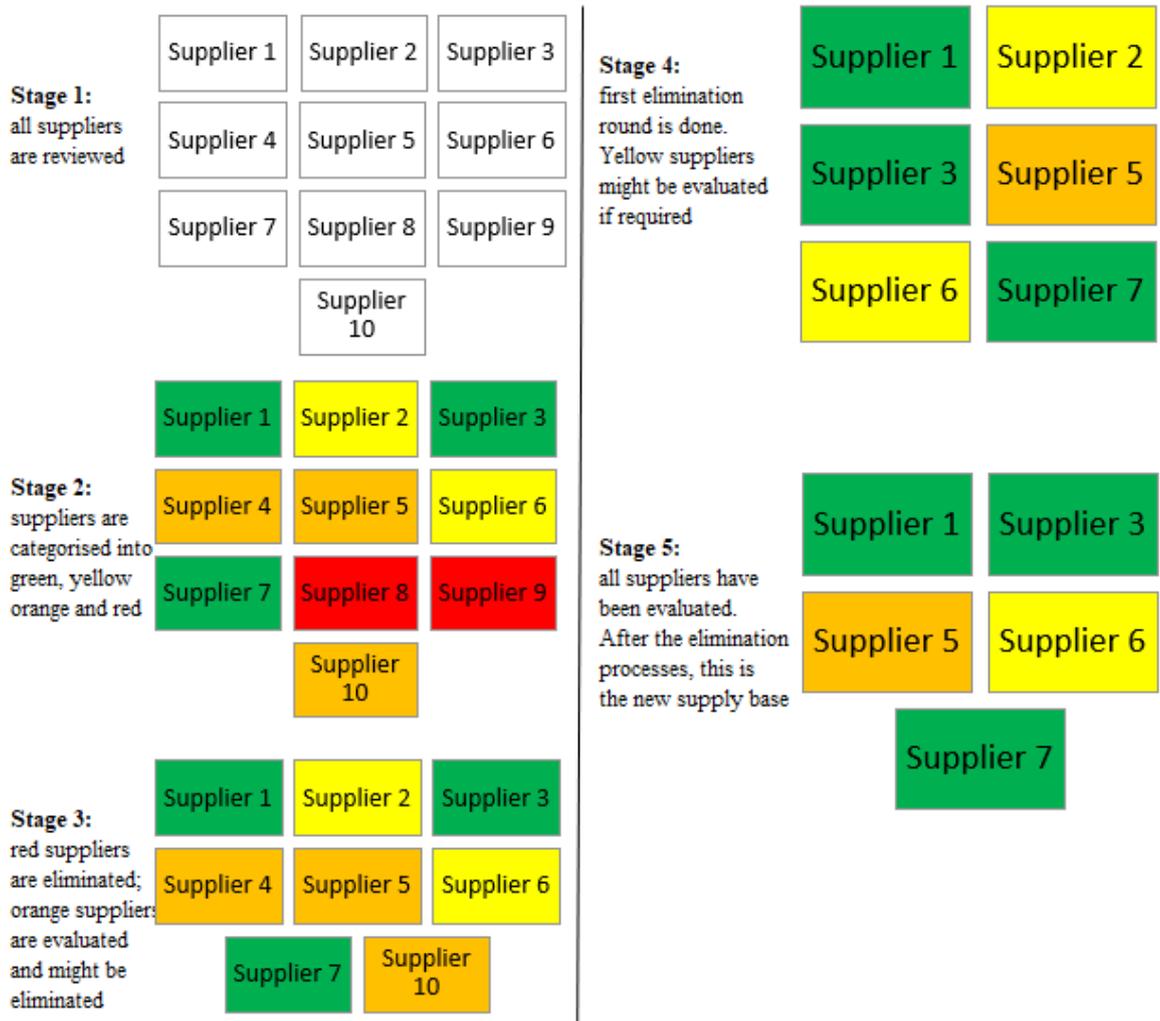


Figure 7: 4-Step Supplier Categorisation.

Source: Own elaboration, based on Carter & Ogden (2008)¹⁸⁶.

Definition of Elimination and Preferred Customer Status Criteria

Next to the creation of short-lists, criteria for the evaluation of the short-listed suppliers needs to be defined. These elimination criteria should include both qualitative and quantitative issues that carefully need to be evaluated and analysed in a later stage. Additionally, the team needs to define decision criteria on how to evaluate a possible preferred customer status for top performing suppliers. Possible elimination criteria are for example the overall performance, quality level, future relationship status or the total turnover while possible preferred customer status criteria could be innovations from the supplier, future importance of the products and/or supplier or order volumes.¹⁸⁷ Once these

¹⁸⁶ see Carter & Ogden (2008), p.13.

¹⁸⁷ see Meeting Lead Buyers, Appendix C.

criteria are defined and all involved persons have given their permission of the short list, the supply base reduction process can continue with the third phase.



In the action phase, all important decisions regarding the supply base reduction are made and executed.

Elimination of Inactive Suppliers

As a first intermediate target, all red categorised suppliers can be removed from the supply base, as those are inactive over a certain period and thus, probably not needed anymore. However, a quick check before eliminating these suppliers is necessary as there might be suppliers who are marked as inactive but are required every few years for special purchases. Those suppliers cannot be deleted as they are specialised suppliers. Apart from this, all inactive suppliers should be deleted from the commodity group's supply base. As these suppliers are already inactive and thus, do not have open orders or are scheduled for orders, there is no need for a systematic or periodical elimination but they can be eliminated all at once.

Evaluation of Short-Listed Suppliers

After the first elimination, the project team can start evaluating all short-listed suppliers according to the predefined criteria and measurements. The result per criteria should be listed into an overview that all criteria can be easily compared. All suppliers that failed the evaluation are listed for reduction. However, it needs to be noticed that each targeted supplier needs to be re-checked whether there is a substitute within the supply base. When there is no substitute within the supply base, the team needs to research whether a new supplier should be sourced as potential substitute or if the supplier should remain in the supply base. Once there is no supplier listed who is indispensable, the suppliers can be eliminated from the supply base.

Elimination of Suppliers + Information to Suppliers

The actual elimination should be systematic and not abrupt to ensure a smooth transition, i.e. suppliers should be deleted stepwise and with premonition.¹⁸⁸ This enables the targeted suppliers to plan their exiting, gives the substitute suppliers time to plan the new demands and, offers the purchasing department time to adapt their systems and change order plans. Consequently, it is important to note that the suppliers need to be informed by the team that they have been eliminated from the supply base including an exit date. If possible, reasons should be named that the supplier is able to comprehend the result.

Check for Optimal Product Distribution and/or Preferred Customer Status

Once the supply base is rationalised, the team has the choice between two future outlooks – establishing a preferred customer/supplier relationship or distribute the order scheme more evenly over the whole supply base. Trying to reach a preferred customer status by the top suppliers offers many benefits, as mentioned previously. However, this approach might not fit to every commodity group and thus, the alternative is to spread the orders more equally among suppliers to avoid a dependence on few suppliers.

If the project team wants to establish more closely relationships with suppliers, the top performing suppliers need to be evaluated according to the predefined criteria for preferred customer status to check for opportunities. The other option would be to take away orders from high performing suppliers and distribute it more evenly, to strengthen the relationship with lower performing suppliers and increase thus, the flexibility. This approach is based on the idea that high performing suppliers often have a full production and order schedules and are accordingly not reliable in their deliveries due to capacity bottlenecks resulting out of too many orders.¹⁸⁹ This is the case for the targeted commodity group. Subsequently, the focus lies on spreading the purchasing volumes and values more equally over the supply base to create a broader and more diversified supply base with no dependencies. Consequently, identifying suppliers with large purchasing values and volumes might offer the chance to identify where to start reducing order placements.

¹⁸⁸ see Ogden (2006), p.36.

¹⁸⁹ see Team Meeting Lead Buyers, Appendix C.



After successfully reducing the supply base, the long-term phase is meant to provide continuous improvement and development options. Here, the suppliers' performance should be monitored and evaluated regularly, and feedback should be given. Furthermore, the suppliers should be encouraged to give feedback as well. This ensured that problems are detected early and thus, supply is not disrupted. Moreover, arising issues can be discussed beforehand, leading to better problem solving. Regular feedback also ensures that the quality is kept at a certain level and it is checked whether suppliers are capable of delivering the required quantities.¹⁹⁰

The second task of the long-term phase is reaching a status where suppliers actively want to increase their relationship efforts and level with the focal firm as a close relationship offers many advantages, e.g. better communication, preferred resource allocation or industry insights. Even if the focal firm does not want to engage in a preferred customer/supplier status, relationship management is required to ensure reliability and the continuity of the business relationship. Both ways, relationship management and constant communication as well as feedback should be internalised within the focal company as the final aim of the long-term phase is to constantly develop the supply base to guarantee a secured supply without any troubles and problems with high-quality suppliers.

¹⁹⁰ see Group Discussion, Appendix C.

Steps		Information for the Steps
Preparation	Establishment of Cross-Functional Team	Indirect and direct members Responsibilities and duties
	Overview of current State of Supply Base	Order volumes and values of whole supply base Order volumes and values of targeted commodity group Number of suppliers
	Problem Definition	Main problem Problems that led to the main problem Hampering factors
	Goal and Target Definition	Overarching goal Intermediate goals
	Action Plan and Timeline	Tasks and actions Redefine responsibilities and duties Timeframe
Information	Collection of Supplier Information	
	Spend Analysis	
	Pareto Segmentation	
	Supplier Categorisation	4-Step categorisation into inactive, low-performance, regular and high-performance
	Creation of Short-List	Low-performance suppliers
	Definition of Elimination Criteria	
	Definition of Preferred Customer Status Criteria	
Action	Elimination of Inactive Suppliers	Check for special cases, e.g. specialised suppliers
	Evaluation of Short-Listed Suppliers	Evaluate according to the pre-defined criteria
	Check for Substitute Suppliers in Supply Base	
	If necessary: Check for New Substitute Suppliers	Only if existing suppliers cannot replace suppliers who will be eliminated
	Elimination of Suppliers	Systematic elimination with a phase-out phase to guarantee an easy transition
	Information of Elimination to Supplier	State reasons for elimination, e.g. evaluation results
	Check for Optimal Product Distribution among Suppliers	Check which suppliers should be used for which products
	Check for Possibility of Preferred Customer Status	Evaluate according to the pre-defined criteria
Long-Term	Monitor Supplier's Performance	
	Regular Feedback	Feedback from suppliers to focal firm Feedback from focal firm to suppliers
	Achievement of Preferred Customer Status	
	Constant Development of Supply Base	

Figure 8: Summary of the Supply Base Reduction Process.
Source: Own elaboration.

6.4. Comparison of the proposed Process and the reviewed Processes

Table 3 shows the differences and similarities between the reviewed and the created process. As can be seen, all important parts of the proposed model are written down as components, while an X marks whether the other authors include these components in their process. All processes contain the steps of problem definition, short-list creation, elimination criteria, and evaluation of suppliers. Next to this, there are overlaps within the components of cross-functional team, definition of goals and targets, action plan and timeline, spend analysis, selection criteria for preferred suppliers, feedback, and monitoring. These components are all somewhere in the other processes mentioned and used. Newly added are pareto segmentation, the 4-step segmentation which is based on the 3-step segmentation of Carter and Ogden (2008), the two-way feedback, and the possibility of a preferred customer status.

The 4-step segmentation is based on Carter and Ogden (2008), but added by one component, the inactive suppliers. This guarantees that all suppliers, active and inactive, are listed within one segmentation, offering a better overview and elimination possibility. Next to this, the two-way feedback ensures that there is an information exchange between the supplier and the focal company, not only to find problems or define objects but also to enlarge the relationship between the supplier and the focal company. With this exchange, it is possible to detect problems better and find sooner solutions which are profitable for both sides. Moreover, the relationship is strengthened which might lead to a better relationship status. The third newly added part is the possibility of a preferred customer status. The thesis itself does not investigate in the preferred customer status as this is one of the long-term goals and thus, another topic. However, the process offers the company the possibility of discovering this opportunity, and shows that there might be an advantage in focussing on relationship management.

Author Components	Sarkar & Mohapatra (2006)	Carter & Ogden (2008)	Pryjama (2011)	Nafie (2012)
Cross-Functional Team		X		X
Problem Definition	X	X	X	X
Definition of Goals and Targets	X	X		X
Action Plan & Timeline		X		X
Spend Analysis		X	X	X
Pareto Segmentation				
4-Step Segmentation	3-Step Segmentation			
Short-List Creation	X	X	X	X
Selection Criteria Preferred Suppliers		X		
Elimination Criteria	X	X	X	X
Evaluation of Suppliers	X	X	X	X
Feedback				X
2-Way Feedback				
Monitoring		X		X
Preferred Customer Status				

Table 3: Similarities between Supply Base Reduction Processes.
Source: Own elaboration.

7. Schuler Pressen GmbH – Supply Base Reduction

7.1. Introduction to the Supply Base Reduction of Schuler Pressen GmbH

The application of the developed supply base reduction process focuses on the commodity group 0709 and is only a first theoretical investigation. This means that no real actions are taken, yet, and that the solely purpose of this investigation is to find out whether there is potential in decreasing the size of the supply base. Consequently, the only involved department is the purchasing department. Nevertheless, this application of the process is to be taken serious as it gives advice to Schuler and simulates how the supply base might be decreased. Moreover, it needs to be noted that the last phase, the long-term phase will not be highlighted in the following, as for this, real actions need to be taken in the previous stage.

Additionally, not all stages of the process will be adapted in the application, as those are not needed for the first investigation. The following steps will be left out: preparation phase – action plan and timeline, action phase – information of elimination to supplier, and the whole long-term phase.

7.2. Preparation Phase

Cross-Functional Team

The team that is responsible for supply base reduction process consists of only one direct member – the researcher – as this subject is a first investigation of a possible supply base reduction. However, indirect members of the team are the lead buyer or the targeted commodity group, the head of location procurement who is responsible for the supply base reduction, and the technical purchasing department in Weingarten, as the employees of this department are the operative purchasers of the targeted commodity group. As there is only one direct member, all tasks are the researcher's responsibility who gets help from the above-mentioned indirect members of the project team.

Overview of the Current State of the Supply Base

The supply base of Schuler is categorised into ten different commodity groups, each consisting of several sub-commodity groups.¹⁹¹ Each commodity group focuses on different aspects of the product range and all commodity groups together create a supply base of 4.444 listed suppliers. All commodity groups together generate a purchasing value of approximately 725 million euro with a purchasing volume of 38 million ordered pieces over the last two years (01/2016 – 01/2018). As previously mentioned, this research focuses on the commodity group 07 and uses the sub-group 0709 as an example. Currently, 961 suppliers and 395 service suppliers are listed for 07 with a total purchasing value of 72 million euro and 800.675 ordered pieces. Narrowing it down to 0709, currently, 519 suppliers are listed in the supply base. Moreover, 0709 generates a value of 15 million euro and had a total order volume of 286.085 pieces in the past two years.

Problem Definition

The scope of this first supply base reduction is the sub-commodity group small parts machining as many suppliers are located in this commodity group. Even though this commodity group is a special case because it belongs to the special engineering section, there are too many suppliers listed which accumulates in high administrative costs and a complex supplier relationship management. Moreover, most of the listed suppliers are small-sized companies with 5 to 40 employees in total, i.e. the suppliers have low production capacities and are not planning their future capacities but accepting every order possible, from Schuler as well as competitors. Consequently, the problem is that there are too many suppliers offering the same services while most of the orders are allocated to the top performing suppliers.

Hampering factors in this reduction process are the complex construction due to the special engineering as each ordered product is customised and thus, differs. There are no mass products ordered in this commodity group and consequently, order automatization is difficult as well as framework contracts. Moreover, suppliers need to be specialised and have certain knowhow. Another hampering factor might be the resistance of the operative purchasing department to reduce the supply base as the team troubles in finding enough suppliers with free capacities.

¹⁹¹ see Schuler Group Intranet (2018b) (not publicly available).

Goals and Targets

The overarching goal of this supply base reduction is to decrease the number of suppliers to a more manageable size and thus, decrease costs and improve efficiency. Related targets are an easier order allocation to a predefined range of suppliers, better relationships with the remaining suppliers and less dependence on the top performing suppliers. Intermediate targets within the process are defined as the elimination of inactive suppliers, identification of low-performing suppliers and an overview of the structure of the supply base.

7.3. Information Phase

Collection of Supplier Information

The required data was collected with the help of two group discussions, one with the technical operative purchasing department and one with the lead buyers of commodity group 07. Furthermore, the ERP systems of Schuler were used to gather the required data about the suppliers. Data collected from the ERP systems are purchasing volumes, purchasing values, number of orders, audit results, categorisation (standard, phase-out, strategic and, preferred customer) and, delivery reliability. This task was carried out individually by the researcher via her own ERP system account.

Spend Analysis + Pareto Segmentation

In the spend analysis, 509 suppliers have been listed and categorised. All information used encompass the timeframe 01/2016 – 01/2018. After a first short overview, it became clear that out of the 509 listed suppliers, 237 have not been used in the past two years for any orders and thus, they can be marked as inactive. Moreover, 12 out of the remaining 272 suppliers have been marked as phase-out suppliers, i.e. contracts are already terminated and there are no more orders planned for these suppliers. Consequently, there is a total number of 272 active suppliers.

When taking a first look at the data, it became obvious that there are massive differences between the listed suppliers. Most suppliers are small companies with few employees and machinery, but there are as well medium to large sized companies with many employees and a respective machinery and production capacity. Consequently, order volumes and values differ strongly, with the highest order value of 1.7 million euro in the past two

years, while the average order value lies at 50.000 euro for the past two years. Regarding the quantities, there are some differences as it can be distinguished between two categories – fewer but more expensive orders and many orders with less expensive products that are needed on a more regular basis. Additionally, in average, listed suppliers are registered for 5 sub commodity groups, however, the range is between being listed in one sub commodity group and being listed in 80 sub commodity groups. On average, 38% of the total order volume per supplier is obtained in commodity group 0709.

Regarding the pareto segmentation, two segmentations have been done – order value and order quantity. Both segmentations are categorised into A, B and C suppliers, where A-suppliers offer 80%, B-suppliers 15% and C-suppliers 5% of the purchasing value or quantity. This analysis resulted in 39 A-suppliers, 63 B-suppliers and 170 C-suppliers regarding the order value and 25 A-suppliers, 34 B-suppliers and 213 C-suppliers regarding the order quantity. This means that 78 percent of the suppliers are responsible for only 5 percent of the order quantity, while 9 percent of the supply base are in control of 80 percent of the total order quantity. A similar distribution can be noticed for the total order value, as 14 percent of the suppliers hold 80 percent of the total order value, while 62 percent of the supply base create together a total turnover of only 5 percent. A visualisation can be found in figure 9.

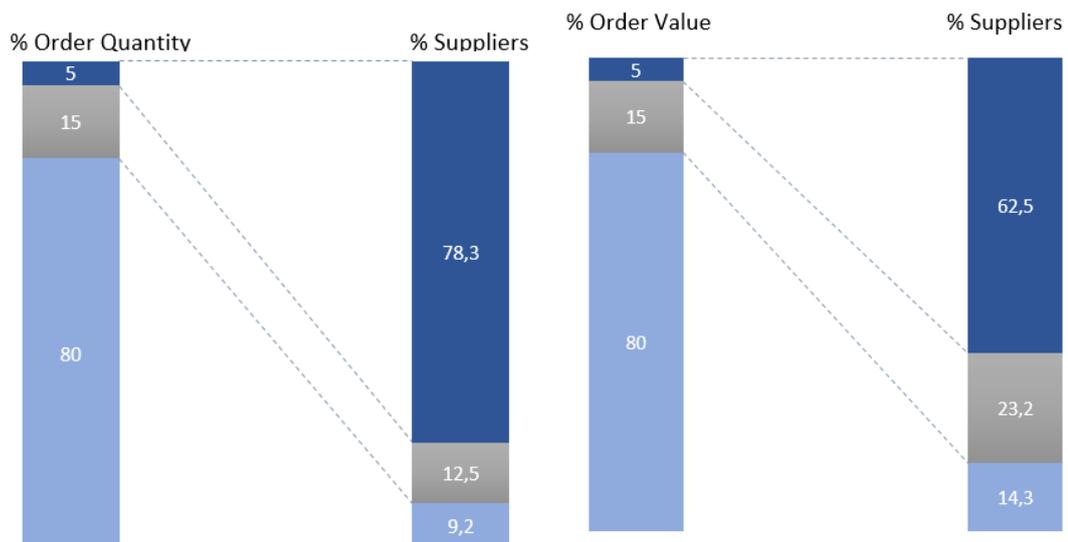


Figure 9: Order Quantity and Order Value Distribution.
Source: Own elaboration.

Supplier Categorisation & Short-List

After conducting the spend analysis and the pareto segmentation, suppliers have been categorised accordingly into different sectors. Mainly, suppliers have been sorted into four different categories – inactive and phase-out, low-performing, regular, and top-performing suppliers. The identified low-performing suppliers have been nominated for the short-list for a possible reduction, while the top-performing suppliers have been nominated for an evaluation, too. For the top-performing suppliers, the goal is to change the product distribution and take orders away and distribute them more equally among the supply base.

In total, 41 suppliers have been categorised into the top-performing category, 65 as regular suppliers, and 152 suppliers are in the low-performance sector. Nevertheless, within the low-performance category, there are three suppliers who have either a strategic or preferred status. Thus, they are excluded from the short-list. 249 suppliers are inactive or in the phase-out stage.

As a result, 149 suppliers have been short-listed for evaluation and thus, a possible elimination, while 41 suppliers are listed for an order re-distribution and an evaluation for a possible preferred customer status. In figure 10, the categorisation has been visualised.

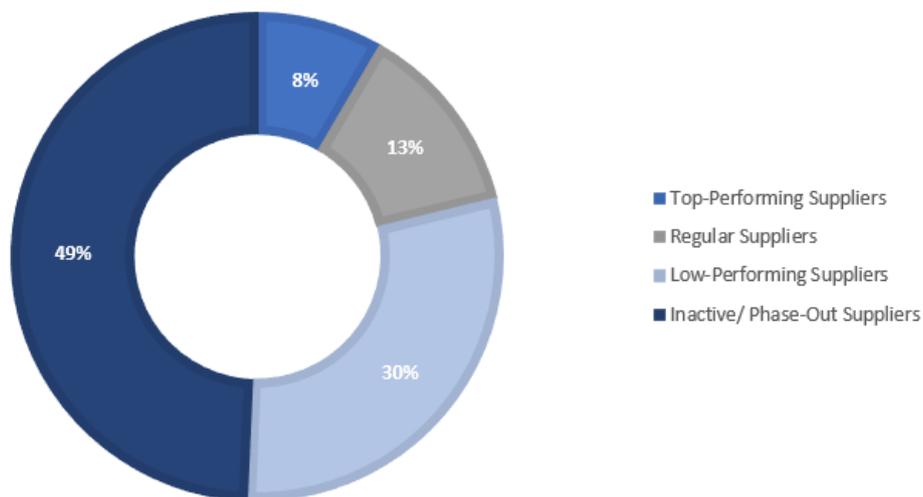


Figure 10: Overview of Supplier Categorisation.
Source: Own elaboration.

Definition of Elimination Criteria

In consultation with the lead buyers of commodity group 07, the following three elimination criteria were determined – purchasing value, delivery reliability, and the number of offered product types. Nevertheless, it needs to be mentioned that mostly, no product is bought twice and thus, a categorisation according to the product specifications is not possible. Consequently, numerical elimination criteria are applied. To the lead buyers, the delivery reliability is the most important factor, followed by the purchasing value.

The elimination criteria are applied stepwise. First, all suppliers with a purchasing value of less than 1.000 euro are eliminated, followed by a separation between suppliers with a higher or lower delivery reliability of 70 percent. All suppliers with a delivery reliability of less than 70 percent are checked for a possible elimination. These suppliers need to be checked for their importance. The remaining suppliers are checked for their number of product types offered. Generally, when a supplier only offers one product type, the supplier should be eliminated, unless there is no substitute supplier.

Definition of Preferred Customer Status Criteria

According to the lead buyer of 0709, a preferred customer status is not applicable to this commodity group and thus, no criteria are defined. As 0709 belongs to the special engineering section, forecasting is highly complicated and most of the time not possible and thus, it is not possible to reserve production capacities from suppliers as it cannot be planned which machines are required. Moreover, the lead buyer follows a purchasing strategy of dispensing the purchasing quantities rather than pooling the demand to certain suppliers. Additionally, this commodity group is not of strategic importance and has no new product development themes. Consequently, no preferred customer status criteria are defined.

7.4. Action Phase

Elimination of Inactive Suppliers, Evaluation of Short-Listed Suppliers & Check for Substitute Suppliers

As a first filter in the elimination process, all inactive suppliers have been eliminated. In total, 237 inactive suppliers have been identified which can consequently, be deleted from the supply base. After the elimination of inactive suppliers, the short-listed suppliers have firstly been filtered according to their purchasing value. All suppliers with a purchasing value of less than 1.000 € in the last two years have been nominated for elimination. In total, 39 suppliers have been identified within this filter. Their purchasing values range between 40 € and 950 € for the past two years.

As a second elimination step, the delivery reliability of all short-listed suppliers has been collected and all suppliers with a rate of less than 70 percent have been processed to further investigations. Suppliers with a delivery reliability over 70 percent are retained in the supply base for now. In this step, 30 suppliers have been identified with a low delivery reliability. Nevertheless, these 30 suppliers needed to be re-checked regarding their importance. After checking the number of product types and possible substitute suppliers, 19 out of the 30 targeted suppliers have been nominated for elimination, while 11 suppliers need to be retained.

The last elimination criterion is the number of product types. The remaining short-listed suppliers have been analysed according to their number of offered product types, whereby 13 suppliers only offer one type of product, each having a possible substitute within the supply base. Consequently, these suppliers can be eliminated from the supply base.

Elimination of Suppliers

In total, 71 suppliers have been targeted for elimination according to the supply base reduction process. This correlates to a total supply base reduction of 13.9 percent, and a reduction of the active suppliers by 26.1 percent. Additionally, 237 inactive suppliers have been identified for elimination, which correlates to a reduction of 46.6 percent. Next to this, 12 suppliers are in their phase-out stage. In total, 320 suppliers can be eliminated and thus, the supply base can be decreased by 60.5 percent. Accordingly, 201 suppliers will be retained in the supply base.

Check for optimal Product Distribution

Regarding the optimal product distribution, the lead buyer of 0709 determined that the purchasing volume should be spread more equally over the supply base. Consequently, volumes should be taken away from the top-performing suppliers. To determine, which top-suppliers should be chosen for product re-distribution, the delivery reliability has been checked, as from a qualitative point of view, all top-suppliers are performing well. Currently, 41 top-performing suppliers are listed, each with a different performance level. However, the delivery reliability of some of these suppliers lacks consistency and thus, less orders should be placed according to the lead buyer. According to him, those suppliers are all small to medium sized firms with few employees, having a strict production plan. Still, they are accepting too many orders and thus, struggle with their delivery reliability because of bottlenecks or poor production planning.¹⁹²

Consequently, the 41 top-suppliers have been evaluated according to their delivery reliability. 19 suppliers have a delivery reliability of less than 80 percent over the last two years, whereby 6 of them even reach a rate of less than 50 percent. As the delivery reliability is one of the key performance indicators of the purchasing department, these low rates are not acceptable and the suppliers should be re-evaluated according to the product distribution. There might be substitute suppliers in the supply base which can be used more often, generating a more dispersed product distribution and offering a better relationship to those suppliers as well as a higher significance as a customer.

Generally, there should always be at least two suppliers who are able to supply a required product so that the company does not get into a single sourcing situation. Due to the special engineering sector, this is not always possible and thus, exceptions and hence, single sourcing occurs sometimes.

Check for Possibility of Preferred Customer Status

As the purchasing strategy for 0709 plans a broader scope rather than focusing on preferred suppliers, establishing preferred customer statuses is not the priority of the lead buyer.¹⁹³ Nevertheless, top-performing suppliers have been identified according to their order values and quantities. According to these indicators, three suppliers have been identified as the

¹⁹² see Team Meeting Lead Buyers, Appendix C.

¹⁹³ see Team Meeting Lead Buyers, Appendix C.

most important suppliers for 0709, each having order values of above one million euro for the last two years. In this case, it might be useful to establish a better relationship management and try to achieve the preferred customer status. This can be done with the help of strategic planning and a higher level of cooperation. In that case, the lead buyer needs to actively involve the suppliers into relationship management and regular communications. Moreover, Schuler needs to offer those suppliers a benefit from a deepened relationship.

8. Discussion and Conclusion: How to successfully reduce the Supply Base?

When a company investigates in reducing its supply base, several factors need to be considered, among others the overall situation of the company and its supply base, the product specifications and future implications. Consequently, many aspects need to be taken into account which makes the process complicated and time-intensive. Nevertheless, a supply base reduction offers opportunities and benefits for a company as administrative costs are decreased, logistics are improved as inefficient suppliers are targeted and eliminated. Moreover, the relationship with the focal firm's suppliers can be tightened and restored.¹⁹⁴ For these reasons the case company Schuler decided to reduce its supply base for their commodity group 0709. To help Schuler finding a way to reduce its supply base, a process guideline has been established which should lead the company through the supply base reduction process. The developed process can be adapted to all commodity groups of Schuler, while commodity group 0709 was taken as an example and first investigation. Nevertheless, it needs to be distinguished between two different sorts of supply base reduction – the strategic long-term approach and a one-time reduction.¹⁹⁵ The established process combines the two approaches as the general reduction is based on a one-time reduction aiming to reduce the supply base for a cost reduction and a better overview of the supply base. Nevertheless, in the long-term phase of the established process, a strategic approach is embedded, as the long-term phase asks for a relocation of the order distribution as well as constant relationship management with the goal of developing the supply base over time.

¹⁹⁴ e.g. see Cousins (1999), p.153; see Lemke et al. (2000), see p.45/52-52; see Nam et al. (2011), p.333; see Song et al. (2014), p.524/526.

¹⁹⁵ see Cousins (1999), p.147; Talluri & Narasimhan (2005), p.130; see Sarkar & Mohapatra (2006), p.150.

Within the analysis, several sub questions have been asked to comprehend the overall problem and support an answer of the research question. When taking a first look at the current state of the supply base, it becomes obvious that there is no real structure in place. Theoretically, suppliers should be segmented into different categories – standard, preferred and strategic suppliers, however, this categorisation does not take place and only few suppliers are categorised accordingly. This is one of the reasons why the supply base has grown too large, as no specific suppliers have been selected for specific product types. The current state is rather that there is a pool of suppliers and the operative purchasers decide upon their experience which supplier should be chosen for an order. Consequently, the desired state of the supply base is a more structured and segmented state. For the future, it is desired to generate a more segmented and structured supply base with clear responsibilities and divisions to enable a better relationship management and thus, a better management of the supply base. Next to this, the supply base should contain enough suppliers to prevent single sourcing situations in order to have enough competition among the suppliers to create price benefits. Additionally, single sourcing should be prevented as Schuler does not want to be dependent on single suppliers. Generally, there should be at least three suppliers per product category left in the supply base, even though there are exceptions where single sourcing is the only solution due to product specifications.

In order to reach the desired state of the supply base, first of all, a supply base reduction needs to take place. This investigation into a possible reduction has been carried out within this research, allowing the lead buyers to get an overview of a smaller supply base. With the reduced supply base, there is less confusion and chaos and thus, structures can be implemented more easily than before. After the reduction, the remaining suppliers can be categorised into different categories, i.e. standard, preferred and strategic suppliers, and order demands can be spread over the supply base correspondingly. Nevertheless, it needs to be kept in mind that a reduced supply base has as well disadvantages, especially when suppliers know that the supply base has been reduced. In this case, suppliers might show opportunistic behaviour, trying to get better conditions for themselves. Moreover, less suppliers offer less flexibility and an increased dependency to the chosen suppliers.¹⁹⁶ However, as there is no request for single sourcing but rather multiple sourcing with at least three possible suppliers per product type, supplier opportunism should be prevented.

¹⁹⁶ e.g. see Talluri & Narasimhan (2005), see Choi & Krause (2006), p.640; see Sarkar & Mohapatra (2009), p.124-125; p.130; see Nam et al. (2011), p.333; see Ates et al. (2015), p.205.

Regarding the supply base reduction itself, it was possible to identify 237 inactive suppliers that have not been used in the past two years. After cross-checking for special suppliers, it has been decided that all 237 inactive suppliers can be deleted from the supply base as they are not required anymore. Next to this, 12 suppliers have been listed as phase-out suppliers with terminating contracts. After short-listing 149 suppliers for reduction and analysing them according to the pre-defined criteria, purchasing value, delivery reliability and number of offered product types, 71 suppliers have been targeted for elimination. As a result, it can be said that the supply base can be decreased by approximately 60 percent. A visualisation of the elimination can be found in figure 11.

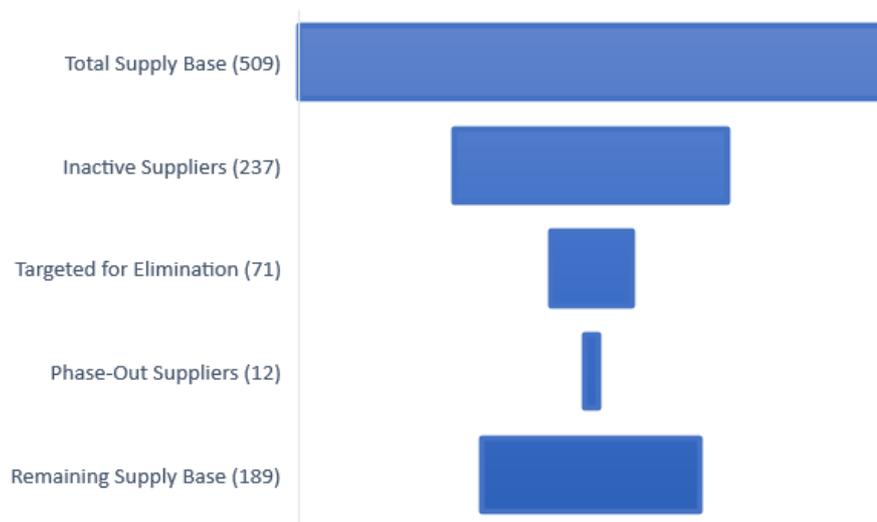


Figure 11: Supply Base Reduction Process in Numbers.
Source: Own elaboration.

Out of the remaining 189 suppliers, 41 have been identified as top-performing suppliers as they deliver the highest purchasing volumes and values. Nevertheless, even though these suppliers have the highest impact, their performance does not always fit with their status. According to the delivery reliability, 19 suppliers lack in their reliability as they have a delivery reliability of less than 80 percent. Consequently, this supply base reduction can be used as a fresh start to segment the supply base in a new way and identify which suppliers should really be top-suppliers and which not.

However, during the research some problems arose. Within the theory section, critical success factors have been defined, among others, a regular supplier evaluation and an

intact relationship management.¹⁹⁷ Nevertheless, during the creation and application of the reduction process, it became obvious that only quantitative criteria can be applied as qualitative criteria, e.g. audit results and relationship management, are not established within the company. Audits are not executed for all suppliers and thus, no consistent result can be created. Only few suppliers are regularly audited, however, none of the short-listed and none of the identified top-performing suppliers have been audited in the past years. Hence, the available audit results would not be significant as no conclusions regarding a correlation between audit results, delivery reliability as well as purchasing values and volumes can be drawn. Still, it was possible to conduct the supply base reduction with the predefined criteria, as well as it was possible to give an overview of the top-suppliers who should be re-evaluated due to their performance. Consequently, the research question *“How can the company Schuler Pressen GmbH efficiently reduce its supply base, especially in the area of machined parts and machining?”* can be answered by using the developed process guideline as it proposes a way of how to segment and reduce the supply base.

Generally, it is advisable for the company to establish regular audits for all suppliers to be able to compare each supplier under specified circumstances. Moreover, regular audits offer the possibility of identifying problems and bottlenecks but also room for improvement and relationship management. Additionally, the supply base should be managed more carefully and segmentations should be taken more seriously. Once the supply base is decreased, Schuler should as well investigate in a proper order distribution and decide which suppliers are used as preferred suppliers for specified product types. As the whole supply base should be restructured, new top-suppliers can be defined, as the lead buyer found out that the current top-suppliers are not as reliable as they should be which might happen because the order volumes are too high.¹⁹⁸ Thus, the reduced supply base offers Schuler the opportunity to segment their supply base in a new way and create new structures and thus, improve the overall performance of their suppliers.

¹⁹⁷ see Cousins (1999), p.146; see Trent & Monczka (1999), p.938; see Talluri & Narasimhan (2005), p.130;

¹⁹⁸ see Team Meeting Lead Buyers, Appendix C.

9. Limitations

During the conception of the thesis several limitations arose which could have an influence on the outcome of this research. The thesis might be useful for both academics and practitioners as the study focuses on a case company and gives examples of specific improvements. However, the in the following mentioned limitations need to be considered while reading this thesis.

First, the timeframe was restricted to 20 weeks while the process of supply base reduction normally takes a longer time. Consequently, important insights during the process could be missing in this study. Moreover, the theoretical part relies on literature found by using certain keywords which could be biased or other important literature with other keywords could have been missed. As this study was conducted within a single company, results cannot be generalised and adopted from other businesses or industries. Moreover, data was mainly gathered via the ERP systems of the case company by the author who might have misunderstood certain data or did not see the whole context. This might lead to false interpretations, which is a limitation of this research. Another issue are the two group discussions. Both discussions were conducted on a voluntary basis and as a result, the group members could have missed out important information or did not reveal their true opinions leading to misinterpretations. Further, information gathering was mainly deducted from the operational purchasing department and answers regarding certain suppliers could be biased due to relationships or personal preferences. Another limitation of this study is that it only takes the focal firm's point of view into account but not the perspective of customers and suppliers. Here, future research could concentrate on researching the outcomes of a supply base reduction for customers and suppliers. Moreover, the targeted commodity group belongs to the special engineering sector which means that qualitative measures need to be carefully evaluated by technical employees, which did not happen within this study. Thus, the used elimination criteria are only of quantitative nature, leaving out technical insights. The last limitation is that the results of this research are based on a mixture of subjective and quantitative data where subjective data might be misinterpreted.

10. Further Research

As a supply base reduction takes a long time and the thesis was limited to 20 weeks, it would be interesting to follow up on the supply base reduction process of the case company. As this thesis was meant for a first investigation and thus, no real eliminations took place, it would be interesting to see whether the suggested eliminations will take place. Moreover, it could be further researched whether the developed supply base reduction process is applicable to all commodity groups of the case company or only applicable to some of the commodity groups. Additionally, it would be interesting to include the suppliers point of view into the supply base reduction process as well as into the preferred customer status process. This would offer new insights of how and why to eliminate or not eliminate certain suppliers. Moreover, capacity or capability drawbacks could be analysed better with the help of the suppliers' input. Consequently, a research that includes both the case company and the suppliers' point of view might create new insights and thus, develop new approaches to reduce the supply base of a company. Another point of view is the preliminary reason why supply bases grow large and thus, need to be reduced later. This research might add up to better sourcing strategies and new approaches on how to effectively manage the supply management department. Moreover, this might offer companies solutions to not let their supply base grow too big and keep it under control.

Furthermore, it would be interesting to establish regular audits for every supplier and compare the results of the audits with the expectations of a supplier. Here, expectations of the focal company could be compared to the point of view of the supplier which might show gaps between expectation and perception.

11. References

1. Ateş, M. A., Wynstra, F., & van Raaij, E. M. (2015). An exploratory analysis of the relationship between purchase category strategies and supply base structure. *Journal of Purchasing and Supply Management*, 21(3), 204–219.
2. Babbie, E. (2011). *The Basics of Social Research*. Wadsworth: Cengage Learning.
3. Bemelmans, J., Voordijk, H., Vos, B., Dewulf, G., (2015) "Antecedents and benefits of obtaining preferred customer status: Experiences from the Dutch construction industry", *International Journal of Operations & Production Management*, Vol. 35 Issue: 2, pp.178-200
4. Berger, P. D., Gerstenfeld, A., & Zeng, A. Z. (2004). How many suppliers are best? A decision analysis approach. *Omega*, 32(1), 9–15.
5. Berger, P. D., & Zeng, A. Z. (2006). Single versus multiple sourcing in the presence of risks. *Journal of the Operational Research Society*, 57(3), 250–261.
6. Burke, G. J., Carrillo, J. E., & Vakharia, A. J. (2007). Single versus multiple supplier sourcing strategies. *European Journal of Operational Research*, 182(1), 95–112.
7. Chen, Y., Li, K. W., & Liu, S. F. (2008). A comparative study on multicriteria abc analysis in inventory management. *Conference Proceedings - IEEE International Conference on Systems, Man and Cybernetics*, 3280–3285.
8. Choi, T. Y., & Krause, D. R. (2006). The supply base and its complexity: Implications for transaction costs, risks, responsiveness, and innovation. *Journal of Operations Management*, 24(5), 637–652.
9. Chowdhary, P., Ettl, M., Dhurandhar, A., Ghosh, S., Maniachari, G., Graves, B., ... Tang, Y. (2011). Managing procurement spend using advanced compliance analytics. *Proceedings - 2011 8th IEEE International Conference on E-Business Engineering, ICEBE 2011*, 139–144
10. Clifford, N., Cope, M., Gillespie, T., & French, S. (2016). *Key Methods in Geography*. SAGE.
11. Cousins, P. D. (1999). Supply base rationalisation: myth or reality? *European Journal of Purchasing & Supply Management*, 5(3–4), 143–155.
12. Cousins, P. D., Lamming, R. C., Lawson, B., & Squire, B. (2008). *Strategic Supply Management*. Essex: Pearson Education Limited.
13. Flores, B. E., & Whybark, C. D. (1986). Multiple Criteria ABC Analysis. *International Journal of Operations & Production Management*, 6(3), 38–46.

14. Gadde, L. E., & Håkansson, H. (1994). The changing role of purchasing: reconsidering three strategic issues. *European Journal of Purchasing and Supply Management*, 1(1), 27–35.
15. Grosfeld-Nir, A., Ronen, B., & Kozlovsky, N. (2007). The Pareto managerial principle: When does it apply? *International Journal of Production Research*, 45(10), 2317–2325.
16. Haddara, M. (2014). ERP Selection: The SMART Way. *Procedia Technology*, 16, 394–403.
17. Handfield, R. B., & Nichols, E. L. (2004). Key issues in global supply base management. *Industrial Marketing Management*, 33(1), 29–35.
18. Heese, H. S. (2015). Single versus multiple sourcing and the evolution of bargaining positions. *Omega (United Kingdom)*, 54, 125–133.
19. Hesping, F. H., & Schiele, H. (2016). Matching tactical sourcing levers with the Kraljič matrix: Empirical evidence on purchasing portfolios. *International Journal of Production Economics*, 177, 101–117.
20. Ho, W., Xu, X., & Dey, P. K. (2010). Multi-criteria decision making approaches for supplier evaluation and selection: A literature review. *European Journal of Operational Research*, 202(1), 16–24.
21. Hüttinger, L., Schiele, H., & Schröer, D. (2014). Exploring the antecedents of preferential customer treatment by suppliers: a mixed methods approach. *Supply Chain Management: An International Journal*, 19(5/6), 697–721.
22. Karlsson, F., & Eriksson-Ritzén, S. (2011). Planning for Supplier Base Reduction - understanding Supplier Base Reduction's role in purchasing, 104. Retrieved from <http://lup.lub.lu.se/luur/download?func=downloadFile&recordOid=1858497&fileOid=1858506>
23. Knox, S., & Burkard, A. W. (2009). Qualitative research interviews Qualitative research interviews. *Psychotherapy Research*, 19 (December 2012), 37–41.
24. Lemke, F., Goffin, K., Szwejczewski, M., Pfeiffer, R., & Lohmüller, B. (2000). Supplier Base Management: Experiences from the UK and Germany. *The International Journal of Logistics Management*, Vol. 11 (2), pp. 45-58.
25. Lewis, H. Thompson. (1937). Industrial purchasing. *New York: Prentice-Hall, inc.*
26. Li, C. (2013). Sourcing for Supplier Effort and Competition: Design of the Supply Base and Pricing Mechanism. *Management Science*, 59(6), 1389–1406.

27. Limberakis, C. G. (2012). Spend Analysis: Best-in-Class. *Supply Chain Management Review*, 16(April). Retrieved from [https://mycourses.aalto.fi/pluginfile.php/388468/mod_resource/content/1/Limberakis, C..pdf](https://mycourses.aalto.fi/pluginfile.php/388468/mod_resource/content/1/Limberakis_C..pdf)
28. Makhija, R. (2006, April 19). Spend Analysis: Today's Tools for Tomorrow's Savings. Retrieved from <http://americancityandcounty.com/issue20060401/spend-analysis-todays-tools-tomorrows-savings>
29. Nafie, O. (2012). Developing a Supplier Base Reduction Process. Retrieved from [https://www.theseus.fi/bitstream/handle/10024/44543/Developing a Supplier Base Reduction Process_Omar Nafie.pdf?sequence=1](https://www.theseus.fi/bitstream/handle/10024/44543/Developing_a_Supplier_Base_Reduction_Process_Omar_Nafie.pdf?sequence=1)
30. Nair, A., Jayaram, J., & Das, A. (2015). Strategic purchasing participation, supplier selection, supplier evaluation and purchasing performance. *International Journal of Production Research*, 53(20), 6263–6278.
31. Nam, S. H., Vitton, J., & Kurata, H. (2011). Robust supply base management: Determining the optimal number of suppliers utilized by contractors. *International Journal of Production Economics*, 134(2), 333–343.
32. Nollet, J., Rebolledo, C., & Popel, V. (2012). Becoming a preferred customer one step at a time. *Industrial Marketing Management*, 41(8), 1186–1193.
33. Ogden, J. A. (2006). Supply Base Reduction: An Empirical Study of Critical Success Factors. *The Journal of Supply Chain Management*, 42(4), 29–39.
34. Ogden, J. A., & Carter, P. L. (2008). The supply base reduction process: an empirical investigation. *The International Journal of Logistics Management*, Vol. 19 (1), pp. 5-28.
35. Pryjma, D. (2011). Supplier Base Reduction Process. Retrieved from <https://dspace.cc.tut.fi/dpub/bitstream/handle/123456789/20680/pryjma.pdf?sequence=1>
36. Renge. (2005). Commodity Sourcing Strategies: Processes, Best practices, and Defense Initiatives. *Journal of Contract Managemnet*, 20.
37. Reuter, C., Foerstl, K., Hartmann, E., & Blome, C. (2010). Sustainable Global Supplier Management: The Role of Dynamic Capabilities in Achieving Competitive Advantage. *Journal of Supply Chain Management*, 46(April), 45–63.
38. Sarkar, A., & Mohapatra, P. K. J. (2006). Evaluation of supplier capability and performance: A method for supply base reduction. *Journal of Purchasing and Supply Management*, 12(3), 148–163.

39. Sarkar, A., & Mohapatra, P. K. J. (2009). Determining the optimal size of supply base with the consideration of risks of supply disruptions. *International Journal of Production Economics*, *119*(1), 122–135.
40. Schiele, H., Calvi, R., & Gibbert, M. (2012). Customer attractiveness, supplier satisfaction and preferred customer status: Introduction, definitions and an overarching framework. *Industrial Marketing Management*, *41*(8), 1178–1185.
41. Schuler Group (2015). *schulergroup.com*. Retrieved from https://www.schulergroup.com/unternehmen/presse/pressemeldungen/tab/archiv/2015/2015_06_23_yadon/index.html
42. Schuler Group (2018). *schulergroup.com*. Retrieved from <https://www.schulergroup.com/>
43. Schuler Group Company Presentation (2017). *schulergroup.com*. Retrieved from https://www.schulergroup.com/investor_relations/download_investor_relations/investor_relations/presentationen_schuler_unternehmen_2017_03_06_e.pdf
44. Schuler Group Intranet (2018a). *myschuler.de* Retrieved from <https://www.myschuler.schuler.de/00099/SitePages/Start.aspx>
45. Schuler Group Intranet (2018b). *myschuler.de* Retrieved from <https://www.myschuler.schuler.de/00099/SitesPages/Material%20Groups.aspx>
46. Song, D. P., Dong, J. X., & Xu, J. (2014). Integrated inventory management and supplier base reduction in a supply chain with multiple uncertainties. *European Journal of Operational Research*, *232*(3), 522–536.
47. Talluri, S., & Narasimhan, R. (2005). A note on ‘A methodology for supply base optimization’. *IEEE Transactions on Engineering Management*, *52*(1), 130–139.
48. Tanskanen, K., & Aminoff, A. (2015). Industrial Marketing Management Buyer and supplier attractiveness in a strategic relationship — A dyadic multiple-case study. *Industrial Marketing Management*, *50*, 128–141.
49. Trent, R. J., & Monczka, R. M. (1999). Achieving world-class supplier quality. *Total Quality Management*, *10*(6), 927–938.
50. Úbeda, R., Alsua, C., & Carrasco, N. (2015). Purchasing models and organizational performance: A study of key strategic tools. *Journal of Business Research*, *68*(2), 177–188.
51. Ulkuniemi, P., Araujo, L., & Tähtinen, J. (2015). Purchasing as market-shaping: The case of component-based software engineering. *Industrial Marketing Management*, *44*, 54–62.

52. Wetzstein, A., Hartmann, E., Benton, W. C., & Hohenstein, N. O. (2016). A systematic assessment of supplier selection literature – State-of-the-art and future scope. *International Journal of Production Economics*, 182, 304–323.
53. White, J. (2012, April 01). What's the buzz about spend analysis? Retrieved from <http://americacityandcounty.com/fiscal-management/whats-buzz-about-spend-analysis>
54. Zeydan, M., Çolpan, C., & Çobanoğlu, C. (2011). A combined methodology for supplier selection and performance evaluation. *Expert Systems with Applications*, 38(3), 2741–2751.
55. Ziggers, G. W., & Henseler, J. (2016). The reinforcing effect of a firm's customer orientation and supply-base orientation on performance. *Industrial Marketing Management*, 52, 18–26.

12. Appendix

Appendix A – Questionnaire Group Discussion Technical Purchasing

Part 1**1. Richtlinien und Strategie ***

Markieren Sie nur ein Oval pro Zeile.

	trifft voll zu	trifft teilweise zu	neutral	trifft teilweise nicht zu	trifft nicht zu
Es gibt klar definierte Richtlinien für den operativen Einkauf	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich halte mich an diese Richtlinien	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Die Richtlinien sollten angepasst werden	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Es gibt eine klar definierte Einkaufsstrategie für meine Warengruppe	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Einkaufsstrategien werden klar und deutlich an den operativen Einkauf kommuniziert	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich halte mich an diese Einkaufsstrategie	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Es gibt viele sogenannte „bevorzugte Lieferanten“ bzw. Pflichtlieferanten, die vom strategischen Einkauf festgelegt sind	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Es gibt wenig sogenannte „bevorzugte Lieferanten“ bzw. Pflichtlieferanten, die vom strategischen Einkauf festgelegt sind	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

2. Operativer Einkauf *

Markieren Sie nur ein Oval pro Zeile.

	trifft voll zu	trifft teilweise zu	neutral	trifft teilweise nicht zu	trifft nicht zu
Bedarfsanforderungen an den Einkauf werden frühzeitig gestellt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bedarfsanforderungen sind terminlich realisierbar	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich wähle nach eigenem Ermessen, bei welchen Lieferanten Materialien/Produkte angefragt werden	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich wähle nach eigenem Ermessen, welcher Lieferant den Auftrag erhält	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich kann eigenständig nach neuen Lieferanten suchen und diese anlegen/nutzen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Für bestimmte Materialien/Produkte werden mir Lieferanten vorgegeben	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich hätte gerne mehr fixierte Preise/ mehr mit Preislisten arbeiten	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich hätte gerne mehr Vorgaben in Bezug auf die Lieferantenauswahl	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Für die meisten Lieferanten sind Preise im System hinterlegt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

3. Größe der Lieferantenbasis *

Markieren Sie nur ein Oval pro Zeile.

	trifft voll zu	trifft teilweise zu	neutral	trifft teilweise nicht zu	trifft nicht zu
Ich nutze nur einen kleinen Teil, der für meine Warengruppe verfügbaren Lieferanten regelmäßig	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Es gibt viele Lieferanten für bestimmte Material-/Produktgruppen innerhalb meiner Warengruppe	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich nutze meistens dieselben Lieferanten für bestimmte Material-/Produktgruppen innerhalb meiner Warengruppe	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Es gibt Material-/Produktgruppen, welche nur von bestimmten Lieferanten bedient werden können – aufgrund der Komplexität der Teile	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Es gibt Material-/Produktgruppen, welche nur von bestimmten Lieferanten bedient werden können – aufgrund von Kapazitäten bei Lieferanten	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. Zufriedenheit mit den Lieferanten *

Markieren Sie nur ein Oval pro Zeile.

	trifft voll zu	trifft teilweise zu	neutral	trifft teilweise nicht zu	trifft nicht zu
Die meisten Lieferanten erfüllen die Qualitätsansprüche	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Die wenigsten Lieferanten erfüllen die Qualitätsansprüche	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Die Preise vieler Lieferanten sind zu hoch	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Viele Lieferanten sind auf die Aufträge der Schuler Pressen GmbH angewiesen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wenig Lieferanten sind auf die Aufträge der Schuler Pressen GmbH angewiesen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Die meisten Lieferanten melden sich innerhalb der vorgegebenen Fristen (Anfragen, Angebote, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Viele Lieferanten liefern pünktlich	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wenige Lieferanten liefern pünktlich	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. Eigene Präferenzen bei Lieferanten *

Markieren Sie nur ein Oval pro Zeile.

	trifft voll zu	trifft teilweise zu	neutral	trifft teilweise nicht zu	trifft nicht zu
Es gibt Lieferanten die zwar gelistet sind, aber bei denen ich nicht bestelle – aufgrund von zu hohen Preisen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Es gibt Lieferanten die zwar gelistet sind, aber bei denen ich nicht bestelle – aufgrund von Qualitätsproblemen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Es gibt Lieferanten die zwar gelistet sind, aber bei denen ich nicht bestelle – aufgrund von Lieferproblemen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich bevorzuge bestimmte Lieferanten für bestimmte Material-/Produktgruppen, auch wenn die Konkurrenz günstiger ist (bei ähnlicher Qualität)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich bevorzuge bestimmte Lieferanten für bestimmte Material-/Produktgruppen, weil sie günstiger sind, obwohl die Qualität der Konkurrenz besser ist	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich bevorzuge bestimmte Lieferanten für bestimmte Material-/Produktgruppen, weil ich zu den Verkäufern eine bessere Beziehung habe und bevorzugt behandelt werde.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Qualität ist wichtiger als der Preis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Preis und Qualität müssen gleichwertig betrachtet werden	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Part 2

Bitte schätzen Sie die Wichtigkeit der unten genannten Faktoren für einen reibungslosen Ablauf des Einkaufs ein.

6. Generelle Faktoren *

Markieren Sie nur ein Oval pro Zeile.

	sehr wichtig	wichtig	neutral	eher unwichtig	unwichtig
Transparenz zwischen verschiedenen Abteilungen und dem Einkauf schaffen	<input type="radio"/>				
Transparenz zwischen dem Einkauf und Lieferanten schaffen	<input type="radio"/>				
Regelmäßige Benchmarks	<input type="radio"/>				
Regelmäßige Lieferantenbewertung	<input type="radio"/>				
Regelmäßiges Lieferantenfeedback	<input type="radio"/>				
Klare Einkaufsstrategie formulieren und kommunizieren	<input type="radio"/>				
Fachwissen & Kompetenz im Einkauf regelmäßig erweitern/schulen	<input type="radio"/>				
Zuständigkeiten klar definieren	<input type="radio"/>				
Einsparungen erkennen und messen	<input type="radio"/>				

7. Faktoren bei der Lieferantenauswahl *

Markieren Sie nur ein Oval pro Zeile.

	sehr wichtig	wichtig	neutral	eher unwichtig	unwichtig
Preisgestaltung	<input type="radio"/>				
niedrige Fehlerquote	<input type="radio"/>				
Qualität	<input type="radio"/>				
Liefertreue	<input type="radio"/>				
Flexibilität bei Mengenanpassungen	<input type="radio"/>				
Flexibilität bei kurzfristigen Bestellungen	<input type="radio"/>				
Informationssicherheit	<input type="radio"/>				
Innovationen	<input type="radio"/>				
Bereits vorhandene Partnerschaft/Kooperation	<input type="radio"/>				
Möglichkeit zur Partnerschaft/Kooperation	<input type="radio"/>				
Erfüllung von Sonderwünschen	<input type="radio"/>				

Appendix B – Semi-Structured Interview Questions

Questions about the Interviewee

1. What is your name?
2. What is your job title?
3. What are your main responsibilities?
4. How long are you already working for Schuler Pressen GmbH?

Questions Commodity Group 0709

1. What is the purchasing strategy for 0709?
2. How are the relationships with suppliers managed?
3. How would you rate the relationships with suppliers of 0709?
4. Are there specific suppliers and/or products that are only required every few years?
5. How many product groups belong to 0709?
6. How do you segment the suppliers?
7. How do you choose mandatory suppliers for a specific product?
8. Are there any products where it is not helpful to reduce the number of suppliers?

Procurement Questions

1. What is more important – quality, price or delivery reliability?
2. Are there no-go suppliers who are still listed in the supply base?
 - a. Why
 - b. How are those marked?
 - c. Do you still use them, e.g. for service?
3. Are benchmarks conducted on a regular basis?
4. How much does a supplier cost per year?
5. What do you think about the preferred customer/supplier status?
 - a. Applicable to 0709?

Spend Analysis

1. Do you perform a spend analysis on a regular basis?
2. How often do you perform a spend analysis?
3. Which criteria are considered?
4. What happens with the results?
 - a. Who is informed
 - b. Which information are used

Supplier Selection

1. What are the minimum requirements for a supplier?
2. How are new suppliers selected?
3. Who decides which supplier is added/deleted from the supply base?

Appendix C – Interviews and Group Discussion

Interview A – Introduction Interview – confidential, 15th February 2018

Head of Location Procurement Göppingen and Weingarten, and Outbound Logistics

Team Meeting with Lead Buyers - confidential, 16th May 2018

Lead Buyer Raw Materials

Lead Buyer Forgings & Manager Global Purchase

Lead Buyer Raw Materials

Team Lead Operative Technical Purchasing Göppingen

Group Discussion – technical Purchasing Department – confidential, 15th May 2018