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# Developing a Supplier Base Reduction Process

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## **Preface**

It is often said that challenges make life interesting and overcoming them makes life meaningful. With this perspective in mind, I started my journey for the Master's Degree in Industrial Management. Given the time pressure and other professional limitations, I must say that it has been a very challenging journey but also very rewarding. I have greatly enjoyed studying in this program and have learnt a lot.

I would like to express my gratitude to my instructor Thomas for his guidance and valuable inputs. Furthermore, I would like to thank Marjatta and Zinaida for their uninterrupted support and assistance throughout the process. To all of you, I salute your energy and passion in everything you do.

I would also like to extend my gratitude to the case company for giving me the opportunity to conduct this study and to all my colleagues and interviewees. First and foremost, among those, I would like to thank Anne who has provided me with tremendous insight and guidance.

Finally, I thank my wife, my parent and the rest of the family for their patience and encouragement. Without their support, I could not have completed this great journey.

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<p>The number of suppliers at the Global Spares Supply department (GSS) had grown large due to the extensive acquisition program that KONE Corporation undertook since 1975. A review of the GSS supplier base and supplier performance history revealed that the current supplier base was too large for effective and efficient management. In fact, poor supplier's performance started impacting end-customers and sometimes disrupts the fulfilment process.</p> <p>This Thesis is based on a single case company department (GSS) and the chosen methodology is action research. The aim of this Thesis is to assist GSS to effectively manage and improve the performance of its supplier base. The objective is to develop a process that describes all the activities to be performed to reduce successfully the number of suppliers.</p> <p>The proposed process has been developed from a conceptual process which was formed based on the analyzed literature and the available best practices. The process is repeatable and systematic and it consists of four major phases that incorporate eighth intermediate steps.</p> <p>The testing of the process has resulted in an elimination of 103 suppliers which correspond to a reduction of 6, 6 % of the current GSS supplier base. The first results were promising and the long-term outcome from a supplier base reduction initiative is a manageable supplier base that comprises a list of preferred suppliers to collaborate with as an integrated part of the supply chain. Besides the developed process, this Thesis investigates the root causes of the GSS' growing supplier base and suggests recommendations on how to prevent its future expansion.</p>	
Key words	Supplier Base Reduction, Supply Base Management, Supplier Selection, Supplier Relation Management, Supplier Development

## Contents

Preface

Abstract

Table of Contents

List of Figures

List of Tables

Acronyms

Glossary

1	Introduction	1
1.1	Background	1
1.2	Business Problem and Objective	3
1.3	Scope of the Thesis	4
1.4	Structure of the Thesis	5
2	Research Method and Material	6
2.1	Methodology and Research Design	6
2.2	Data Collection	7
2.3	Reliability and Validity	10
3	Best Practices of the Supplier Base Management	11
3.1	Supplier Selection	11
3.1.1	Make-Or-Buy Decision	11
3.1.2	Criteria for Supplier Selection	13
3.2	Supplier Base Reduction	16
3.2.1	Single Source Vs Multiple Sources	17
3.2.2	The Importance of the Supplier Base Reduction	20
3.2.3	Barriers and Success Factors of SBR initiative	21
3.3	Tools for Reducing the Supplier Base	24
3.3.1	Spend Analysis	24
3.3.2	Criteria for Supplier Base Reduction	26
3.3.3	Approaches of Reducing the Supplier Base	27
3.4	Process of Supplier Base Reduction	31
3.4.1	Supplier Base Reduction Process by Carter et al.	31
3.4.2	Supplier Base Reduction Process by Pryjma	33
3.4.3	Conceptual Process of SBR	35

4	Case Company	37
4.1	Introduction to KONE Corporation and GSS	37
4.1.1	KONE Corporation	37
4.1.2	Global Spares Supply Department	40
4.2	Current State Analysis of GSS Supplier Base	41
4.2.1	Spend Analysis	41
4.2.2	Supplier Base Expansion Factors	43
4.2.3	Supplier Selection	48
4.2.4	Supplier Relation Management	49
5	Building a Supplier Base Reduction Process for GSS	52
5.1	Analysis of the Conceptual Process in GSS Environment	52
5.2	The Proposed Process of Supplier Base Reduction	60
6	Testing and Evaluating the Proposed Process of SBR	66
6.1	Preparatory Stage	66
6.2	Framework Development Stage	68
6.3	Implementation Stage	70
6.4	Results and Evaluation of the Process	73
7	Discussion and Conclusions	74
7.1	Summary	74
7.2	Practical Recommendations	75
7.3	Reliability and Validity	76
	References	79
	Appendices	
	Appendix 1. The Proposed Process of Supplier Base Reduction	
	Appendix 2. Schema Representing the Results from the Process Testing	

## List of Figures

Figure 1. Effect of mergers or acquisitions on the supplier base .....	2
Figure 2. Scope of the Thesis .....	4
Figure 3. Action research cycle utilized in the study .....	6
Figure 4. Options of Make-Or-Buy .....	12
Figure 5. Karljic's product purchasing classification matrix.....	19
Figure 6. The spend analysis process and outcome .....	25
Figure 7. Graphical representation of supplier base reduction .....	28
Figure 8. The tiering approach .....	30
Figure 9. Supplier base reduction process by Carter et al. ....	31
Figure 10. Supplier base reduction process by Pryjma .....	33
Figure 11. The conceptual process of a supplier base reduction initiative.....	35
Figure 12. KONE operations, R&D and production sites around the world .....	37
Figure 13. KONE organizational chart .....	38
Figure 14. KONE acquisitions during 1967-2007 .....	39
Figure 15. The state of the GSS supplier base in 2011.....	41
Figure 16. Product-related purchases per % of active suppliers in 2011 .....	42
Figure 17. Spend per active supplier during 2011 .....	43
Figure 18. GSS large base factors leading to its oversize.....	44
Figure 19. The conceptual process of supplier base reduction.....	52
Figure 20. The proposed process of supplier base reduction.....	61
Figure 21. Supplier elimination criteria and sub-criteria.....	68
Figure 22. Framework development stage: targeting suppliers for elimination.....	69
Figure 23. Implementation stage: analysis of products & determining final list of suppliers to be eliminated.....	71

## List of Tables

Table 1. Exploratory phase interviews and dates .....	8
Table 2. Semi-structured interviews and dates.....	9
Table 3. Advantages and disadvantages of single Vs multiple sourcing strategy.....	18
Table 4. Supplier base reduction benefits .....	21
Table 5. Supplier base reduction critical success factors .....	22
Table 6. Supplier elimination criteria applicable to GSS.....	56
Table 7. The SBR approaches and project plan applicable to GSS.....	63
Table 8. Implementation stage: sub-steps and the involved stakeholders .....	72
Table 9. Tactics used to ensure reliability and validity in this study.....	76

## **Acronyms**

BP	Best Practices
COT	Completed on-time
ERP	Enterprise Resource Planning
GSS	Global Spares Supply
JIT	Just-in-time
NCF	Non-conformity Certificate
NEB	New Elevator Business
OEM	Original Equipment Manufacturer
OTB	One-time buy
PCM	Product Change Management
RFP	Request for Proposal
R&D	Research and Development
RFQ	Request for Quotation
SAP	Systems, Applications & Products in Data Processing
SB	Supplier Base
SBR	Supplier Base Reduction
SEB	Service Business Line
SRM	Supplier Relation Management

## Glossary

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Duplicate suppliers	Suppliers registered in a company's database under different identification codes but refer in real life to the same supplier.
Active suppliers	Suppliers registered in a company's database and actively used to purchase products or services.
Inactive suppliers	Suppliers registered in a company's database without being currently selected for the supply of any product.
Dormant suppliers	Suppliers unused for a period of time (no demand for their products).
Supplier base	All suppliers being currently registered in a company's database.
Supplier base reduction	The process and activities that aim at reducing the number of suppliers that are registered in a company's database.
Supply market	Regroups all the buyers and sellers of a given product or service.
Maintenance	Servicing or/ and repairing of a faulty equipment (KONE dictionary).
Modernization	Upgrading of functionality or safety and to qualify as modernisation, the performance of the equipment must be enhanced compared to the state when it was new (KONE dictionary).

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# 1 Introduction

The introduction Section presents first the background of this Thesis. Thereafter, the business problem and the objective are discussed as well as the scope and the limitations. Finally the structure of the Thesis is outlined.

## 1.1 Background

In today's highly competitive business environment, companies are focusing on the supply chain management as a means of achieving long-term competitive advantage. One of the most important elements in designing an efficient supply chain is the number of suppliers that is utilized for the supply of products or services (Ogden 2006:36).

In the past, companies contracted with many suppliers in order to enhance competition between suppliers and reduce costs. The buyer-supplier relationship was price-based or adversarial (Benton 2010:3). However, business practices proved that having many suppliers prevents buyers from establishing good relationships with suppliers and incurs additional costs and causes inefficiencies (Carter et al. 2008: 7; Goffin et al. 2000: 3; Axelsson et al. 2005:62). For this reason, the focus has shifted lately towards a more cooperative approach and companies started to reduce the number of suppliers they utilized.

The case company department *Global Spares Supply* (referred to in this Thesis as GSS) is part of KONE Corporation which manufactures elevators, escalators, and automatic building doors. The company provides also solutions for modernization and maintenance of its own equipments as well as a wide range of other manufacturer's equipments. The performance of KONE's maintenance business is dependent among other elements on the availability of spare parts. GSS' mission is to provide quality spare parts for all KONE elevators, escalators and automatic building doors, as well as commercial replacement parts and components for a wide range of other manufacturers. Overall, GSS has 124,801 spare parts in its offering and plays a critical role in the after sales market.

The number of suppliers at GSS had grown large due to many reasons. One of the main reasons is the extensive acquisition program that KONE Corporation undertook since 1975. Generally, when companies merge, they do not automatically integrate or adopt the same purchasing or supplier management policies. Quiet often, during the transition period, these companies do not have a well-thought process for gathering and storing data related to suppliers or materials which translates into different pools of information that potentially include similar data (Millington 2011:28). This phenomenon is illustrated in Figure 1.

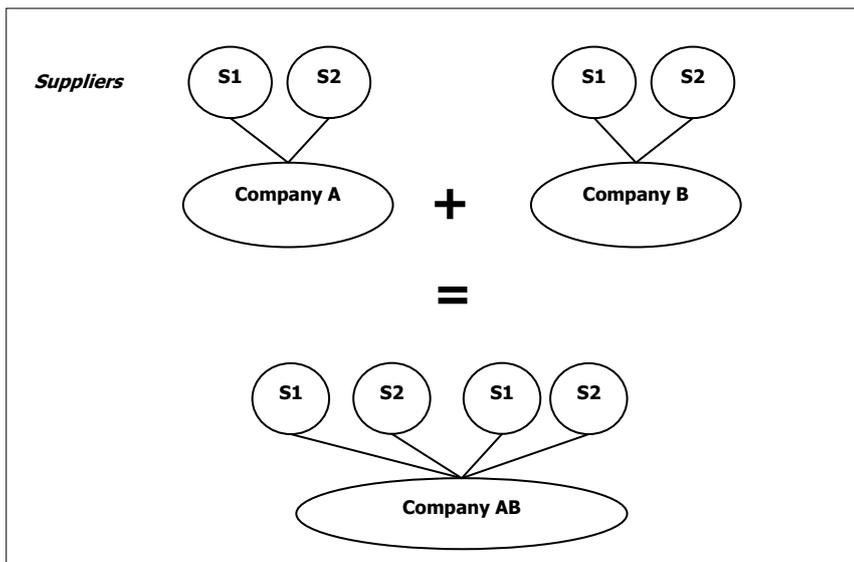


Figure 1. Effect of mergers or acquisitions on the supplier base (modified from Pryjma 2011).

As depicted in Figure 1, a merger or an acquisition can significantly increase the number of suppliers and create an overlap in the supplier base of the new entity.

The following five definitions are used as key terms in the Thesis. Some of them are widely accepted, while others are defined by the researcher for the purposes of this study only. These key terms include: first, **the supply market** regroups all the buyers and sellers of a given product or service. Second, a **supplier base** is defined as the suppliers being currently registered in a company's database. Third, **supplier base reduction** is defined as the process and activities that aims at reducing the number of suppliers being registered in a company's database. Fourth, **dormant suppliers** are suppliers unused for a period of time (no demand for their products). Fifth, **inactive suppliers** refer to suppliers registered in a company's database but not selected for the supply of any product.

## 1.2 Business Problem and Objective

The Business problem which this Thesis aims to solve concerns the reduction of the supplier base. Presently, GSS has an estimated supplier base of more than 1500 suppliers. The analysis of this large supplier base revealed three challenges. Firstly, while GSS has more than 1500 suppliers registered in its databases, it actively uses fewer than 300. Secondly, many suppliers supply only one or two products. Thirdly, GSS purchases the same category of products from many different suppliers; for example, it uses over 50 suppliers to purchase electrical products such as lamps only.

Presently, this large supplier base leads to the GSS purchasing budget being divided among many suppliers. While some suppliers demonstrate enough business ability and are willing to develop in order to meet the GSS requirements, others may be less collaborative and more difficult to deal with. In practice, it means that when GSS purchasing budget is low in regard to a given supplier, the latter is less motivated to nurture better buyer-supplier relationship or develop further. Consequently, GSS is forced to cope with a poor service level as it holds no bargaining power on such suppliers. The situation may become even more complicated, if small suppliers with low purchasing budgets are responsible for the supply of critical and/or slow moving products (non-stock items). In such a case, any delay or lack of cooperation from the supplier can significantly disrupt the fulfilment process and ultimately affect GSS customers and service performance.

As mentioned earlier, KONE Corporation has conducted an extensive acquisition program through which it has inherited a number of product and suppliers. Sometimes, these products are so specific to a certain market that finding an alternative supplier from the existing supplier base appears to be especially challenging, and GSS is sometimes forced to take in local suppliers to its supplier base.

At the moment, this large supplier base causes certain operational problems to GSS. As a result, the department sees potential benefits in reducing it. It strives to decrease the number of suppliers in order to leverage its purchasing through volume consolidation with a preferred list of suppliers. Reducing the supplier base will also provide opportunities to implement streamlined processes with important suppliers, and reduce purchasing management efforts which would ultimately generate cost savings.

Since having too many suppliers proved to be inefficient, this Thesis aims to assist GSS to effectively manage and improve the performance of its supplier base. The objective is to develop a process that describes all the activities to be performed in order to reduce the number of suppliers and to build a more efficient supplier base.

### 1.3 Scope of the Thesis

The focus of this Thesis is to develop a process for the GSS department that could be implemented to reduce its supplier base. However, it lies beyond the scope of this study to examine the entire supplier base of KONE Corporation. The reasons behind this limitation are: (1) the researcher is working for the studied department and trying to solve an encountered business problem within GSS, and (2) the examination of the entire supplier base of KONE being a complex task, with many intervening variables and stakeholders. The scope of this research is therefore limited to only one department as shown in Figure 2.

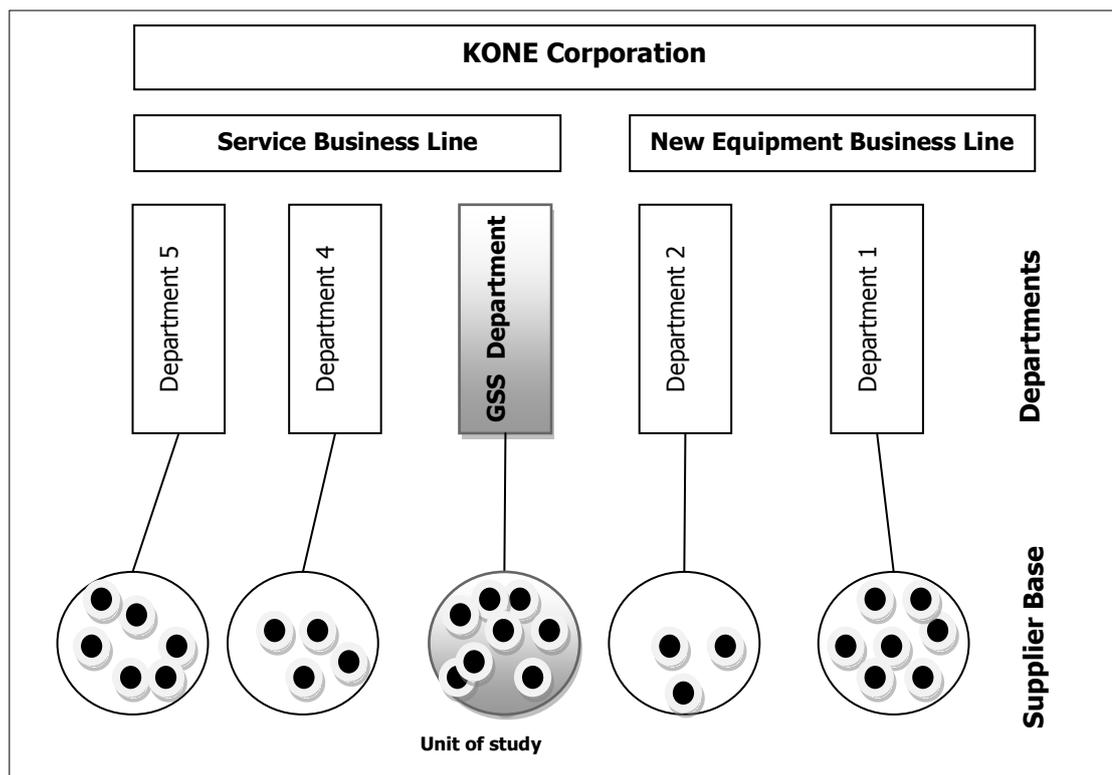


Figure 2. Scope of the Thesis.

Additionally, it is important to stress that the supplier base reduction, as subject of this Thesis, is only one key element of the supply management. Other elements, such as supplier base rationalization or supplier relations management are not scrutinized in this study, with supplier base reduction chosen as the focus area which needs further development.

Finally, there are multiple approaches of reducing the supplier base. Despite the fact that the researcher suggests in the project plan to combine both the systematic elimination and the standardization approach, this Thesis focuses on developing the process that supports the utilization of the systematic elimination approach only. The reason being is that the standardization of products is a fairly common practice at the studied department and does not require deeper learning.

#### 1.4 Structure of the Thesis

The Thesis is divided into seven Sections. The coming Section 2 presents the research methods and material. Section 3 discusses the theoretical framework of this study in which some literature and existing best practices in the field of supplier selection, supplier base reduction, and tools as well as processes for reducing the supplier base are reviewed. Section 4 provides an overview about KONE Corporation and GSS as well as it analyses the current state of GSS' Supplier Base. Section 5 builds the proposed process that could be implemented by GSS to reduce its supplier base. Section 6 tests and evaluates the proposed process as well as it provides advices on how to implement a supplier base reduction process. Finally, Section 7 provides a summary and evaluation of the study together with its initial purpose. It discusses the managerial implications and the validity and reliability of this study.

## 2 Research Method and Material

This Section describes the research method and material utilized in conducting this study. First, the methodology and the research design are discussed. Second, the data collection method together with the reliability and validity of the study are overviewed.

### 2.1 Methodology and Research Design

This Thesis uses a qualitative research strategy and applies the action research as its research approach. The qualitative research methodology was chosen because the studied business phenomenon needs deeper understanding of interactions and is subject to interpretations (Collis et al. 2009:4). Therefore, quantitative research does not seem to be appropriate since the questions in this research deal with exploratory issues, rather than frequencies or incidences.

According to Collis et al. (2009), an action research is a methodology used in applied research. The latter describes a study that is designed to apply its findings to solving a specific and existing problem. This research aims to solve a business problem encountered within a real-life context of a single company department. It aims to investigate the root causes of the problem and find an effective way of bringing about a change. Thus, the action research approach is chosen as the most appropriate research methodology. The action research cycle utilized in this Thesis is outlined in Figure 3.

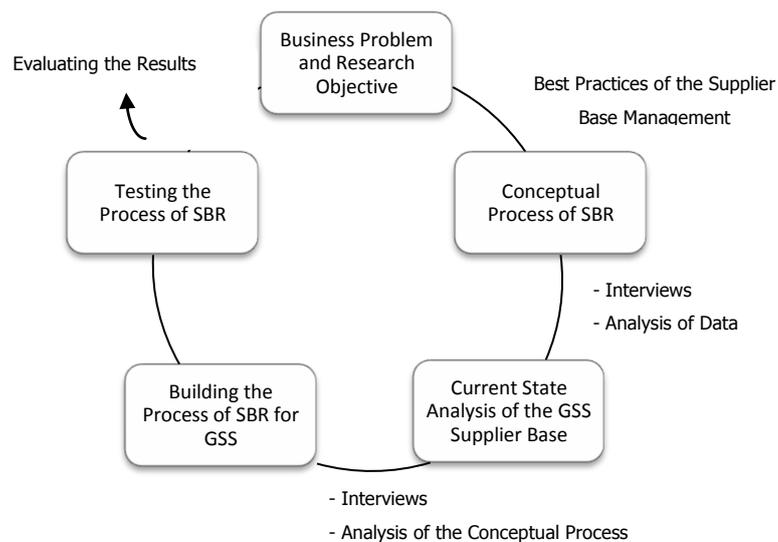


Figure 3. Action research cycle utilized in the study.

According to Quinton et al. (2006: 47), the research design means the logic that links the data to be collected (and the conclusions to be drawn) to the initial objective of study. As depicted in Figure 3, the action research cycle comprises six steps.

At the beginning of the cycle, the business problem and the research objectives are identified. In the second step, a conceptual process of the supplier base reduction is developed based on the literature and other empirical best practices. The purpose of the conceptual process is to describe the activities for conducting a supplier base reduction (SBR) initiative as well as to serve as a generic roadmap on which the proposed process is built. In the third step, different data (internal manuals, numerical data, finding from interviews) are collected and deeply analyzed in order to assess the current state of the GSS supplier base. This analysis helps in planning further actions of the SBR initiative and gives insights on how to build the proposed process for GSS. In the fourth step, multiple interviews are conducted in order to analyse the conceptual process developed in step 2. The resulting analysis is utilized to tailor the conceptual process to the GSS environment. The outcome is a proposed process of SBR that could be implemented by GSS to reduce its supplier base. In the fifth step, the proposed process is tested into practice. The researcher implements the process on a pilot scale environment. Finally, at the sixth step, the results are evaluated and recommendations suggested on how to implement the process.

## 2.2 Data Collection

Generally, there is a variety of methods in which a researcher can collect data. According to Yin (2009:102), the chosen research methodology dictates the appropriate data collection method. He argues that evidence comes from six sources: documents, archival records, interviews, direct observation, participant observation, and physical artifacts. In this Thesis, the data are collected from a combination of sources: interviews, researcher own experience, and the literature including the department manuals and numerical data.

Firstly, interviews were used to gather information on the problem, its origins, and impacts on different stakeholders. The first interviews were conducted during the exploratory phase and the writing of the proposal. They were in the form of unstructured face-to-face discussions with open-ended questions. This has helped to determine the department goal and plan the resources for the SBR project.

To conduct this project, a cross-functional team was established. It consists of six informants (including the researcher) from different units and the team was to meet once a month to discuss the problem, plan the activities and monitor the progress. This cross-functional team is referred to in this Thesis as SBR team. The interview details for the first phase are summarized in Table 1. Later in the text of this Thesis, the information captured from the interviewees is quoted and referred to by an interview number indicated in this Table.

*Table 1. Exploratory phase interviews and dates.*

Interview	Interviewee's Title	Date of Interview
1	Sourcing Manager	25.11.2011
2	Front Office Team Leader	05.12.2011
3	Purchasing Manager	12.12.2011
4	European Operations Manager	12.12.2011
5	Global Category Sourcing Manager	12.12.2012

As seen from Table 1, two individual interviews were held with two key informants (Interview 1 and 2) and a group interview was held with the department stakeholders most concerned by the SBR initiative (Interview 3, 4 and 5).

In addition to the exploratory phase interviews, a series of semi-structured interviews were conducted. During these 60 minutes long interviews, the researcher had identified topics of interest for discussion. Closed questions (yes or no questions) were avoided in order to give the interviewees the chance to present their own opinions. The interviewees were selected, first, based on their relation to the supplier base problem and, second, on their position in the organizational hierarchy. The interview details for the second phase are summarized in Table 2.

*Table 2. Semi-structured interviews and dates.*

Interview	Interviewee's Title	Date of Interview
6	European Operations Manager	2.2.2012
7	Sourcing Manager	2.2 & 29.3.2012
8	Senior Technical Specialist	2.2.2012
9	Technical Specialist 1	7.2.2012
10	Technical Specialist 2	29.2 & 29.3.2012
11	Product category Manager	28.2.2012
12	Technical Specialist 3	24.2.2012
13	Logistics Engineer	26.2.2012
14	Purchasing Team Leader	28.2.2012
15	Purchaser 1	15.1.2012
16	Purchasing Project Technician	25.1.2012
17	Purchaser 2	28.3.2012
18	Senior Data Specialist	5.4.2012
19	Front Office Team Leader	27.3 & 3.4.2012

As seen from Table 2, the interviews were held with people from different functions and holding different positions. Most of the interviewees were either directly or indirectly affected by the studied business problem.

Secondly, the researcher own experience was utilized during the research process since the researcher is a fulltime employee at the studied department and is directly involved in purchasing and strategic sourcing activities. This gave the opportunity to quickly grasp certain technical information as well as to use his existing knowledge for the purpose of this Thesis.

Thirdly, a detailed literature review was conducted in order to identify best practices related to the supplier base reduction. Academic articles from leading referenced journals and magazines constituted the substance of this review. Additionally, books and special reports related to supply chain were reviewed in order to acquire a board understanding of the topic. Finally, data from the case company's internal resource planning system (SAP) was used. The latter comprises numerical data related to purchasing, products, and suppliers. Moreover, general information related to GSS, its processes, archived statistics and reports related to supplier performance was used for the purpose of this study.

### 2.3 Reliability and Validity

Reliability and validity need to be considered in producing grounded results. According to Yin (2009), it is possible to judge the quality of any given research according to certain logical tests. These tests have been summarized in numerous textbooks and are reliability and validity (Yin 2009: 40). Generally, one of the most important elements to ensure a reliable and valid study is to develop a rigorous research design by studying the appropriate methodology. It is critically important to study the available research methods and the corresponding data collection tools in order to choose the one that best suits the study. Additionally, thoroughly describing all the research activities appears to be necessary, since without a plan, the research could take the form of random activities that are impossible to replicate, which compromises the validity and the reliability.

According to (Yin 2009: 45), reliability refers to the capability of a study to display the same results while using different data collection methods. The objective of establishing reliability is to be sure that, if a later investigator follows the same procedures as described by an earlier investigator, the later investigator should arrive at the same findings and conclusions.

As for the validity of a study, it is divided into two types of validities: internal validity and external validity. Firstly, the internal validity evaluates whether the researcher measured what he or she intended to measure, when the research was designed (Quintone et al. 2006: 129). Secondly, the external validity evaluates whether the study findings are generalised beyond the immediate case company (Yin 2009: 43). In regard to this study, the external validity would mean whether the developed supplier base reduction process is applicable to another department (within KONE) or an external company.

The researcher is employed at the case company and is responsible for the implementation of the proposed process; and since the expected results from the supplier base reduction initiative are measurable, it is possible to evaluate the reliability and validity of this study. The results and evaluation of the reliability and validity are summarized in Section 7 at the end of this Thesis.

### **3 Best Practices of the Supplier Base Management**

This Section presents the theoretical foundation of this Thesis. First, the literature related to supplier selection is discussed. Second, different theoretical studies and tools related to supplier base reduction are examined as well as various empirical supplier base reduction processes. Finally, the conceptual process of the supplier base reduction is developed.

#### **3.1 Supplier Selection**

Supplier selection is one of the most critical activities to be performed in purchasing management. Therefore, before describing in detail the supplier selection criteria, it appears of great importance to introduce the concept of *Make-Or-Buy* (MOB). Theoretically, before buying a product from an external supplier, a company needs to examine the possibility to manufacture it internally using its own resources.

##### **3.1.1 Make-Or-Buy Decision**

The Make-Or-Buy decision could be defined as the act of choosing between manufacturing a product in-house or to buy it from an external supplier. The buy side of the decision is also referred to as outsourcing (Encyclopedia of management 2006). According to Benton (2010), the MOB has become one of the most important strategic decisions companies need to make. In today's competitive market, with the surge of strategic sourcing, the concept of MOB has created heated discussions among business practitioners. Many believe that a company should own and manage most of its resources in order to ensure independency and maintain the required service performance and quality. Others see it as an opportunity to give up secondary activities in order to focus on their core businesses (Benton 2010:157). However, in both cases, there are benefits and drawbacks, and it is difficult to make such decisions in a structured and rational manner (Benton 2010:157). This is the reason why an in-depth analysis needs to be conducted at a strategic and operational level. According to Inman (2005), variables considered at the strategic level include analysis of the current and future environment. Issues like government regulation, competing firms, and market trends all have a strategic impact on the MOB decision.

According to Inman (2005), some of the most important reasons to make a product in-house are: cost concerns, need of direct control over the product property right and its quality, lack of competent or reliable suppliers, and to maintain a backup source and ensure safe supply. Conversely, the most important reasons to buy a product externally are: lack of technical expertise, insufficient capacity to produce in-house and cost concerns, and the need of small volume as well as the supplier's expertise on a specific field (Inman 2005). In practice, there are multiple options of the MOB decision. While some companies may decide to fully make or buy products; others may utilize certain arrangements with other partners. These options are summarized in Figure 4.

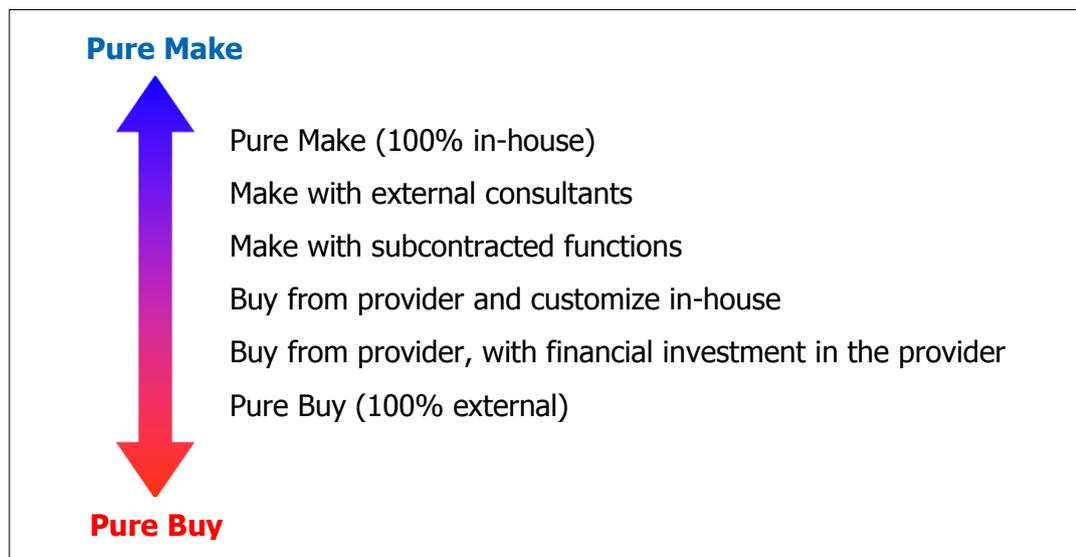


Figure 4. Options of Make-Or-Buy (Modified from Bergmann 2005:4).

As depicted in Figure 4, a company has the choice between multiple arrangements when it comes to making or buying a product. Depending on the strategic goal of the company, the latter can either make the product totally in-house using its own resources, make it internally with the help of an external consultant in the design or conception phase, subcontract (called also make-make process) the product to an external sub-constructor, buy the semi-finished product externally and customise it internally, buy the product from a fully or partially owned supplier, or regularly buy the product from an external supplier.

### 3.1.2 Criteria for Supplier Selection

Based on the MOB analysis, once a company decides to buy products externally, it then needs to search and select a supplier who best satisfies its requirements. The supplier selection decision has long been regarded of strategic importance (Carter et al. 2008: 5). Howards (1943) already discussed the importance of supplier selection in one of the very early purchasing texts. He stated: "it is probable that of all the responsibilities which may properly be said to belong to the purchasing managers, there is none important than the selection of suppliers" (Benyoucef et al. 2003:20). In recent times, the analysis of criteria for supplier selection has become even more important and has taken the attention of many business practitioners and purchasing managers (Tahriri et al. 2008:56).

This rising importance of supplier selection decision could be explained by the following factors: the increased globalization the world is witnessing today; the increased value of purchased components as percentage of total revenue for manufacturing firms (between 40 and 80% according to Beneton 2010), and the expansion of companies' supply chain in a way that it incorporates suppliers or customers that are geographically distant. More importantly, defining the key criteria for supplier selection concerns and requires the intervention of various departments within a company. In fact, the decision is extremely important because it ought to reflect the consensus of multi-actors and optimise the performance of the company as a whole but not a specific actor in the chain (Benyoucef et al. 2003:21).

Usually, the supplier selection is a multi-objective task which includes both qualitative and quantitative factors. Tahriri et al. (2008) argue that sometimes, companies are obliged to make tradeoffs between tangible and intangible factors in order to select the most convenient suppliers. For example, the quality of a product and its cost constitute a dilemma in some cases and companies are required to select the supplier who establishes a compromise between the two criteria.

In view of the fact that companies are required to ensure an efficient and continuous supply of products, defining key criteria for supplier selection appears to be of great necessity. The defined criteria will not only help the company to select new suppliers but also to evaluate the existing ones or/and, in some case, eliminate suppliers. However, it is worth mentioning that the supplier selection criteria may differ slightly from the supplier base reduction criteria (supplier elimination criteria). For example a com-

pany may select a supplier based on price and eliminate another supplier based on the amount of past purchases. The coming paragraphs present the finding of different academicians since the 1960's in respect to supplier selection criteria. Surprisingly, the literature is abundant in this field and one can easily abstract an extensive list of distinct criteria that are found to be important in the supplier selection decision.

One of the most notable studies in regards to supplier selection criteria was conducted by Dickson in 1966. Dickson created a questionnaire and sent it to 273 purchasing professionals based in companies located in the United State and Canada. Dickson wanted to identify the most important criteria of supplier selection. A total of 170 responses were received and the results of his study are summarized in Table 4.

*Table 4. Dickson's supplier selection criteria (Dickson 1966).*

Rank	Criteria	Rating	Importance
1	Quality	3.508	Extreme
2	Delivery	3.417	
3	Performance history	2.998	
4	Warranties and claim policies	2.849	Considerable
5	Production facilities and capacity	2.775	
6	Price	2.758	
7	Technical capability	2.545	
8	Financial position	2.514	
9	Procedural compliance	2.488	
10	Communication system	2.426	Average
11	Reputation and position in industry	2.412	
12	Desire for business	2.256	
13	Management and organization	2.216	
14	Operating controls	2.211	
15	Repair service	2.187	
16	Attitude	2.120	
17	Impression	2.054	
18	Packaging ability	2.009	
19	Labor relations record	2.003	
20	Geographical location	1.872	Slight
21	Amount of past business	1.597	
22	Training aids	1.537	
23	Reciprocal arrangements	0.610	

As illustrated in Table 4, Dickson identified 23 criteria and ranked them according to their importance. According to Dickson's findings, during the 60's, *quality* of the products, *on-time delivery* of the supplier, *the historical performance* of the supplier, and the *warranty* offered by the suppliers were considered as extremely important criteria for supplier selection. Surprisingly, the price criterion was only ranked number six in the list and was seen of lesser importance.

In a later study about the supplier selection criteria, Weber et al. (1991) reviewed 74 articles published between 1966 and 1990 and evaluated the occurrence (importance) of the criteria studied earlier by Dickson. The authors found that the 23 criteria were still discussed in most of the articles; however, they noticed that the importance of the criteria has changed due to changes in the business environment and management theories. They interestingly noted that the criterion *price*, *delivery*, and *quality* are the most treated in the literature (were ranked 1, 2 and 3 respectively). These three criteria were ranked 6, 2 and 1 in Dickson's ranking. Furthermore, the criterion *geographical location* which appeared in the 20<sup>th</sup> position in 1966 (not important in Dickson's study) has become of extreme importance in the 90's. This could be explained by the appearance of the Just-in-time (JIT) manufacturing practices that stresses the importance of supplier's location in ensuring faster deliveries. Actually, the emergence of the JIT concept has changed buyers' expectations from suppliers and has imposed a reordering of criteria by which suppliers are selected (Weber et al. 2001:3). Under the JIT concept, the price is not as important as the quality and the buyer-supplier relationship is not necessarily cost-adversarial, rather it is based on trust, reliability, and partnership.

Another important finding of Weber's study was that several criteria have received little attention in the studied period (1966-1990). For instance, the authors found that criterion *warranties and claim policies*, *communication system*, *impression*, *labour relations record*, and *amount of past business* have received no or very little attention.

In a more recent study, Zhang et al. (2003) reviewed 49 articles published between 1991 and 2003 in order to investigate further the important supplier selection criteria. The study was done based on the 23 criteria identified earlier by Dickson and studied later by Weber (as discussed above). The researchers found that the criterion *price*, *quality*, and *on-time delivery* have received the greatest amount of attention.

Most recently, there has been a noticeable change in the way companies approach their suppliers. Many companies started to realise that the cost-based buyer-supplier relationship undermines the potential development of suppliers and creates an adversarial relationship where each partner tries to maximise his own benefit (Benton 2010: 163). Researchers argue that when the relationship is based on partnership, trust, long-term agreement and mutual interest, the overall benefits far exceed the savings generated from the cost-based buying approach. Consequently, this new type of relationship privileges selection criteria such as capacity of co-operation, communication system, commitment, and flexibility.

In general, many supplier selection criteria were studied in the literature. While some criteria were found to be static, others continue to evolve over time depending on the trends in the business environment. It is important to note that relevant supplier selection criteria for a given company are not necessarily relevant to another one. The company's business activity and the strategic management decision usually dictate what and on which basis suppliers are selected.

### 3.2 Supplier Base Reduction

As mentioned earlier, the supplier base reduction could be defined as the process and activities that consist of reducing the number of suppliers being registered in a company's database (Ogden 2003a:4). According to business practitioners, having the correct number of suppliers cannot arbitrarily be decided upon. On the contrary, companies are required to go through a formal process to arrive at their targeted supplier base numbers (Carter et al. 2008:5). Such a process needs to be formed in accordance with the company's structure and business strategy and should support the purchasing strategy. One of the challenges in defining a purchasing strategy is to determine the number of suppliers a company should use for the supply of a particular product. For this reason, the *Single Source versus Multiple Sources* decision is considered as a prerequisite for defining a winning purchasing strategy.

### 3.2.1 Single Source Vs Multiple Sources

Much debate has taken place concerning the number of suppliers a company should utilize. One side of the debate stands for the *multiple-sources* approach. This involves the use of two or more suppliers to purchase a product. The other side of the debate is in favour of the *single-source* approach, in which only one supplier is utilized to supply a particular product (Benton 2010:175). In both approaches, the objective is to ensure a continuous, an efficient and quality supply of products; however what differs is the number of suppliers to utilize.

Traditionally, companies used multi-sourcing as a way to ensure safe and cheap supply of products but the main arguments in favor of this approach are based on the fact that having many suppliers encourages competition among them which reduces the prices. In addition, when buyer-supplier relationships lacks trust, the purchasing company tries to protect itself from any supply failures related to lead-time, quantity and quality by having multiple sources for the same product.

Recently, there has been a shift from the traditional adversarial buyer-supplier relationship to the use of a limited number of qualified suppliers with deeper relationship (Axelsson et al. 2005:62). The documented benefits of single-sourcing such as quantity discounts from order consolidation, reduced management efforts, and reduced supplier base can explain this trend.

The strategic importance of single or multiple sourcing has been extensively discussed in the literature and many authors have studied the advantages and disadvantages of both strategies. To list a few, Table 3 summarizes the advantages and disadvantages of single versus multiple sourcing strategies.

Table 3. Advantages and disadvantages of single Vs multiple sourcing strategy (Costantino et al. 2008).

	Single Sourcing	Multiple Sourcing
<i>Advantages</i>	<ul style="list-style-type: none"> <li>• Partnership between buyers and suppliers allows cooperation, shared benefits and long-term relationship based on high levels of trust</li> <li>• Reduction of risk of opportunistic behavior</li> <li>• Large commitment of the supplier that is willing to invest in new facilities or new technology</li> <li>• Lower purchase price resulting from reduced production costs, due to better knowledge of the manufacturing process by supplier and achieved economies of scale (faster learning curve)</li> </ul>	<ul style="list-style-type: none"> <li>• Alternative sources of materials in case of delivery stoppage by a supplier</li> <li>• Reduced probability of bottlenecks due to insufficient production capacity to meet peak demand</li> <li>• Increased competition among suppliers leads to better quality, price, delivery, product innovation and buyer's negotiation power</li> <li>• More flexibility to react to unexpected events that could endanger supplier's capacity</li> </ul>
<i>Disadvantages</i>	<ul style="list-style-type: none"> <li>• Great dependency between the buyer and the supplier</li> <li>• Increased vulnerability of supply</li> <li>• Increased risk of supply interruption</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced efforts by supplier to match buyer's requirements</li> <li>• Higher costs for the purchasing organization (greater number of orders, telephone calls, records)</li> <li>• Longer learning curve</li> </ul>

As stated in Table 3, both single and multiple sourcing strategies present benefits and drawbacks. Noticeably, the advantages of multiple sourcing can be viewed as the disadvantage of single sourcing and vice versa. Benton (2010) suggests a tactic that would help companies to obtain advantages of both. This tactic consists on applying significant pressure to single-source suppliers or to provide significant certainty to suppliers in a multiple-sourcing environment. According to Benton (2010), providing long-term contract can be viewed as a reward and the short-term contract as punishment. He argues that an extended contract length can provide the needed stability to produce single-source results while still using more than one supplier.

According to Albronda et al. (2001:4), choosing between single-source or multiple-sources need to be based on a thorough purchasing portfolio analysis. The latter could be defined as the process of analyzing, classifying and differentiating between important and less important purchases. In such a process, the total purchasing volume of a company is analysed and divided per product group or supply market. Many purchasing portfolio models have been developed in order to help companies to maximise the supply security and to develop differentiated purchasing strategies, but the most popular model was developed by Peter Kraljic in 1983. In this model, Kraljic (1983) created a portfolio matrix that classifies products on the basis of two dimensions: profit impact and supply risk and each dimension has two possible values: low and high. The resulting 2x2 matrix consists of four quadrants as shown in Figure 5.

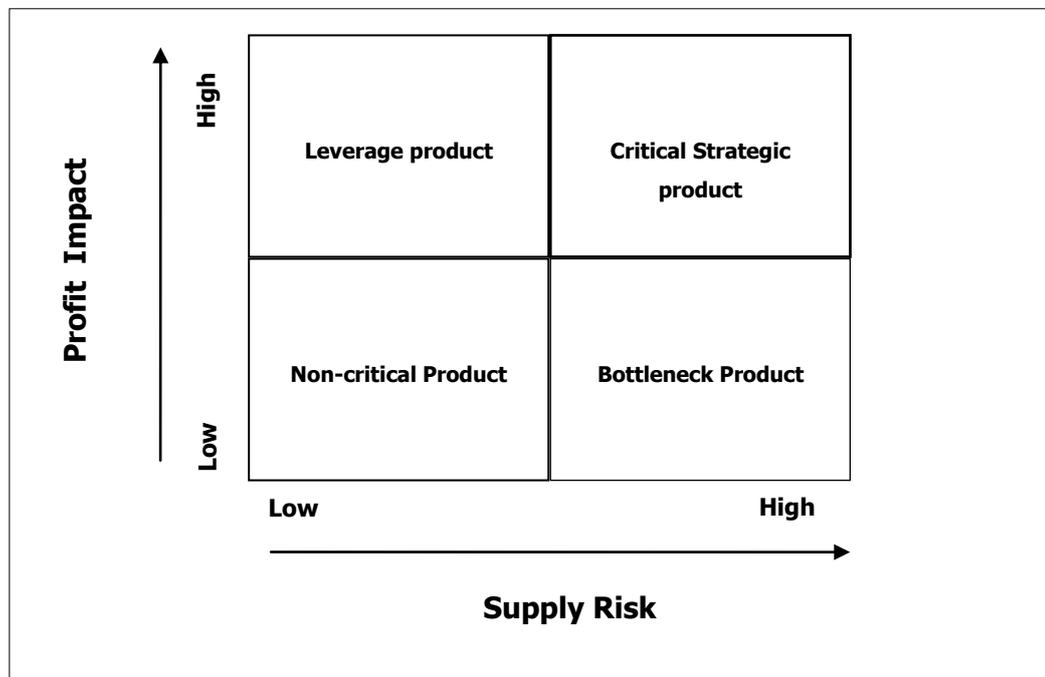


Figure 5. Kraljic's product purchasing classification matrix (Kraljic 1983).

As it can be seen from Figure 5, Kraljic identified four product categories for which a set of differentiated strategies can be identified. Depending on the category of the product, purchasing managers can decide the minimum required number of suppliers and other purchasing approaches. First, a strategic product is a product that is critical for a buyer and is characterized by a high supply risk caused by scarcity or other factors. Second, leverage product is a product that generates great profit to a buyer and is readily available from different suppliers. With these products, it is easy to switch suppliers since the quality is standard.

Third, bottleneck product is characterized by a high supply risk since it is acquired from only one supplier or its delivery is unreliable and has a limited impact in the profit. Karljic recommends in this case over ordering when the product is available and looking for more than one supplier (multi-sourcing). Forth, non-critical product is a product that is easy to buy and also has a low impact on profit. It is recommended to reduce time and money spent on these products using standardization or optimizing inventory levels.

### 3.2.2 The Importance of the Supplier Base Reduction

Regardless of the final decision concerning the single source versus multiple-sources analysis, business practitioners recommend reducing the overall supplier base (Goffin et al. 1997; Ogden 2003b). Lately, there has been a great debate about the SBR and a search in the literature quickly confirms this tendency. In his paper named *managing suppliers: when fewer can mean more*, Goffin et al. (1997) gave an empirical evidence of this trend in the UK manufacturing companies and found that 201 companies from different industrial sectors cut their supplier base by 9 to 35 per cent. Evidence for this trend comes also from a number of examples from individual companies. For instance, Xerox cut its supplier base from 5000 to 500 suppliers; Motorola reduced the number of its suppliers from 10000 to 3000; and Carillion announced in 2010 that it was cutting its supplier base from 25000 to 5000 (Goffin et al. 1997: 5; Millington 2011:28).

Conceptually, the perceived benefits of the SBR could be assimilated to the benefits of the single-sourcing approach since the latter implies the use of limited number of suppliers. Taken to its limits, the SBR will inevitably lead to a single-sourcing policy and the reverse is true (Jessop 1997:45). But what are the empirical benefits of SBR? A number of studies have looked at this and it seems that the main effect of a reduced supplier base is that it leaves the buyer more time to develop closer relationships with the remaining suppliers (Goffin et al. 1997:4; Jessop 1997:45). Jessop (1997) argues that working with a smaller number of suppliers reduces the costs and increases the quality and innovation which ultimately leads to a competitive advantage for companies. In his empirical study of ten companies that have conducted a SBR, Ogden (2003a) identified many benefits. Some of these benefits are: (1) increased access to supplier's technology and innovation, (2) increased quality, (3) decreased supplier management costs and efforts, (4) increased leverage through volume consolidation, (5) better buyer-supplier relationship, (6) reduced inventory costs and unit price, (7)

enhanced information sharing, (8) reduced long-term uncertainty, and finally (9) increased supplier's responsiveness. The above mentioned benefits seem to go in line with many other findings. A summary of these findings is listed in Table 4.

*Table 4. Supplier base reduction benefits.*

Benefits of a Supplier Base Reduction	Reference
Closer and better supplier relationships	Ellram (1991); Goffin et al. (1997)
Increased leverage	Benton (2010)
Improved quality	Axelsson et al. (2006)
Increased supplier innovation and R&D	Sollish et al. (2011)

As examined earlier and seen from Table 4, the literature provides evidence of the trend towards smaller supplier base and clearly depicts the benefits of such initiative, but it does not thoroughly describe processes or verified methods for reducing successfully the supplier base.

### 3.2.3 Barriers and Success Factors of SBR initiative

Before implementing any SBR initiative, it is important for companies to examine first the existing limitation and the critical success factors. Firstly, among the barriers that prevent a SBR initiative, Porter (1997) found that reducing the number of suppliers reduces the competition among a company's suppliers rather than enhancing it. He argues that price reduction comes when the competition is intense. Furthermore, he stresses that unless a company has a well defined supplier evaluation system and displays readiness to reward selected supplier with long-term contract, the SBR benefits are difficult to achieve. Similarly, Goffin et al. (1991) argue that a closer buyer-supplier relationship, which is one of the main benefits of reducing the number of suppliers, brings sometimes drawbacks. They found that among the companies that conducted a SBR, one company's purchasing manager was particularly concerned about the closer buyer-supplier partnership that the SBR has brought. This manager stated: "it makes little sense for our company to enter into long-term contracts with suppliers on commodities because of the possible downward market fluctuations". Other business practitioners argue that the benefits from a SBR initiative are not easily achievable and very rarely measurable. They concluded that many companies are reducing the number of

suppliers just for the sake of doing it and that they neglect the long-term implications of such initiative (Goffin et al. 1997:10).

As for the success factors, many business practitioners agree on the importance of some elements for conducting successfully a SBR initiative. This includes information system, cross-functional team, time pressure, selection of the right supplier, good communication, key management support, and a well-thought and communicated strategy (Carter et al. 2008; Goffin et al. 1997; Ogden 2006; Ogden 2003b). In Ogden’s notable study (2006) on companies that have reduced the number of suppliers, case study respondents were asked to identify critical success factors of the SBR projects in which they have been involved. Overall, Ogden identified 20 success factors. Table 5 summarizes the most important ones.

*Table 5. Supplier base reduction critical success factors (modified from Ogden 2006).*

Critical Success Factors	Importance
Good information system	10
Cross-functional team	9
Selecting the right supplier	7
Good Communication during the project	5
Win-win relationships	4
Key management support	4

As shown in Table 5, successful SBR projects depend before all on good information systems. The latter allow companies to gather historical information regarding past purchases, suppliers, prices, and every other data necessary for conducting preliminary analysis and on which decisions on what and how to eliminate supplier are made. Ogden argues therefore that good information systems are a prerequisite to effective SBR initiatives. According to Ogden (2006), the second most important success factor is the cross-functional team. He argues that getting inputs and securing the participation of other departments is sometimes critically important for the implementation phase of the project. For example, finance can help to validate the savings realised from the initiative or capture data for the initial analysis. Generally, stakeholders are likely to approve changes when they are initially educated about it and when they are given the opportunity to influence or participate in the change.

Another important success factor is the correct selection of suppliers. Before proceeding with the supplier reduction, it is of prime importance to identify supplier selection criteria that would help the company to successfully select suppliers based on these criteria. Ogden (2006) argues that when shifting larger volumes to fewer suppliers, companies need to ensure that the selected suppliers have the capacity and capability to support larger volumes and within the expected requirements in terms of quality and lead-time. Good communication with key stakeholders is another important success factor of SBR project. It is essential that project objectives and benefits are communicated throughout the company. Moreover, the changes that result from the SBR such as new ordering process or new suppliers list need to be communicated to internal users directly or indirectly affected by the initiative.

The fifth most important success factor in Ogden's study (2006) was the win-win relationships with the suppliers. Five of the ten companies conducted the SBR in order to form closer relationships where mutual benefits are shared between the buyer and the suppliers. Ogden (2006) argues that just reducing the supplier base without establishing contractual relationships with suppliers, could disrupt the supply of products. As discussed earlier, granting long-term contract is perceived as a reward by suppliers and enhance commitment as well as trust between both parties.

The last critical success factor in Ogden's study (2006) was the key-management support to the SBR initiative. In fact, to avoid any blockage during the implementation process, Ogden suggests involving early enough the key decision makers. These people according to Ogden are not necessarily top managers or manager directly concerned with the SBR but manager with influence. In one of the studied case companies, the involved individuals in the SBR project were believed to be the legitimate spokespeople in name but it was revealed later on that the true decision makers were not involved which impacted the process and induced unnecessary delays and efforts.

Other business practitioners argue that the SBR should be seen as an investment since the initiative requires financial resources or involves decisions with considerable effects on the company's financial situation. They conclude that having the key management involved is more than necessary for the success of the initiative (Jessop 1997; Bernstein 2005).

### 3.3 Tools for Reducing the Supplier Base

As soon as the problems of a large supplier base are identified, a company needs to use the appropriate tools and opt for the most convenient approach to reduce the number of suppliers. To be able to undertake a SBR initiative, a company typically conducts the *spend analysis* in order to determine where to focus its efforts and define the supplier base reduction criteria and approach.

#### 3.3.1 Spend Analysis

The spend analysis is viewed as the first tactical step of a SBR initiative. It is defined as the process of aggregating, cleansing and analyzing corporate spending data in order to reduce costs and improve operational performance (Aberdeen Group 2005:7). In other words, the spend analysis is the process designed to find out how much a company spends and with whom and for what products or services (Makhija 2006:12). Generally, the spend analysis is used not only for decisions regarding the supplier reduction but also for decisions relating to the supply chain management as whole or to support strategic sourcing activities and decisions. According to Aberdeen Group study (2004), the spend data analysis allows companies to achieve the following benefits:

- Reduce in material costs by 2% to 12% through informed sourcing
- Eliminate duplicate suppliers
- Reduction of off-contract spending by 50%
- Cut excess stocks by 50%
- Lower inventory costs by 5% to 50%
- Decrease the redundant or unnecessary part introductions (Aberdeen Group 2004: 10).

The Aberdeen group study (2004) examined the spend data management strategies, processes and systems of 157 companies worldwide over a three year period. While the study provided clear evidence of the benefits of the spend analysis, only a fraction of the respondent companies truly understood how much they spend by product or supplier.

According to Sollish et al. (2011), a successful spend analysis is characterized by three key steps. Figure 6 illustrates these processes.

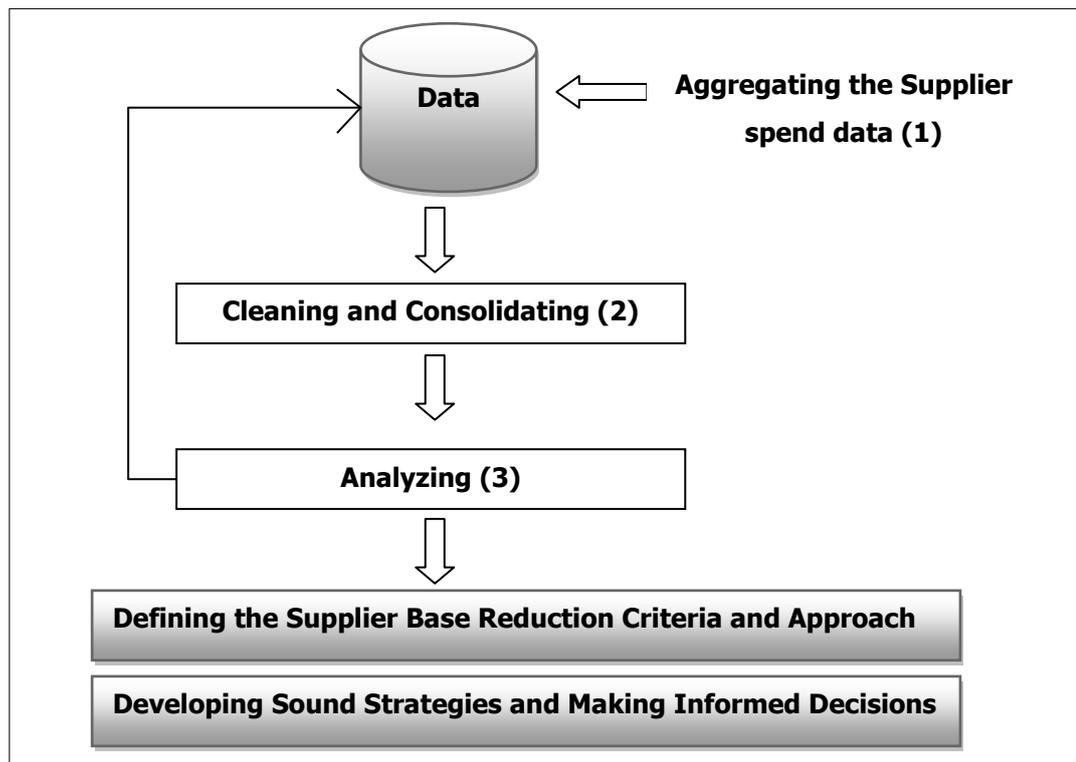


Figure 6. The spend analysis process and outcome.

As shown in Figure 6, the first step consist on aggregating the spend data. Sometimes, companies have decentralised or even non-computerized purchasing systems which require significant efforts and time to collect the information. In such a situation, data can be collected from the account payable systems, suppliers, expense reporting tool or from company's purchasing cards (PCard). The second step consists on cleansing and eliminating duplicate entries for suppliers, standardizing supplier names (for example, IBM. versus International Business Machine), and removing unnecessary or wrong information. Once the spend data has been collected and cleansed, the analysis can begin. The proper execution of spend analysis can reveal very important information such as the number of suppliers, the purchasing volume per supplier, the number of material per supplier or the number of suppliers used for a product category, and the historical consumption figures per product or group of product. This information could be used to determine how to capitalize buying power, with what suppliers, and how to develop or eliminate suppliers.

### 3.3.2 Criteria for Supplier Base Reduction

On the basis of the spend analysis, and if it is clear to proceed with a reduction of the supplier base, a company needs to identify the criteria on which the suppliers for elimination will be targeted. However, as studied earlier in Sub section 3.1.2, the supplier selection is a complex and demanding issue that has no real correct answer. Each firm ought to define and weight the criteria that are most relevant to its specific business environment and strategic goals.

As far as the supplier reduction initiative is concerned, it is of prime importance to make the difference between the criteria for selecting new suppliers and the criteria for eliminating existing suppliers. Since this study focuses on the reduction of suppliers using the supplier base reduction criteria (referred to in the coming Section as supplier elimination criteria), it does not focus on the process to target new suppliers. In practice, the major difference is that some of the criteria that are heavily important for eliminating existing suppliers (amount of past purchases, historical performance, quality) cannot easily be applied to select new suppliers. Conversely, some of the criteria for selecting new suppliers can be applied when eliminating existing suppliers. But despite this difference, business practitioner strongly advice to define clearly both the supplier elimination and supplier selection criteria since phasing out suppliers implies phasing in new suppliers or redirecting purchases to other existing suppliers.

The literature review did not yield much result in regard to the supplier reduction criteria or process. There is a clear void in the literature in this respect, but among the few criteria mentioned in the literature (Carter et al. 2008; Ogden 2003; Goffin et al. 1997), the following can be distinguished:

- The amount of past purchases (spend)
- The availability of internal information
- Historical quality records and service performance
- Trust and commitment
- Supplier's development capabilities.

In his empirical study about the SBR process of one case company, Pryjma (2011) identified 8 criteria for eliminating suppliers. These criteria are listed below:

- Geographic location
- Supplier yearly budget
- Number of production units supplied
- Number of items purchased
- Volume of orders
- Staff opinion
- Value added by supplier
- Standard or specific product (Pryjma 2011: 43)

From Pryjma's criteria, it can be noticed that some of the criteria are tangible and others are intangible. For instance, the criterion *value added by supplier* seems to be rather subjective which may well bias the supplier elimination process. Pryjma identifies these criteria based on interviews with different stakeholders from the studied company and was able to implement a systematic elimination of suppliers.

Depending on the state of a company's supplier base, some criteria could lead to a systematic elimination of suppliers and, sometimes, this could reduce the number of suppliers by up to 50% (Millington 2011:28). For example, if the first and most important elimination criterion for a given company is Supplier yearly budget < 500 EUR, it would be easy to target suppliers for elimination and therefore eliminate all the suppliers with whom the company purchased less than 500 EUR. Not surprisingly, later on, the process becomes more complicated, time consuming and more dependent on the inputs of multiple stakeholders. In the forthcoming Subsection, the approaches of reducing the supplier base are further described.

### 3.3.3 Approaches of Reducing the Supplier Base

In his detailed analysis of 10 companies that undertook a supplier base reduction initiative, Ogden (2003) has identified three ways through which a supplier base can be reduced. These approaches are (1) systematic elimination, (2) standardization, and (3) tiering.

Firstly, *systematic elimination* is a method in which suppliers are eliminated based on clearly defined supplier reduction criteria. In practice, once these criteria are applied to a supplier database, it is possible to distinguish suppliers to be kept in the database from the ones to be eliminated (Pryjma 2011: 22). Research shows that most companies tend to choose the systematic elimination option (Ogden 2003b; Carter et al. 2008). In his study, Ogden (2003b) observed that some companies suddenly eliminated suppliers from the supply base while others preferred to take a gradual approach. Both elimination options are illustrated in Figure 7.

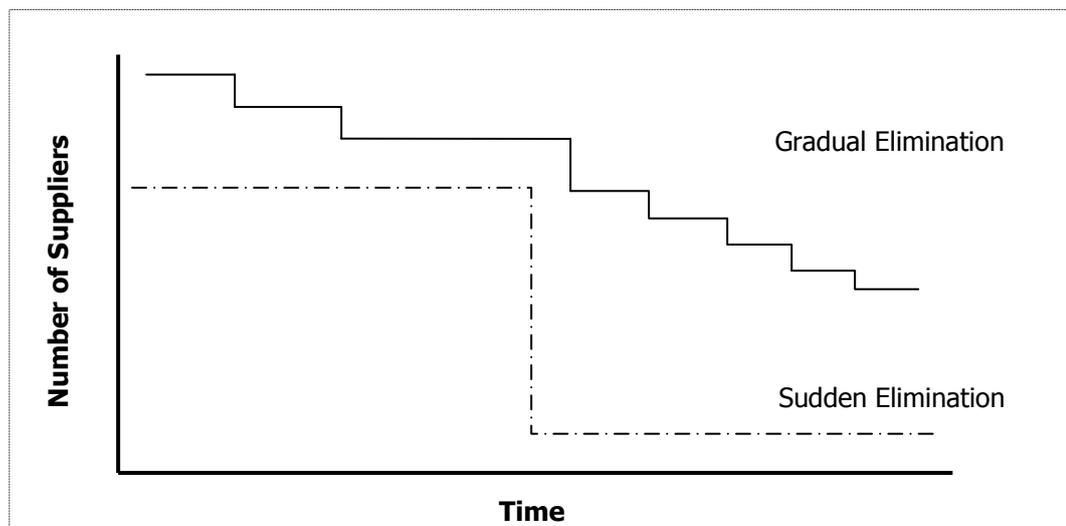


Figure 7. Graphical representation of supplier base reduction (Modified from Ogden 2003).

As seen from Figure 7, the gradual elimination approach consists on reducing the number of suppliers over an extended period of time. On the other hand, the sudden elimination approach reduces the number of supplier in a short period of time.

Depending on the characteristics of the supplier base, its degree of complication, the type of the products involved, companies can choose the approach that best suits their goals. Millington (2011) argues that, sometimes, the systematic elimination involves nothing more than cleansing a company's supplier database from duplicates, bankrupt suppliers, unused suppliers, or inactive suppliers. He adds that the large number of suppliers that many companies have in their database may be misleading and quiet often removing duplicate, errors and one-time purchases could slash down the supplier base by 50%. He, therefore, concludes that one of the pre-requisites for reducing the supplier base is to have access to accurate data that reflects the current state of the

supplier base. At most other times, the systematic elimination requires deep analysis of the supplier base and demands much time and efforts. Generally, business practitioners suggest not proceeding with sudden elimination of suppliers. Instead, they recommend implementing a SBR over a relatively long period of time in order to avoid a supply risk and to allow selected suppliers time to increase their capabilities. As a result, gradually phasing out suppliers and gradually phasing in new suppliers prevent any negative impact on the business or supply disruption.

Secondly, *standardization* is a technique used to replace several products by a single product that has all the functionalities of the product it replaces (Ogden 2003: 131). The approach is more complicated and time consuming than the systematic elimination as it requires the collaboration of multiple departments within the company (sourcing, R&D, and technical support). According to Sollish et al. (2011), quite often companies have many products or components with minor differences that are destined for similar use. Typically, companies acquire products dedicated to a particular need, e.g screw (length 10 mm), and when later on a similar need arises for another screw (length 11 mm), they overlook the similar available product (10mm screw) and possibly proceed with a new purchasing from a different supplier. If the 10 mm screw could be used instead of the 11 mm screw then in such a situation, there is an opportunity to consolidate volume to a single supplier and achieve price reduction while eliminating suppliers.

Thirdly, *tiering* consists of outsourcing the supplier management to important suppliers. The concept was first applied in the automotive industry during the 1990's whereby automakers deliberately assigned responsibility for modules and systems to so-called 1st tier suppliers. The latter acted as integrators, with the task of managing 2nd tier suppliers and thus improving quality and efficiency. To put differently, tiering allows companies to deal with a smaller number of suppliers and to invest enough time and efforts on developing them. The approach is shown in Figure 8.

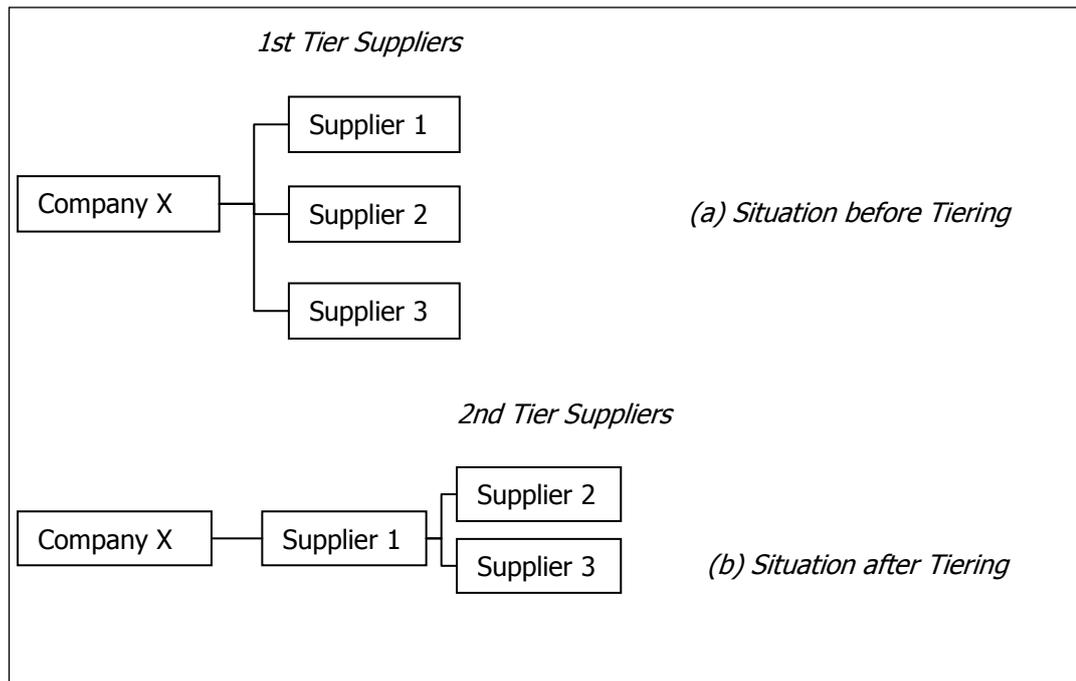


Figure 8. The tiering approach (modified from Pryjma 2011).

As illustrated in Figure 8, there are two possible situations. In situation (a), the company X has three suppliers in its base and has to manage directly the three suppliers to ensure an efficient supply of products. In situation (b), after tiering, the company has transferred the management of supplier 2 and 3 to its supplier 1. In this situation, supplier 1 becomes the 1<sup>st</sup> tier supplier and supplier 2 and 3 become 2nd tier suppliers. In some situations, this does not necessarily reduce the number of suppliers since supplier 2 and 3 are not systematically eliminated, but it reduces the number of relationships that the company must manage.

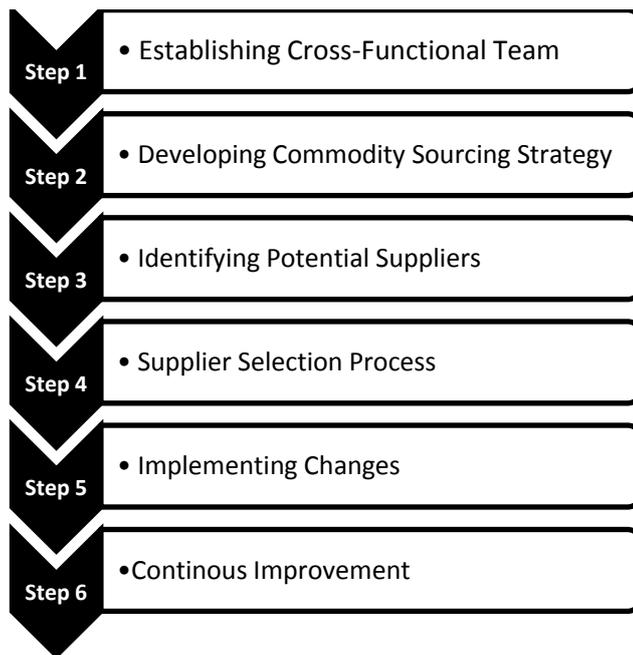
The above studied approaches (methods) of supplier base reduction are not mutually exclusive, and a company may use a combined approach; for example it could use the systematic elimination in a preliminary stage of the SBR initiative and then use the standardization approach.

### 3.4 Process of Supplier Base Reduction

This Subsection, examines two empirical processes found from the best practices. These processes are combined together with other findings from the literature to derive a conceptual process of the SBR. This conceptual process serves as the starting point in building the proposed process of the SBR for GSS.

#### 3.4.1 Supplier Base Reduction Process by Carter et al.

In an attempt to develop a process for a SBR initiative, Carter et al. (2008) conducted an in-depth analysis of ten case studies in companies that reduced their supplier bases. Carter et al. (2008) observed that, while these companies took different approaches, there has been a similarity of the processes they utilised to reduce the number of suppliers. The researcher have thus analyzed these similarities and developed a supplier base reduction process as outlined in Figure 9.



*Figure 9. Supplier base reduction process by Carter et al. (adapted from Carter et al. 2008:15).*

As depicted in Figure 9, the first process consists of six major steps: establishing cross-functional team, developing commodity sourcing strategy, identifying potential suppliers, supplier selection process, implementing changes, and continuous improvement.

First, Carter et al. (2008) observed that most of the studied companies have established a cross-functional team as the first step of a SBR initiative. The aim of the cross-functional team was to obtain inputs and collaboration from relevant stakeholders that are necessary for the implementation phase. Second, most of the studied companies developed a commodity sourcing strategy prior to the implementation phase. This was done on the basis of rigorous spend analysis and corporate goals reflection. As mentioned earlier when discussing the success factors of a SBR, reducing the number of suppliers needs to be taken strategically but not as a quick fix. The third step consists of identifying a list of potentially qualified suppliers based on the defined criteria. The fourth step consists of narrowing down the list of potential suppliers and selecting the suppliers that match the company's requirements. The fifth step of SBR initiative was the actual implementation of changes. According to Carter et al. (2008: 20), this step is the most critical and time consuming of all. During this phase, suppliers are eliminated and others selected, and if the transition period does not allow a smooth transfer of responsibilities from the old to the new suppliers, the company risks disrupting its operations. The final step consists of benchmarking and measuring the impact of the SBR initiative on the purchasing prices, the supplier relationships and the company's supply operations as a whole.

The analysis of this process reveals several important findings. Firstly, it describes broadly the steps to be taken when reducing a supplier base, but does not provide detailed instructions or activities on how to perform each step. Secondly, the process emphasizes the supplier selection of new suppliers, but does not suggest any method of targeting suppliers for elimination. In fact, having a short-list of candidate suppliers for elimination is a pre-requisite for implementing this process, whereas in practice determining which suppliers should be eliminated is often one of the most challenging steps in the SBR initiative.

To summarize, this first process provides a general view on how to conduct a SBR initiative, but does not tactically describe all the necessary activities to successfully implement the SBR.

### 3.4.2 Supplier Base Reduction Process by Pryjma

Pryjma (2011) develops a SBR process for a single case study company. In his study, Pryjma aims, first, at targeting suppliers for elimination by using clearly defined criteria; and second, proceeds with the elimination using a systematic and repeatable process. Pryjma's process is shown in Figure 10.

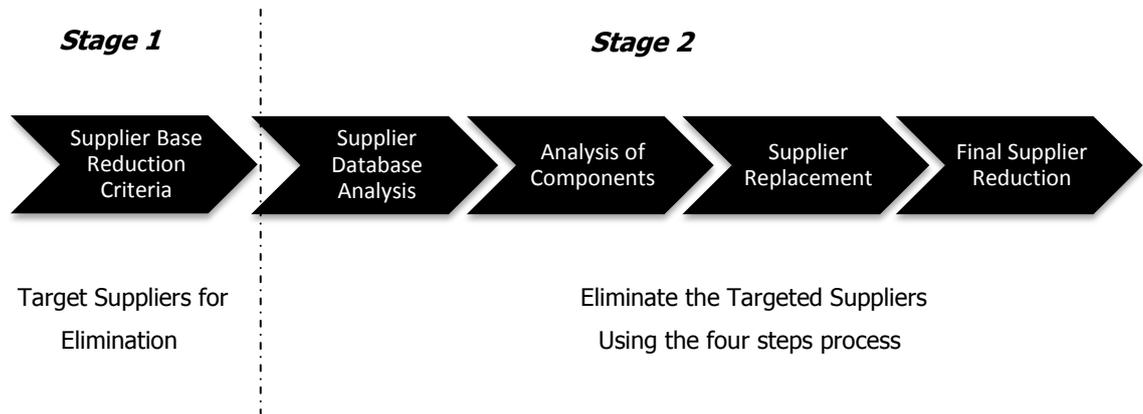


Figure 10. Supplier base reduction process by Pryjma (modified from Pryjma 2011: 48).

As seen in Figure 10, this process consists of two major stages. At Stage 1, the supplier base reduction criteria are thoroughly defined which would allow a methodical differentiation between suppliers to be maintained in the supplier base from those to be eliminated. At Stage 2, he develops a four-step process to eliminate the targeted suppliers.

Firstly, during the supplier database analysis step, Pryjma (2011) suggests analyzing the company's supplier base in order to determine the scope of the SBR initiative. Since the company has several divisions and multiple component categories, he limits the scope of his actions to only one division which resulted in a sample of 60 suppliers. Once the scope is limited, Pryjma (2011) applies the SBR criteria developed in Stage 1 to identify the candidate supplier for elimination. Out of the 60 suppliers, 20 suppliers were targeted for elimination. Secondly, once the targeted suppliers for elimination are identified, Pryjma (2011) proceeds with the analysis of the components for replacement.

Thirdly, during the supplier replacement step, Pryjma (2011) selects new suppliers based on the opposite criteria to those used to target the suppliers for elimination. Additionally, Pryjma (2011) approves his selection by referring to the suppliers' past performance in terms of its delivery accuracy and quality. After identifying the replacement supplier, technical specifications and request for quotations are sent. After receiving and accepting the offers, the new supplier is approved. Finally, in the fourth step, the eliminated suppliers are removed completely from the database, and the process should be documented for further use.

Based on Pryjma's process, it can be seen that special emphasis is put on the tactical side of the SBR initiative. Additionally, as opposed to the first process, Pryjma's process advances the method of targeting suppliers for elimination. Furthermore, it describes methodically some activities linked to the supplier reduction. However, as opposed to the first process, it does not provide a holistic roadmap to the entire process. This could be explained by the fact that Pryjma's process was developed on the basis of a single case company and tailored accordingly, whereas the first process was developed on the basis of multiple case companies.

To summarize, this second process complements the void found in the first process, and combining both processes together with other findings from the literature can generate a winning conceptual process for reducing the supplier base.

### 3.4.3 Conceptual Process of SBR

Using the findings from the literature and combining the processes described earlier, a combined process was developed in this study for building the proposed process to the case company. Figure 11 depicts the resulting conceptual process of a SBR.

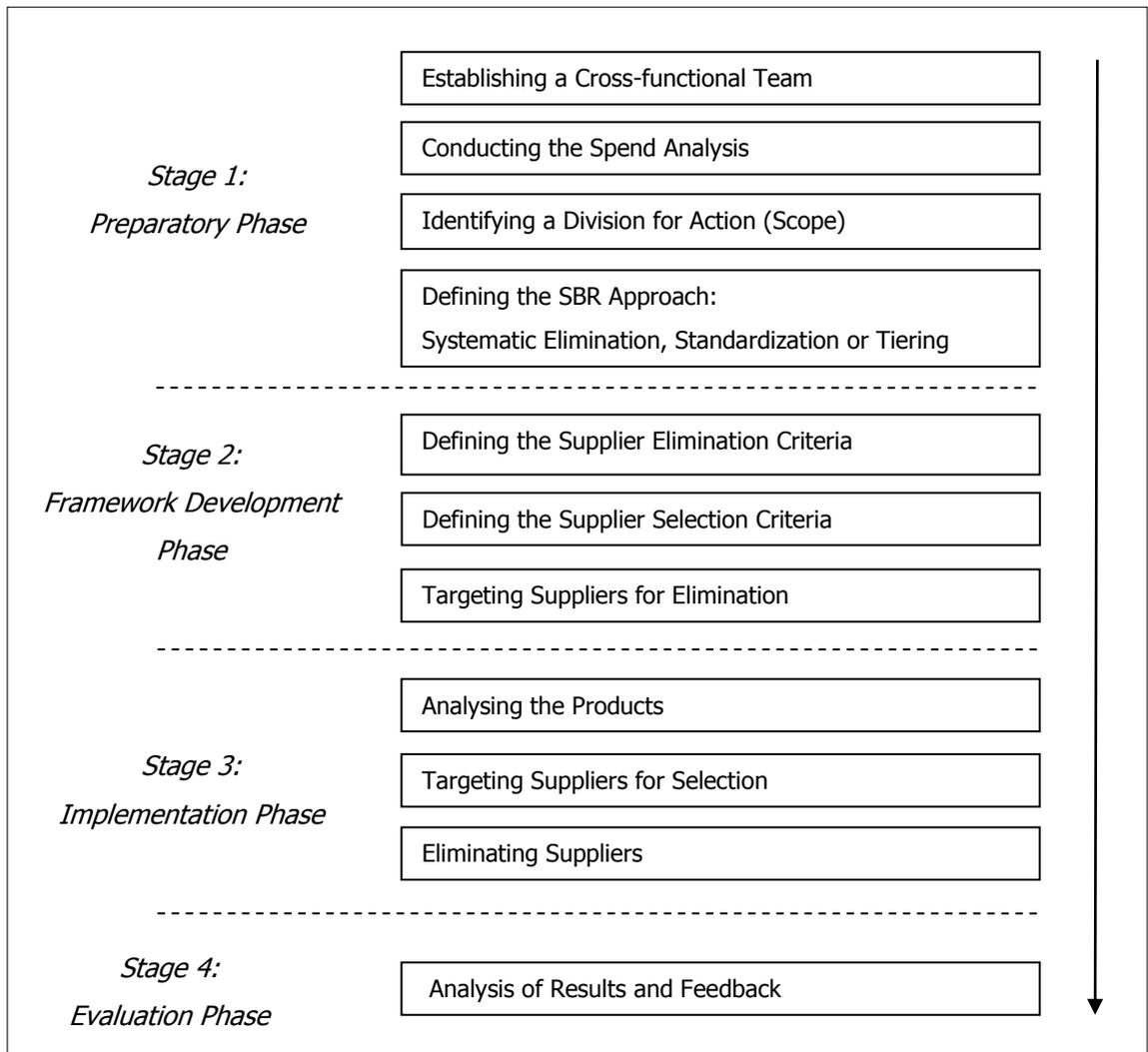


Figure 11. The conceptual process of a supplier base reduction initiative.

As depicted in Figure 11, the combined process model consists of four major stages: (1) preparatory phase, (2) framework development phase, (3) implementation phase, and (4) evaluation phase.

Firstly, the preparatory phase entails establishing a cross-functional team, conducting the spend analysis, and selecting an appropriate SBR approach. The goal of this phase is to deduce a convenient project plan and define further steps and activities.

Secondly, the framework development phase is concerned with the supplier base reduction and supplier selection criteria. The goal here is to target suppliers for elimination and identify replacement suppliers. Thirdly, the implementation phase consists of analysing the products to be replaced and eliminating the targeted suppliers. The goal of this step is to make sure that no supplier is eliminated, unless a new source is found for the corresponding products, or unless agreed otherwise with other stakeholders or dictated by the spend analysis. Fourthly, the evaluation stage consists of evaluating the results of the SBR initiative and feeding back the results to the cross-functional team.

It is important to remind that in each phase, a set of steps and sub-steps needs to be completed in order to succeed in reducing the supplier base. However, some steps may be irrelevant for certain situations and can, therefore, be skipped.

To summarize, in this Section, the best practices related to the supplier selection and supplier base reduction as well as various tools for reducing the supplier base were examined. Additionally, two empirical SBR processes were studied and combined together with the finding from the literature review. The outcome makes a conceptual process of SBR that will be utilized to build the proposed process for GSS.

## 4 Case Company

This Section introduces the case company used in this study. First, a general introduction of KONE Corporation as well as the GSS department is presented. Second, a detailed current state analysis of the GSS supplier base is conducted.

### 4.1 Introduction to KONE Corporation and GSS

This Subsection presents first KONE Corporation, its structure and business divisions. A special emphasize is put on its acquisition programs as well as the importance of its service business lines. Second, the GSS department is presented.

#### 4.1.1 KONE Corporation

KONE Corporation is one of the global leaders in the elevator and escalator industry. It manufactures and provides services for elevators, escalators, and automatic building doors as well as innovative solutions for modernization and maintenance (KONE in brief 2010). KONE's objective is to develop and deliver solutions that enable people to move smoothly, safely, comfortably and without waiting in buildings in an increasingly urbanizing environment (KONE annual report 2011). KONE's key customers are builders, building owners, facility managers, architects, and consultants. KONE operates through over 1,000 offices around the world. It has seven production units in all main markets and seven global R&D centres. KONE's headquarter is based in Helsinki, Finland. In 2011, KONE had annual net sales of EUR 5, 225 billions and approximately 37,542 employees (KONE Annual report 2011). KONE's operations and representation around the world is shown in Figure 12.



Figure 12. KONE operations, R&D and production sites around the world.

The KONE organization is divided into two business lines, service business and new equipment business, and four geographical areas: Central and North Europe, West and South Europe, Asia-Pacific, and the Americas. The organizational structure is represented in Figure 13.

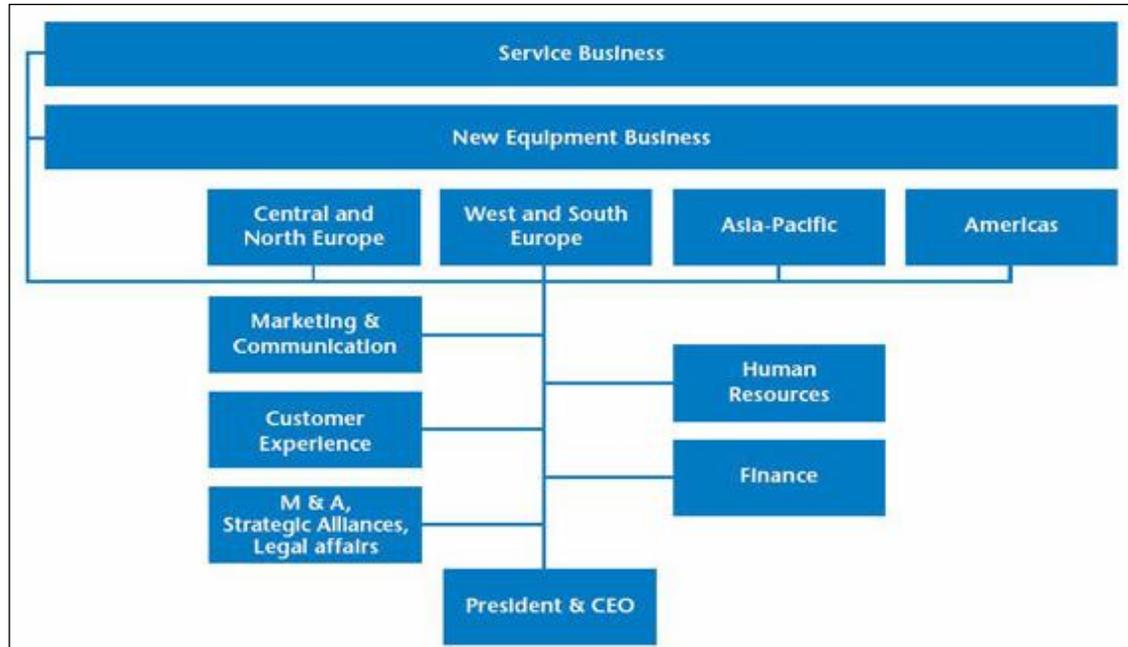


Figure 13. KONE organizational chart.

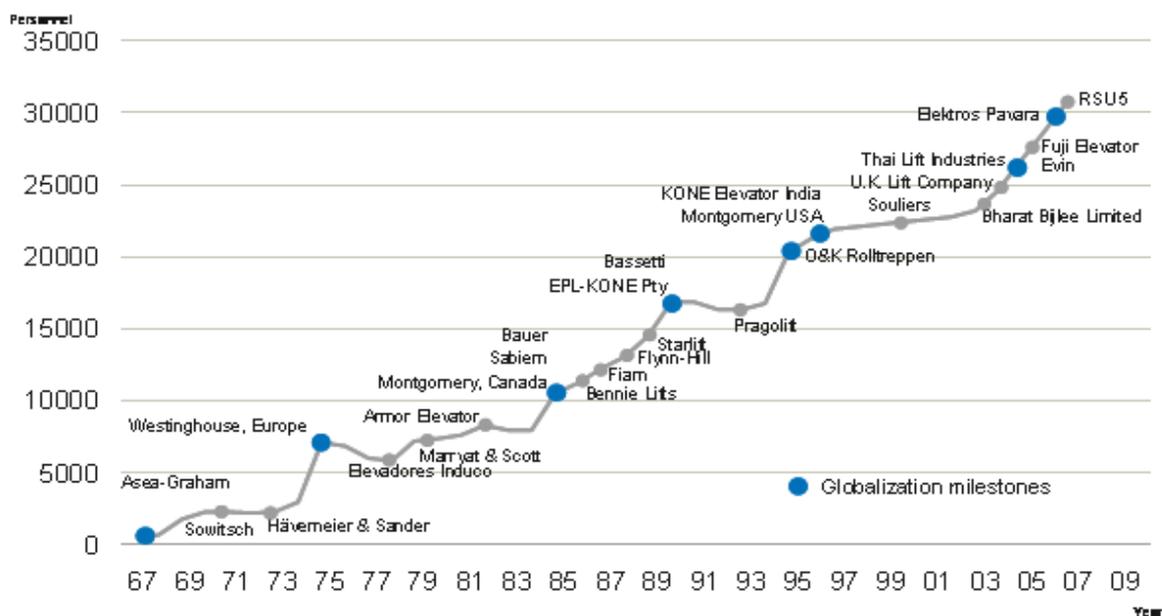
As illustrated in Figure 13, the organizational structure is made of two business lines. The new equipment business line (NEB) includes all the activities related to the production, sales and installation of new KONE equipments. It is divided into two main categories elevators and escalators, and two segments: marine and major projects. Overall, the growth of this business line has been modest lately due to the impact of the global recession on many markets especially the south European and American markets. However, developing countries' markets have grown strongly during the past years due to the increasing urbanization and the rapid economic growth (Annual report 2011).

The service business line includes all the activities related to the maintenance and the modernization of equipments throughout their life cycle. It is estimated that KONE has more than 1.000.000 equipments in its maintenance portfolio (Intranet 2012). The majority of these equipments are those of KONE or inherited brands, and the remaining parts are those represented by other equipment brands such as Otis, Schindler,

and Thyssen. The performance of this service business line is dependent among other elements on the availability of quality spare parts that is under the responsibility of the Global Spares Supply department. KONE's service business line has generated 54% of its 2011 annual revenue, and it is of a strategic importance to the company, while the new equipment business line has generated 46% (Annual Report 2011).

As for the company development, KONE has been growing through a skilful combination of organic growth and acquisitions. Since 1960 the company has conducted an extensive and steady acquisition program which allowed it to strengthen its position in some markets and to internationalise rapidly. Furthermore, it has significantly expanded KONE's offering significantly and consequently enlarged its supplier base. The company's expansion path is illustrated in Figure 14.

Figure 14. *KONE acquisitions during 1967-2007 (Intranet 2012).*



As shown in Figure 14, KONE has expanded rapidly through acquisition of many companies, with the number of employees increasing from a couple of hundreds in 1967 to over 30,000 in 2007.

#### 4.1.2 Global Spares Supply Department

Global Spares Supply (GSS) is a sub-department of KONE's service business line. It provides quality spare parts for all KONE elevators, escalators and automatic building doors, as well as commercial replacement parts and components for a wide range of other manufacturers (competitors). The department employs more than 100 specialists and has distribution centres in China, Germany and Singapore. Additionally it has a number of functions based in France, India, and Hyvinkää where the department head-office is located.

Presently, the range of department product offering includes over 124,801 items from which 47,955 are stock-items and the remaining 76,846 are non-stock items. Stock items are stored in the distribution centres, with some reasonable quantities being available for the-same-day-shipment. Their actual delivery time depends on the destination address, as well as the weight and dimension of the package. Non-stock items are order-bound; and they are usually represented by the items either having specifications, or items with low consumption levels, or very expensive, or fragile items. The average lead time for non-stock items is 28 days. The non-stock items are ordered from suppliers after GSS has received the order from customers.

GSS's customers are typically KONE business units worldwide and other external customers, and for serving them, GSS has a centralized and computerized purchasing process. GSS purchases finished parts and components needed for the after-sales market (maintenance of elevators, escalators and doors), but does not do so for commodities needed for manufacturing purposes (new elevators or escalators). GSS' mission is to support the maintenance business by supplying spare parts efficiently and price competitively (Intranet 2012). Since maintenance activities are often time critical and cannot tolerate out-of-stock situations or late deliveries, failure to fulfil this mission directly affects KONE's maintenance business. Consequently, GSS contribution to KONE Corporation is critical and depends, among other elements, on the efficiency of its supplier base.

## 4.2 Current State Analysis of GSS Supplier Base

In this Subsection, the spend analysis is conducted. Thereafter, the driving factors behind the GSS' large supplier base are examined. Finally, the GSS current supplier selection criteria as well as the supplier relations management practices are analysed.

### 4.2.1 Spend Analysis

Using the GSS database, the spend data and supplier information records were collected for analysis. After collecting, cleansing, and classifying the data, the researcher identified what GSS spends and on which products, or with which suppliers. The results of the spend analysis are represented in this Subsection. Certain data could not be disclosed for confidentiality reasons, but the figures reflect a picture of the reality.

Currently, GSS has about 1560 suppliers registered in its database and a product offering of 124801 spare parts. Parts of these suppliers are non-product related suppliers (representing logistics or consultancy solution providers), or other KONE units assimilated to suppliers. Traditionally, GSS purchases spare parts either from the original equipment manufacturer (OEM), vendors, distributors, and contract manufacturers. Under certain circumstances, the department can purchase products from KONE units around the globe. These units are not necessarily suppliers, but used as middlemen between GSS and the original supplier. An analysis of the GSS supplier base and historical spend has revealed important results which are represented in Figure 15.

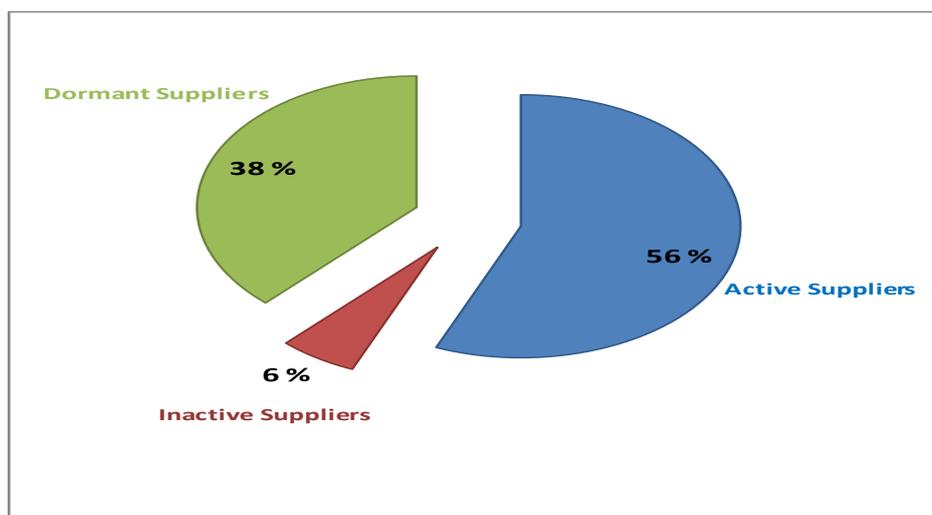


Figure 15. The state of the GSS supplier base in 2011.

As seen from Figure 15, only 56% of the GSS suppliers were used to purchase products; these are active suppliers to which GSS placed at least one purchasing order during the year 2011. On the other hand, 38% of the suppliers (dormant) were not utilized, with the remaining 6% being inactive suppliers. The latter are currently listed in the database without being selected to supply any product. This raises a question of whether these suppliers should be further registered in the database, or whether they should be eliminated. The same fact was recorded several times during the Interviews. A technical specialist stated during Interview 12:

We need to define the term supplier. Is it enough to have one supplier registered in our database to qualify it as a GSS supplier? To my opinion, we have many unknown suppliers in our database that we don't need, or we have used in the past and which will never be used again. I personally avoid contacting these suppliers because it is difficult to negotiate with them and receive a good service (Interview 12).

According to the department records, the current GSS spend is highly fragmented. In fact, most of the purchases in terms of value occur with a limited number of suppliers, but the remaining purchases involve an extended number of suppliers. This situation is illustrated in Figure 16.

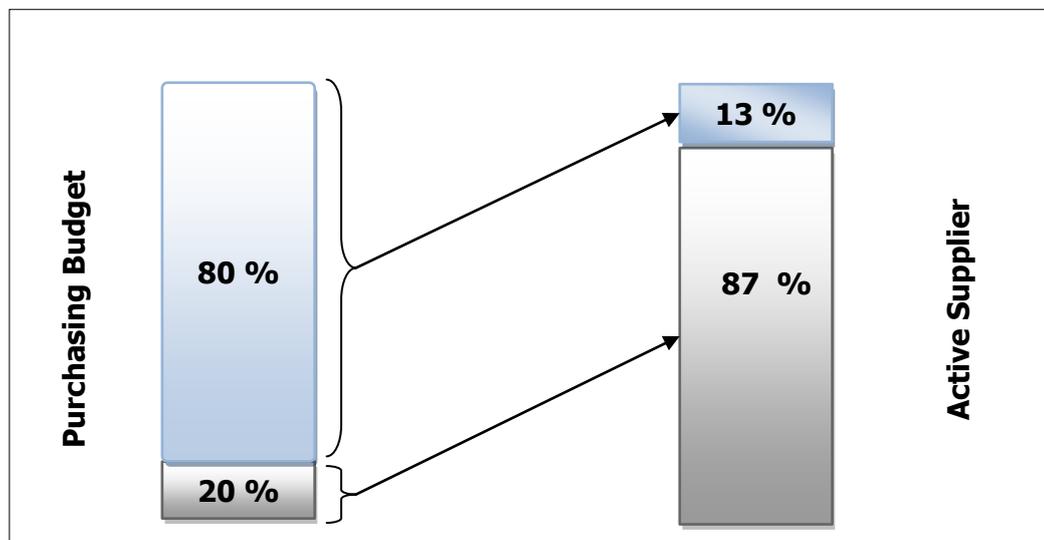


Figure 16. Product-related purchases per % of active suppliers in 2011.

As depicted in Figure 16, about 80% of the product-related purchasing budget is allocated to 13% of the active suppliers, with the remaining 20% being divided among 87% of the active suppliers. This situation implies that, for the 20% purchasing budget, little amount of business is allocated to suppliers. The proportion of purchases per supplier is represented in Figure 17.

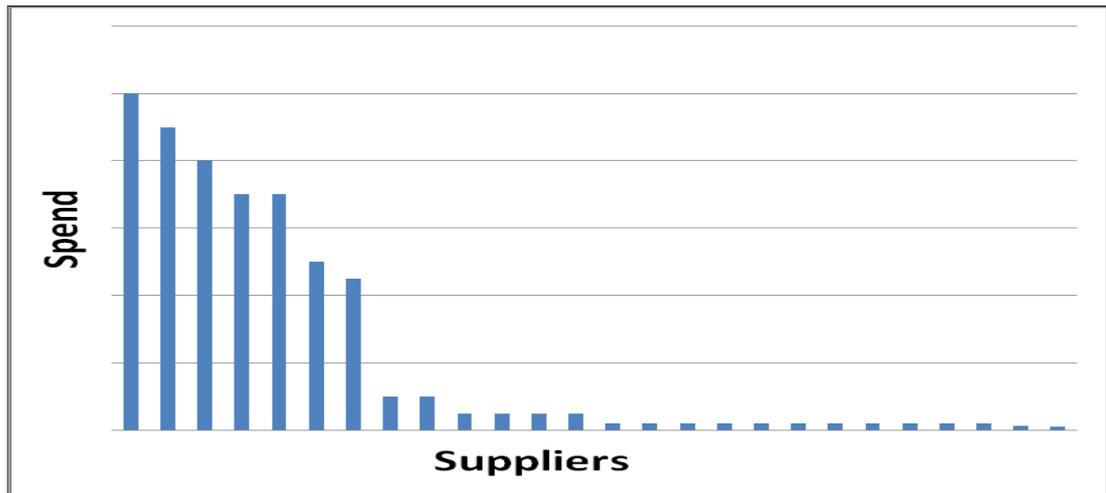


Figure 17. Spend per active supplier during 2011.

As seen from Figure 17, the GSS spend is elevated with a limited number of suppliers, but the remaining great majority of suppliers received very limited business from GSS. The latter situation implies that the department purchases a few products per supplier, instead of consolidating its purchasing within a small number of suppliers to achieve cost savings and minimise purchasing management efforts. As a result, in regard to many suppliers and in respect to the volume, GSS is not seen as an important customer and does not hold enough negotiating power. This fact was captured in Interview 14, when a purchasing team leader was quoted saying:

With so many suppliers, we are obliged to create, send, and follow-up the status of many purchasing orders. Instead of having one big supplier and consolidate our purchasing, we do it the other way and generate enormous stress and management efforts (Interview 14).

Faced with these facts, and complemented with the results of the spend analysis, the SBR team was able to identify the preliminary steps and plan further activities for the SBR project.

#### 4.2.2 Supplier Base Expansion Factors

There are many factors that are responsible for the GSS large supplier base, both external and internal. Firstly, GSS has limited control of the external factors and is sometimes obliged to expand its supplier base as a response to these external factors. For instance, if a product is critical but not readily available, the department may be obliged to have many potential suppliers to prevent potential supply disruption.

Secondly, internal factors arise from certain working methods and strategies that GSS applies. As discussed earlier, mergers and acquisitions are example of expanding the number of suppliers as the two involved companies mutually inherit new products, and thus new suppliers. The factors that lie behind the current GSS large supplier base are summarized in Figure 18.

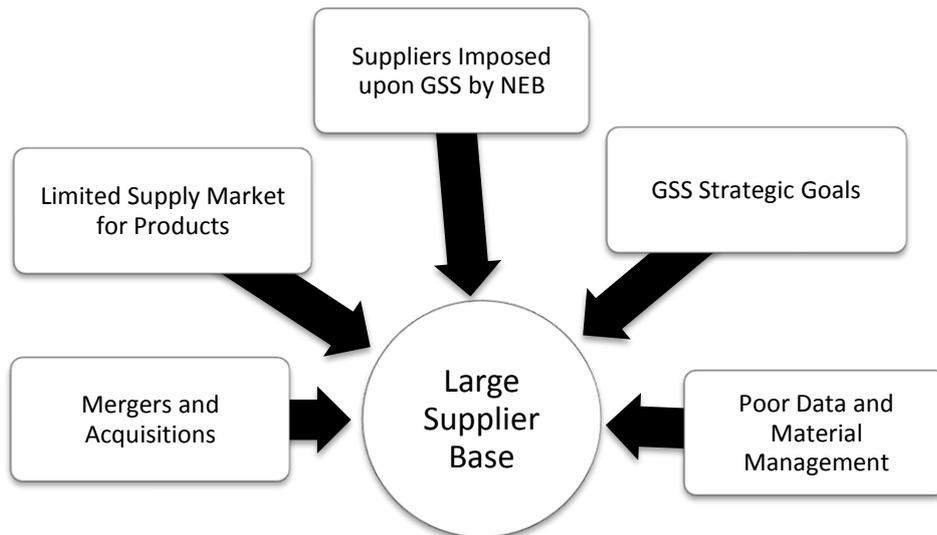


Figure 18. GSS large base factors leading to its oversize.

As shown in Figure 18, the current GSS large supplier base is caused by diverse factors. Among the most important factors are five: (1) mergers and acquisitions, (2) limited supply market for products, (3) suppliers imposed upon GSS by NEB, (4) GSS strategic goal, and (5) poor data and material management. These factors are discussed in detail in the coming paragraphs.

As explained earlier, past *mergers and acquisitions* have greatly increased the GSS supplier base. Typically, when KONE Corporation acquires or merges with another company, the product offering increases due to the consolidation of both companies' offerings. In most cases, suppliers of the acquired company are also added to the KONE supplier base in order to ensure continuity in the supply of inherited products and to guaranty a similar service level to the end-customers.

From the GSS stand point, a new acquisition or merger means new spare parts to be managed, and since GSS is a global provider of spare parts to all KONE units around the world, these newly acquired companies (or even other KONE units) often prefer to hand over their responsibility for spare part management to the GSS department. In practice, this means that GSS adds (purchases) the needed spare parts to its offerings and sells them internally to the same or other units. The spare parts involved could be global materials which are used (purchased) by more than one KONE unit, or they can be local materials which are used in only one specific unit (due to some local standards). In the latter option, finding a supplier for a specific (local) product from the existing supplier base appears to be especially challenging, and GSS is sometimes forced to take in local suppliers to its supplier base. Further on, once the decision to purchase through GSS has been made with respect to some criteria set by GSS, newly acquired companies can transfer (sell) their local stock of materials to GSS warehouse for storage. It has been observed that this transfer of local and specific stock materials also increases the number of inactive or unused suppliers. This observation was captured during the material analysis and stressed during Interview 2 with one of the team leaders:

The stock transfers are responsible in great part of the proliferation of obsolete stock and the number of suppliers. Many KONE units transfer their stock of low moving or obsolete parts to GSS, and we are obliged to add new or very small local suppliers to our supplier base. The end result is that we have many inactive and unused suppliers (Interview 2).

Additionally, in Interview 13, a logistics engineer states:

In the past, we received many stock transfers from KONE units because we wanted to increase our offerings of spare parts and our market share. But we noticed that a significant part of these products do not sell well because they were obsolete from the beginning, or because the parts are very specific to a certain country that we could not sell them globally.

As it can be seen from the analysis, mergers and acquisitions are, to a certain extent, responsible for the overgrowth of the GSS supplier base.

The second factor having lead to an oversized supplier base relates to the *limited supply market for products*. The GSS product offering consists of KONE own-designed products, global or local competitor products, and commercial products. By definition, the commercial products are standard or non-essential products that are readily available for sale (Business dictionary). The KONE own-designed products are also easily purchased through a network of qualified sub-constructors over which GSS has a close

control. Unlike the two previous types of products, the competitor products constitute the biggest challenge for GSS. These products are of short supply and the network of qualified suppliers is tightly controlled by competitors. Moreover, the prices for such products are usually high. In some cases, buying directly from competitors does not seem to be possible since the relationship with competitors is naturally distant. For this reason, GSS is obliged to buy through distributors or vendors and pay a higher price. In order to ensure an uninterrupted supply of such products, GSS maintains multiple-sources of competitor and strategic products. The multiple-source strategy is not a choice. This factor was captured during many interviews. In Interview 9, one technical specialist states:

It will be difficult to eliminate suppliers from whom we purchase competitor products. Even if they would only supply few products, we have to keep them in our supplier base as back-up sources (Interview 9).

Thus, the limited supply factor represents another reason contributing to the over-growth of the supplier base.

The third factor that lies behind the GSS oversized supplier base relates to the *suppliers imposed upon GSS by NEB*. In fact, the KONE Corporation has the new elevator business department (NEB) responsible for manufacturing new equipments. During the design phase of new equipments, both R&D engineers and product category managers (PCM) work closely with GSS portfolio manager in order to determine the range of products that would be sold as spare parts. Once selected, PCM and R&D carefully select suppliers based on a certain set of requirements and establish business relationship with the selected suppliers. The spare part management is always the responsibility of GSS, but at the production phase of new equipments, the supplier selection falls into the sole responsibility of NEB, with GSS being obliged to purchase the needed spare parts from the selected supplier. This limitation occurs due to the fact that some suppliers are involved in the R&D activities or have already long-term contracts with KONE. Additionally, dealing with reliable, strategic and close suppliers guarantees quality in supply of spare parts, especially, during the production phase as it is the most important phase of a product life cycle. When the equipment is retired from NEB (not manufactured anymore), the spare part management moves fully to the responsibility of GSS, with the latter being free to continue with either the NEB selected supplier or select another supplier.

Summing up, this analyses demonstrates that the release of new equipments by NEB department increases the GSS supplier base, especially when NEB selected supplier is not an existing supplier with GSS.

The fourth origin of the oversized supplier base phenomenon is caused by *sustained strategic goals*. Actually, one of the GSS strategic goals is to increase its product offerings in order to provide its customers with new products and ultimately maximize the customer satisfaction level. The new products are added either proactively or upon request by some other KONE units (internal customers). To achieve its goal, GSS encourages internal customers to submit a list of products they would wish to buy from GSS. The requested products are usually compared against the current GSS product offerings for availability check, and if not already available, they are added to the offering. As noted earlier, the products are sometimes specific to certain countries (customers), so that selling them globally is not possible. To overcome this difficulty, GSS is obliged to take in new suppliers to purchase these types of products. This observation was verified in many interviews. For example, in Interview 9, the interviewee states:

It is important to increase the product offerings in order to satisfy customers. But I think that the satisfaction comes sometimes at the expense of our efficiency. We shouldn't add specific parts to our offering or if we do, the forecasted volume should be very high (Interview 9).

Based on the above, it can be noted that satisfying customers sometimes comes at the expense of efficiency of the supplier base.

The fifth reason of the GSS oversized supplier base can be assigned to *poor data and material management*. Generally, product data influences buyer's behavior, and the quality and clarity of data influences the decision making. Furthermore, quality product data helps companies to take well-grounded decisions in regard to product management (discounts, termination of low selling or obsolete products) (Gurd 2011). On the contrary, poor product data leads to poor product management. Errors or lack of clarity of product description has a negative impact on sales and consequently on customer's satisfaction. Typically, poor product data leads to the following negative outcomes: (1) Product are not easily identified by customers, which may subsequently translate into wrong deliveries, (2) the possibility to standardize products and remove duplicates is undermined, (3) the possibility to change or eliminate a supplier is undermined, and (4) the amount of useless or overstocked inventory is increased.

In GSS, the root causes of poor product data are currently multiple. Sometimes, due to the time pressure or lack of rigour, new products are added to the offering based on the limited or incomplete data requirement (e.g. supplier item code, OEM code, and product description). For instance, when a product is added to the offering based only on description or vendor material number but not the original manufacturer's code of the product, GSS runs into the risk of creating duplicates, since the OEM code is the only secure way to identify products in the database. This observation was captured during Interview 16 where a purchasing project technician notes:

We don't have much time to spend on each item we purchase. We receive extended list of items to add to our offering with very poor product information, and sometimes, we have no means to verify whether the same or similar product is already purchased from another supplier (Interview 16).

Similarly, in Interview 14, one of the team-leaders states:

Due to the poor product data, we have similar products in our offering which we purchase from different suppliers. Unfortunately, we don't have the possibility to verify that physically because our warehouses are managed by a third party and located in different countries.

Additionally, since GSS has inherited a vast number of products through past acquisitions or stock transfers, the product data of some products is originally poor, which further hampers the quality of the GSS offering.

Summing up, the analysis of the current situation at the GSS department demonstrates that a poorly organized data generates considerable inefficiency and consequently increases the number of suppliers being utilized by GSS.

#### 4.2.3 Supplier Selection

As for the analysis of the supplier selection process, the GSS department currently has a process in place but it neither seems to be standardized nor follows strict rules. As examined earlier, many suppliers are either carefully selected via the new equipment department or inherited through past acquisitions. When the parts are related to equipment that is not in production anymore, GSS can either continue with the NEB initially selected supplier or select a new one.

Basically, the supplier selection criteria vary depending on the product type. For instance, KONE own-designed parts are selected based on past business relationships,

supplier's capabilities, supplier's performance, price and quality. Competitors' part suppliers are selected based on the price, the availability and the quality of the products. For commercial parts, the supplier selection seems to be heavily price-based or cost-adversarial. Suppliers are selected or deselected for a particular product without any notice.

In practice, when a commercial or competitor product is to be added to the offering, purchasers (technical specialists and purchasing engineers) first look at the existing supplier base in order to identify potential suppliers. Once spotted, requests for quotations are sent and latter on offers are compared against each others. In most cases, the cheapest supplier is selected with little consideration of other costs such as transportation, quality records of the supplier, and size or supplier's capabilities. It seems that very little attention is paid to volume consolidation with important or strategic suppliers or to reduce costs through effort optimization. In Interview 8, a senior technical specialist notes:

We add continuously new commercial or competitor's products into our offering, and since we don't have strict supplier selection criteria, suppliers are selected on case-by-case basis. But the main criteria are the prices and the supplier's answering time. We may select the supplier who offers the first because time is critical to our business and because our department performance is evaluated based on the fastness of our actions (Interview 8).

To summarize, it seems that department's current supplier selection practices does not support the optimization of the supplier base. It has been noted that the selection of suppliers seems to take the course of random activities driven by costs and speed.

#### 4.2.4 Supplier Relation Management

In GSS, relationship with suppliers can be divided into two different types. The first type of relationship links GSS with small or non-important suppliers, and the second type of relationships involves GSS with its big and strategic suppliers.

As for the first type of relationships between GSS and the small suppliers are, at some extent, price-oriented and characterised by a low level of implication. The relationship is maintained as long as purchasing transactions occur but when the transactions stop, the relationships stop. The most of the time, the products involved are standard or competitor's parts, and the terms and prices are rigid. Very little emphasis is put to

develop the relationship or enhance the partnership through IT integration or other processes.

With some exceptions, there is little collaboration between GSS and these suppliers and very little leverage because of the volumes being spread among many suppliers. Additionally, GSS does not contract with all the suppliers to hedge against price escalations or protect itself from sudden price increases. It has been observed that when dealing with some suppliers, the prices increase quiet frequently and without any advance notice. Quiet often, small suppliers offer competitive prices at the beginning of the business relationship hoping to increase their sales, but when the department's purchasing volume does not meet their expectations, they raise their prices or lose their cooperation. This observation has been mentioned by many interviewees. During Interview 15, a purchaser states:

We cannot fully rely on suppliers with limited spend for efficient supply of products. They quiet often raise their prices and rarely provide good customer service. We have to wait long time to get quotations or feedbacks. Furthermore, they rarely understand or respect our shipping requirements which cause us enormous delays and costs (Interview 15).

Similarly, during Interview 12, a technical specialist states:

Our relationships with certain suppliers are not great. Due to our excessive quotation requests and low purchasing volume, they do not bother with us anymore. Some of them believe that we contact them only for price comparison. We should not expect to get exceptional good treatment, if we do not provide suppliers with enough business (Interview 12).

Contrary to the first type, the relationship between GSS and big or strategic suppliers is partnership-based relation. These suppliers are either supplying KONE-designed products or industry-specific products. Overall, the relationship is usually contractual and based on long-term commitment and trust. Some suppliers' engineers are involved during the design phase of the new equipment, and IT and other information platforms are shared in order to coordinate more effectively. Most of these companies have well established processes, and allocate the resources and capabilities to develop in respect to GSS or KONE requirements as a whole. Usually, GSS or KONE account for a large portion of these suppliers' business. Likewise, these suppliers receive a large percentage of the GSS' spend.

Traditionally, to better manage its supply base, GSS measures the suppliers' performance and awards quality certificate to suppliers with proven commitment to quality. To do it, a GSS quality manager conducts a supplier development program with the most

important suppliers. A limited number of suppliers are evaluated each year based on their performance, quality, and future improvement (objective are communicated and KPIs set on a yearly basis). Through this supplier evaluation program, GSS seeks closer long-term relationships, but the main purpose here is to distinguish the supplier who have the most advanced quality management practices, and therefore should be considered as preferred or strategic suppliers. Suppliers who are unable to reach a defined set of requirements will be given a recovery period to attain the minimum requirements. If not attained, these suppliers may be considered for elimination. After the evaluation, suppliers are categorized as strategic, preferred, approved or disqualified.

In spite of its existence, the efficiency of this program is however questionable since it targets only a fraction of the supplier base. In fact, only a limited number of suppliers are evaluated each year because of the lack of time and resources to evaluate many suppliers. Furthermore, the program is targeted at the key suppliers only and neglects the development of small but potentially good suppliers. This fact was captured during Interview 1, when the sourcing manager was quoted saying:

Sometimes, suppliers don't know our requirements in terms of quality and delivery, which results into a low service performance. The problem is that we don't have a supplier development program to all suppliers. The performance of the most important ones is monitored closely via certification and quality award programs but, at this point there is no such a thing to the small and less strategic ones. Unfortunately, we simply don't have the time and the resources to nurture closer relationship with 1500 suppliers.

Therefore it would seem that GSS truly need to reduce the number of its suppliers to be able to develop closer and fruitful buyer-supplier relationships.

## 5 Building a Supplier Base Reduction Process for GSS

This Section utilizes the conceptual process developed in Section 3.4 with the purpose of building a GSS process that could be implemented to reduce the number of suppliers in the case company. First, the conceptual model is analyzed and reflected upon the GSS environment and, second, a SBR process is proposed.

### 5.1 Analysis of the Conceptual Process in GSS Environment

The conceptual process was developed based on the literature and the available best practices as examined in Subsection 3.4. The purpose of the conceptual process is to describe all the activities necessary for conducting a SBR initiative as well as to serve as a generic roadmap. The process shown in Figure 19 was presented to the SBR team and other interviewees for further analysis and development.

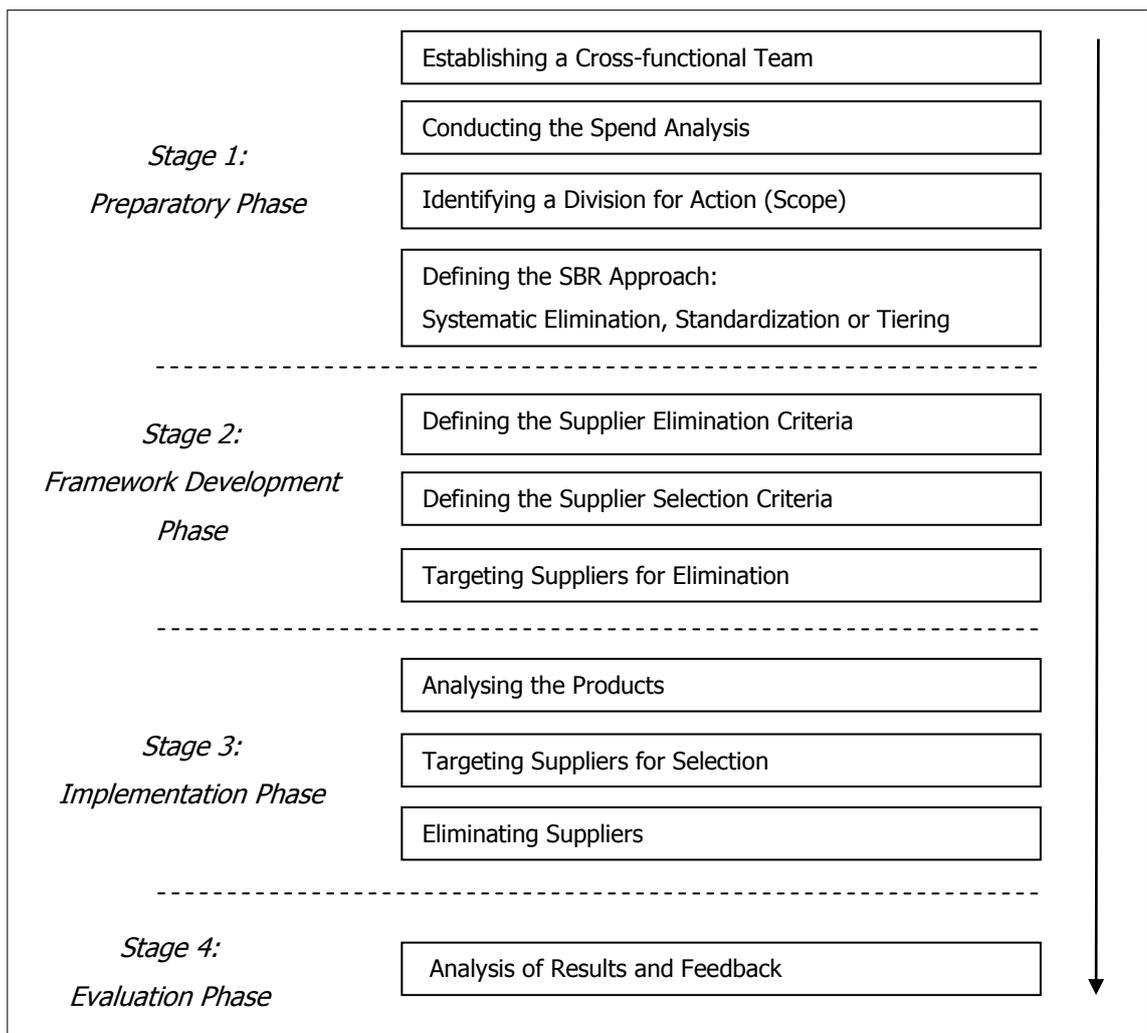


Figure 19. The conceptual process of supplier base reduction.

During the cross-functional team meetings and case company interviews, the proposed conceptual process was found to be partly applicable to GSS environment; with many of its steps appeared straightforward and feasible for GSS. However, to fully serve the purpose of this study, a few steps need to be further developed or adjustment. These steps were: (1) identifying a division for action, (2) defining the SBR approaches, (3) defining the supplier selection criteria, and (4) defining the supplier elimination criteria.

In the forthcoming paragraphs, these steps of the conceptual process will be analyzed and adapted to GSS environment in the case company. The resulting developments will then be incorporated into the proposed process of SBR. Based on the theory and the conducted interviews, the proposed Supplier Base Reduction Process will be built on precisely the four stages of the conceptual process.

### *1. Identifying a division for action*

The conceptual process emphasizes the need for limiting the scope to which the SBR initiative is carried out. According to the cross-functional team, the SBR initiative is targeted at the entire supplier base, but not at a specific division of it (for example, the suppliers for mechanical or electrical parts only). However, the initiative is planned in different stages and utilizes different approaches as it is shown later. Typically, there are several different ways of conducting the SBR initiatives. While in some cases the entire supplier base is targeted, as it is the case with this study, in other cases, the initiative is targeted at a specific product group or division. For example, it may be possible to reduce the number of suppliers utilised for the supply of commercial items only, and at the latter stage to another product category. In such a case, the process becomes repetitive but it should ultimately lead to the reduction of the entire supplier base.

### *2. Defining the SBR approach: systematic elimination, standardization or tiering*

The conceptual process stresses the need for defining the SBR approach. The latter defines the method of how the supplier base should be reduced. Depending on the results from the spend analysis and the scope, a company can choose between: (1) a systematic elimination of suppliers based on clearly identified supplier base reduction criteria (referred to as supplier elimination criteria in the forthcoming Sections) (2), a reduction of suppliers based on product standardization, or (3) tiering.

In the GSS case, tiering does not seem to be the most convenient method to reduce the number of suppliers, since the approach itself implies a transfer of supplier management to a 1<sup>st</sup> tier supplier, but not its elimination. The reason is that the GSS database comprises a number of inactive or unused suppliers that could be eliminated and for which tiering does not make much business sense. However, tiering could be envisaged if combined with the elimination or standardization approach, especially in situations when suppliers with limited business volume are irreplaceable. Concerning the standardization, this approach seems to be applicable to GSS. As studied earlier, if the scope of the SBR initiative is limited to a product category group, then this approach may be convenient because it offers the possibility to standardize products with the aim of reducing the total count, which ultimately reduces the number of suppliers. In fact, the standardization of products is a common practice at GSS, but it is not looked at as a way to eliminate suppliers, but rather a way to improve the product offering. As for the elimination approach, this seems to be the most appropriate with potentially immediate effect on the GSS supplier base. As emphasized earlier during the spend analysis, duplicate suppliers, inactive suppliers, or unused suppliers can be systematically eliminated based on the selected elimination criteria.

Based on the above mentioned steps of *identifying a division for action* and *defining the SBR approach*, combined with the findings from several interviews (7, 10 and 19), the SBR team agreed that the utilization of both the systematic elimination and the standardization approaches would be preferable. Thus, the SBR initiative is planned as follow: in the first stage, the suppliers' data are analyzed and cleansed from the duplicates and inaccurate information. In the second stage, the systematic elimination approach is utilized to eliminate the suppliers based on clearly defined criteria. Finally, in a third stage, the standardization approach will be carried out. In this stage, products will be grouped according to certain categories (e.g. KONE products, commercial mechanical products, or competitors' products) and investigated deeply with the aim of harmonizing similar products and reducing the total count.

While the researcher suggests a SBR project plan combining the systematic elimination and the standardization approach, this Thesis develops the process that supports the utilization of the systematic elimination approach only. The reason is that the standardization approach is already a common practice at GSS which does not require any deeper learning.

### *3. Defining the supplier selection criteria*

Defining the supplier selection criteria helps the company to select suppliers that best satisfy its requirements. The literature review has yielded a vast number of criteria for which suppliers are selected, and these criteria were studied thoroughly in Subsection 3.1.

To find suitable suppliers, the SBR team has agreed to refer to the existing suppliers only. In practice, to eliminate a supplier, his products need to be re-sourced from an already existing supplier, not from a new external one. According to one team leader (Interview 19), the idea behind the SBR initiative is to reduce the number of suppliers, not to add any new ones. Conversely, the sourcing manager (Interview 7) thinks that it is important to consider adding new suppliers (especially big and specialised vendors) if that would lead to the reduction of the overall number of suppliers. It is true that, in some cases, dealing with big vendors may be more efficient, since big vendors usually have extended product offerings available at competitive prices.

In situations when the existing suppliers cannot supply the needed products, the elimination of the targeted supplier does not take place except under certain conditions. These conditions are: (1) the targeted supplier is supplying maximum two parts which have not been actively sold for a period of time (low movers), (2) the parts are not considered to be critical or of strategic importance, and (3) the cross-functional team approves of the elimination and gives its accord to utilize the one-buy process for these particular products.

To ensure an efficient supplier selection process, the SBR team then agreed to select suppliers based on their category. In fact, only the suppliers categorized as strategic or preferred are selected. In practice, a series of evaluations and quality audits is conducted each year, and to be classified as preferred or strategic, the supplier needs to prove steady performance, high quality records, or to be a supplier to which KONE contributes greatly to their revenue. Ultimately, the sourcing team together with the SRM team are responsible for categorizing suppliers and providing the list of preferred suppliers to other SBR stakeholders.

#### 4. Defining the supplier elimination criteria

Defining the supplier elimination criteria is an important element on which the SBR success is based. Clearly defining these criteria helps to differentiate between the suppliers that would remain, from those to be targeted for elimination. Among the criteria studied in Subsection 3.3.2, the following ones can be distinguished:

- The amount of past purchases from a supplier
- The number of products purchased from a supplier
- Supplier quality records and service performance
- The availability and the clarity of internal information
- Supplier's development capabilities
- Supplier's geographical location.

The above supplier elimination criteria were presented to the SBR team for further examination. During the meetings and interviews with the stakeholders (Interview 7, 10, and 19), the interviewees were asked to evaluate the importance of these criteria based on their relevance to the GSS environment and usefulness in eliminating suppliers. The interviewees needed to classify these criteria as important or critically important, as well as to remove the irrelevant criteria. In this context, important criteria meant that they need to be validated in order to proceed with the elimination of a given supplier. However, under certain circumstances, the supplier could still be subject to elimination, even if these criteria are not validated. On the other hand, critically important criteria meant that the criteria must be validated if a supplier was to be eliminated. In addition to the evaluation of criteria found in the literature, the SBR team was asked to define other relevant criteria and identify their level of importance. The results of this examination are summarized in Table 6.

*Table 6. Supplier elimination criteria applicable to GSS.*

<b>Criterion</b>	<b>Description</b>	<b>Importance</b>
1	Amount of past purchases from a supplier	Critically important
2	Number of products assigned to a supplier	Critically important
3	Supply risk	Critically important
4	Historical turnover of products	Important
5	Availability of a replacement supplier	Important
6	Supplier quality records and service performance	Important

As shown in Table 6, six criteria were found to be applicable to GSS. Out of six, *criterion 1: amount of past purchases from a supplier*, *criterion 2: number of products assigned to a supplier*, and *criterion 6: supplier quality records and service performance* were deduced from the literature and the spend analysis. These criteria are meant for conducting a supplier-based analysis. The remaining three, *criterion 3: supply risk*, *criterion 4: historical turnover of products*, and *criterion 5: availability of a replacement supplier* were identified during the SBR team meetings and interviews (Interview 7, 10, and 19), and they are meant for conducting a product-based analysis. Overall, each of the six criteria aims at evaluating the essential conditions under which a supplier could be eliminated, and this is the reason why these criteria were chosen appears to be appropriate. In the following paragraphs, each criterion will be discussed separately.

*Criterion 1: Amount of past purchases from a supplier*

This criterion aims at evaluating the GSS spending with a particular supplier. This criterion was chosen because maintaining a supplier generates costs and if these costs are not offset by an increased utilization of the supplier, the department loses money. The other reason is that by eliminating small suppliers, GSS could provide increased business opportunities to bigger suppliers, which thus leverage the department purchasing and its bargaining power. As revealed by the spend analysis, GSS has many suppliers from which it makes small amount of purchases per year. During the SBR meetings, it was decided to target these suppliers first.

*Criterion 2: Number of products assigned to a supplier*

This criterion aims at assessing the level of complexity when eliminating suppliers. The idea behind choosing this criterion was that by knowing exactly how many products are assigned to (could be purchased from) each supplier, it becomes possible to prioritise the supplier elimination activities. For instance, it is much easier to eliminate a supplier who is selected to supply one product only, than a supplier who supplies ten products. Moreover, this criterion combined with criterion 1 help to identify inactive suppliers that could be subject to immediate elimination.

### *Criterion 3: Supply risk*

As studied earlier, in certain situations the suppliers are shared between different department within KONE (GSS and NEB), and this criterion aims at evaluating the potential impact of the supplier elimination on other departments as well as assessing inherent supply or quality risks. In practice, this criterion is applied to products to be resourced (KONE-designed products only). When these products are utilized in the production of new elevators or escalators, the decision to eliminate the targeted supplier is not then a sole responsibility of GSS. In this case, GSS should place a request to R&D and PCM in order to seek approval to change or eliminate a supplier. If not approved, GSS is restricted in eliminating the targeted supplier. On the other hand, when the product to be resourced is not anymore utilized in the production of new elevators or escalators, the spare part management is fully in the responsibility of GSS, and the latter can change or eliminate the NEB selected supplier without any formal approval.

### *Criterion 4: Historical turnover of products*

This criterion is applied to the products to be replaced, and it aims at understanding the historical turnover as well as evaluating a future purchasing forecast. The outcome of this analysis should help in making decisions related to product termination and the implementation of the one-time buy process (OTB). The one-time buy process could be defined as the process of purchasing a product from a supplier without having the intention to have long term business relationship or to utilize it in other purchasing. With this practice, companies avoid adding up new suppliers to their database but only purchase when a demand for a product arises (Business dictionary). Typically, certain products are not sold for a long period of time. One of the reasons could be that the product has become obsolete and is not saleable any longer. Another reason could be that comparable products are available in the offering at better price and clearer data. And the final reason could be that the product is specific to a certain country and impossible to sell globally to achieve increased turnover. In these situations, it becomes visible that GSS maintains suppliers for no or very limited business transactions. During the SBR team meetings and other meetings (Interview 7, 10, and 18), it was agreed that in the above mentioned situations, the product turnover during a period of five years should be high enough to proceed with finding a replacement supplier. If not, the product should be considered for termination which would potential lead to its supplier elimination. The other alternative would be to eliminate, if possible, the supplier and implement the OTB process for that particular product.

*Criterion 5: Availability of a replacement supplier*

This criterion holds great importance to the success of the SBR initiative. It aims at ensuring whether or not a replacement supplier has been found. Normally, before eliminating a targeted supplier, each and every product must be resourced from a replacement supplier. However, in certain situations, this criterion can be skipped, and a supplier may be eliminated even in the absence of a replacement supplier. In fact, based on the results from the four previous criteria, if the products to be replaced are obsolesces or slow movers, the supplier should be considered for elimination. In case of an unexpected demand for these products, the OTB process is implemented (Interview 7, 9, 14, 18, and 19).

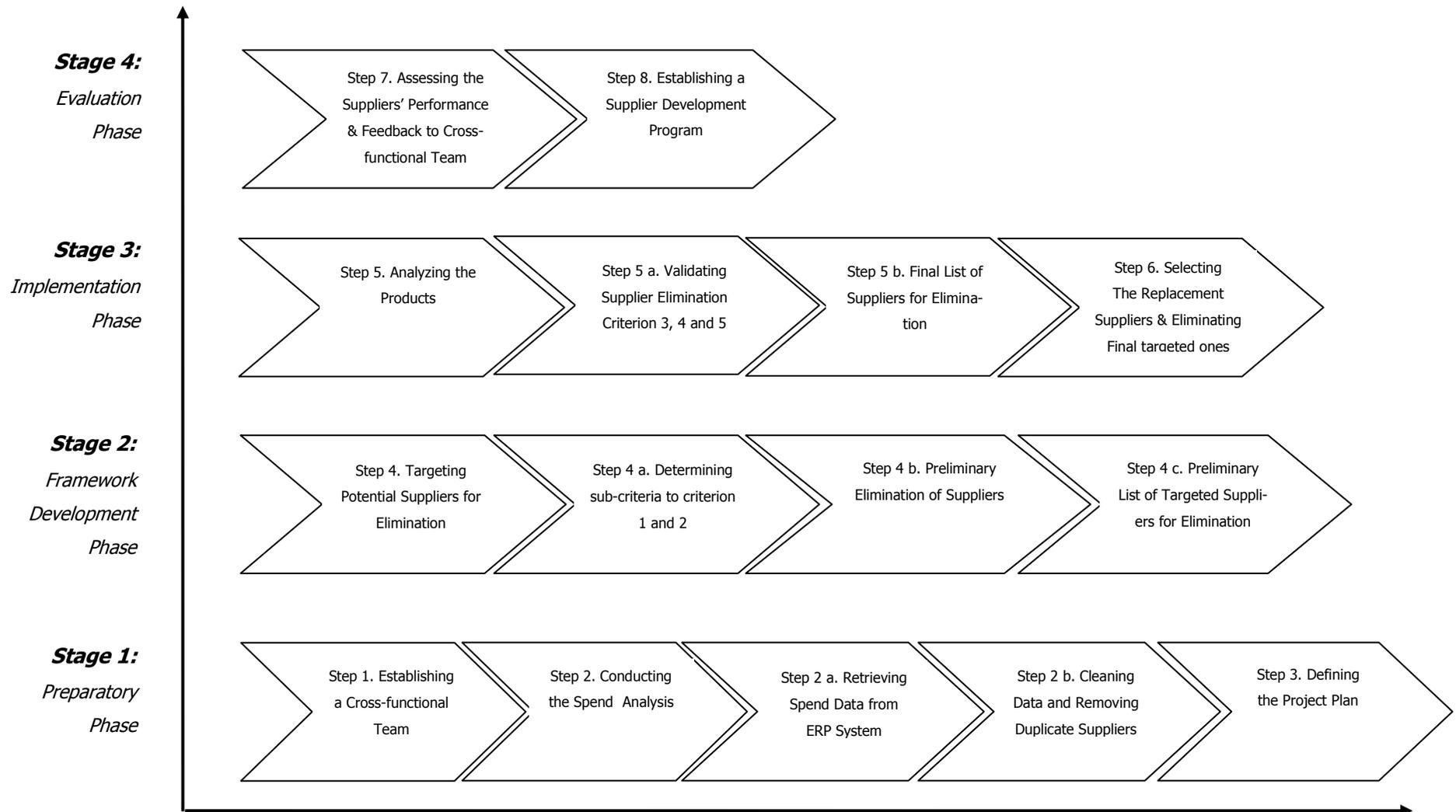
*Criterion 6: Supplier quality records and service performance*

This criterion aims at evaluating the historical performance of suppliers. The reason of choosing this criterion was that by reviewing supplier's performance, it becomes easy to target the ones whom performances fall below the required level of GSS. During the SBR meetings, this criterion was evaluated as important, but not a "must-fulfil" criterion. According to a technical specialist, even if a supplier proved to be well performing but with limited business opportunity growth, it should not remain in the supplier base; instead, it needs to be eliminated and its business re-directed to another important supplier (Interview 10). It is important to note that this criterion is probably not critical at the beginning of the SBR initiative because the GSS supplier base is abundant of small and big suppliers; however, once, the small, inactive, and low performing suppliers are eliminated, the supplier base would comprises suppliers of equal size or business volume. In this case, the supplier quality records and service performance may become a decisive criterion in eliminating suppliers.

To summarize, the supplier elimination criteria developed above can be considered generic and could be systematically applied by GSS. However, with the progress of the SBR initiative, there may raise a need to re-evaluate the importance (or change the order) of these criteria. Additionally, it is important to note that the six elimination criteria could be utilized differently, for example by defining sub-criteria that best match the state of the supplier base as well as the need of a specific time. In the forthcoming testing Section, the researcher will define and describe further how sub-criteria could be useful in implementing the SBR process.

## 5.2 The Proposed Process of Supplier Base Reduction

Based on the previous analysis and the consequential development of the conceptual process, combined with other findings from the interviews, the researcher derived an eighth-step process describing all the activities necessary for reducing the supplier base. The proposed process of the SBR is illustrated in Figure 20.



**Figure 20. The proposed process of supplier base reduction.**

**Supplier Elimination Criteria**

- Criterion 1: Amount of past purchases from a supplier
- Criterion 2: Number of products assigned to a supplier
- Criterion 3: Supply risk
- Criterion 4: Historical turnover of products
- Criterion 5: Availability of a replacement supplier
- Criterion 6: Supplier quality records and service performance

As it can be seen in Figure 20, the process of the SBR depicts the four major stages for reducing the supplier base:

- (1) Preparatory Phase
- (2) Framework Development Phase
- (3) Implementation Phase
- (4) Evaluation Phase.

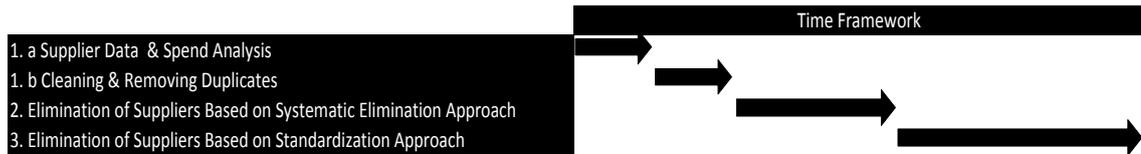
The four stages incorporate 8 intermediate steps detailed as follows:

**Step 1. Establishing a cross-functional team.** The cross-functional team is a prerequisite for conducting successfully a SBR initiative and for securing the desired outcomes. This first step entails creating a multi-functional team that includes dedicated specialists from the technical, sourcing, purchasing, material management, and supplier relation management team as they are all connected to suppliers or materials. Additionally, PCM and sourcing specialists from NEB department may be needed since both GSS and NEB have a number of common suppliers.

**Step 2. Conducting the spend analysis.** The spend analysis is another important activity in the preparatory phase as has been highly emphasized in the literature, if conducted methodically, the spend analysis offers visibility and provides comprehensive guidance on how to plan the SBR initiative. In Practice, this step involves detailed analysis of the data related to past purchasing, materials, and suppliers. The data needs first to be retrieved from the ERP system or the SRM tool with the help of a sourcing specialist. Second, a deeper analysis of the data needs to be conducted in order to clean wrong data and remove any duplicate suppliers. Overall, the findings from the spend analysis should help to define the supplier elimination criteria and further define the approach as well as the project plan.

**Step 3. Defining the project plan.** Performing the two previous steps as well as defining the SBR approach should help to identify a project plan and prioritize the SBR activities. As stressed in the previous Subsection, both the systematic elimination and the standardization approaches are suggested by the researcher. The corresponding project plan is depicted in Table 7.

Table 7. The SBR approaches and project plan applicable to GSS.



As shown in Table 7, the SBR project plan consists of three milestones. During the first milestone, supplier data records and the spend analysis are conducted, and incorrect data are cleaned as well as the duplicate suppliers removed. During the second milestone, the suppliers are eliminated based on the systematic elimination approach. Finally, during the third milestones, further supplier elimination is suggested utilizing the standardization approach.

**Step 4. Targeting potential suppliers for elimination.** Step 4 involves the identification of potential suppliers for elimination. First, sub-criteria to criterion 1: amount of past purchases from a supplier, and *criterion 2: number of products assigned to a supplier* need to be identified and applied to the GSS supplier database. The outcomes from this step are: (1), a preliminary list of targeted suppliers for elimination that requires further actions or deeper product analysis, and (2), a preliminary elimination of inactive suppliers. In some cases, these two criteria alone can be utilized to eliminate suppliers. For instance, if a supplier’s past amount of purchases and number of assigned products equal zero, such a supplier could be eliminated immediately without the need to proceed with other steps. But in most case, the remaining supplier elimination criteria need to be validated in order to obtain the final list of suppliers for elimination. In practice, the GSS purchasing specialist needs to retrieve the suppliers’ records and products data, and provide them to the technical specialist for deeper technical analysis.

**Step 5. Analyzing the products.** Once a preliminary list of targeted suppliers for elimination is identified, an analysis of the products to be resourced starts. In this case, a detailed risk assessment of products and suppliers is performed by the cross-functional team in order to arrive to a final list of suppliers to be eliminated. During this step, *criterion 3: supply risk* and *criterion 4: historical turnover of products* as well as *criterion 5: availability of a replacement supplier* need to be validated. Once all the sub-steps are performed, the SBR team should be able to differentiate between suppliers to be eliminated from those to be kept in the supplier base.

It is important to remind that under certain conditions, some criteria may not be validated but a supplier would still qualify for elimination. In fact, *criterion 3: supply risk* and *criterion 5: availability of a replacement supplier* may not be critically important as pointed out earlier. For example, based on the turnover analysis (results from criterion 4), if the product to be resourced is neither saleable nor available from another supplier, it may be suggested to eliminate the targeted supplier, and purchase the product when a customer's order arrives by utilizing the one-time buy process.

Additionally, during step 5, the technical specialist needs to collect all the product specifications (OEM references, drawings and others data) for the purpose of resourcing these products from another supplier. Requests should be sent to solicit a proposal (RFP) from the GSS preferred or strategic suppliers. As noted earlier, replacement suppliers need to be selected from the existing supplier list. Additionally, these suppliers should not be already targeted for elimination (supplier elimination criteria not applicable).

#### **Step 6. Selecting the replacement suppliers & eliminating the targeted ones.**

Once the final list of suppliers to be eliminated is identified and the replacement suppliers already contacted, this last step involves performing regular purchasing tasks. Once received from the suppliers, different offers are compared against GSS requirements in order to select the supplier who will best fulfil these requirements. The outcome of this step is that the final targeted suppliers for elimination are phased out and the corresponding products are assigned to the newly selected replacement suppliers. In practice, when the definite suppliers for elimination are identified, the technical specialist needs to notify the purchasing specialist who maintains the supplier database that these suppliers should be blocked electronically. Doing this prevents un-intentional utilization of these suppliers in the future. Furthermore, the technical specialist is required to make the final decision regarding the selected supplier, and inform the purchasing department about the details of the offer (price, lead-time, offer number, supplier name).

**Step 7. Assessing the suppliers' performance & feedback to cross-functional team.** This step usually takes place once the SBR initiative is terminated. The aim is to evaluate the impact of the initiative on the performance of the remaining suppliers, and to ultimately assess the effectiveness of the supplier base. It is important to remind that switching from one supplier to another would potentially expose GSS to a supply risk, since time is required for the new supplier to ramp-up its production, or adapt his business practices. For this reason, metrics such as completed-on-time deliveries (COT), non-conformity deliveries (NCF), and customer quality feedbacks need to be closely monitored, and the results communicated to the SBR team. At this stage, it is important to make sure that the objectives originally drawn from the initiative are achieved, and determine whether there is a need to take corrective actions. Finally, good communication and sharing of information between sourcing, purchasing, technical and feedback teams is highly important to guaranty success of the initiative and to take, if necessary, corrective actions.

**Step 8. Establishing a supplier development program.**

This step consists of providing the assessment results to the suppliers with the aim of helping them to bring their performances to the required GSS level. In general, reducing the number of suppliers implies fewer suppliers with an increased spend. This means that for the suppliers that were less important, an evaluation or development program may need to be considered in the future; thus, the GSS SRM team will need to include such suppliers in these programs.

To summarize, the process of the SBR proposed in this Subsection was deduced from the conceptual process. This process consists of four major phases that incorporate eighth intermediate steps. By following the above outlined process, GSS can reduce the number of suppliers and ensure an efficient management of its supplier base. The process describes precisely all the activities and maps the stakeholders as well as their possible contributions to the initiative. By following each step of this process, decisions regarding the suppliers, termination of products, and one-time buy implementation are made in a way that would best serve the long-term interests of GSS. Finally, the process is customizable; by re-arranging the order or the importance of the supplier elimination criteria (sub-criteria also), it could be implemented in various times or circumstances.

## **6 Testing and Evaluating the Proposed Process of SBR**

This Section utilizes the proposed process to test and illustrate how it could be implemented at GSS, after which the results are evaluated.

### **6.1 Preparatory Stage**

This first stage entails creating a cross-functional team, conducting the spend analysis, removing duplicate suppliers, and defining the SBR project plan.

By now, most of these steps were already completed during the process defined earlier in this Thesis. Firstly, the cross-functional team was established at the beginning of this research and was subsequently referred to as SBR team, with the researcher being an active member and performing the tasks required from the technical department. These tasks include: technical checking of products, supplier contact and supplier selection, historical turnover analysis, proposal of products for termination, and proposal of suppliers for elimination.

Secondly, the spend analysis was also conducted during the current state analysis of the GSS supplier base (Subsection 4.2.1). The analysis revealed important findings such as the total number of suppliers, amount of purchases per supplier, dormant suppliers, inactive suppliers, and duplicate suppliers. Thirdly, based on the spend and the supplier data analysis, five duplicate suppliers were identified. These suppliers were registered in the supplier's database under different identification codes, but in fact referred to the same supplier. Very often, such suppliers are registered under different address or have slightly different legal names. Unfortunately, it has been noticed that in some cases, different purchasing orders were created to both suppliers (duplicated) to purchase different products, which consequently increased the GSS operational costs and purchasers' management efforts. One of the reasons why these situations were left unnoticed was the fact that certain suppliers are integrated into the GSS electronic purchasing platform which creates orders and communicates to suppliers automatically. When this practice is combined with time pressure, purchasers have little time to verify manually every transaction. While studying the duplicate suppliers, it has been noted that in some cases these duplicates are not easy to remove. The reason behind it is that certain suppliers have a decentralized organizational structure, which

means that different legal entities are designed to supply different product groups. These entities can either be located within the same or in different countries. In such situation, GSS has to deal with different entities and consequently maintain more suppliers.

Fourthly, the project plan of the entire SBR initiative was already developed in the previous Section. Although the SBR project is targeted at the entire supplier base, in the current testing Section, a few limitations need to be emphasized. First, because of the complexity and the time constraints of the project, the researcher restricted the testing activities to the suppliers utilized by the European distribution center only, which comprises 1322 suppliers altogether. In practice, this means that all except for Asian suppliers were targeted for the testing of the proposed SBR process. The reason of this geographical limitation was that most of the stakeholders are located within the same office as the researcher, which optimized the time and the researcher's control over the testing process. Second, during the testing, the researcher implemented the SBR initiative by following the stages stressed in the proposed SBR process, with the systematic elimination being the chosen approach.

Overall, the preparatory stage discussed in this sub-section is of critical importance for achieving the overall SBR goals. It is the most significant strategic and political stage of the entire initiative. At the GSS department, it has been noticed that some key persons were unenthusiastic about the SBR project during the first exploratory investigations. This could be explained by the divergence of interests that govern different teams. In general, the SBR initiative is without doubt beneficial to the entire department, but it is correct to say that during the implementation stage most of the tasks are performed by the technical department. For this reason, it is important to regard the initiative strategically and to involve higher management in order to align interests and provide managerial support.

To summarize, once the cross-functional team is established and the required data become available to start the analysis, this first stage can be easy and fast because its tasks do not require many stakeholders' involvement. In the testing, the outcome from the preparatory phase was the elimination of five suppliers, as well as more accurate image about the supplier base and a clearer roadmap to perform the initiative.

## 6.2 Framework Development Stage

The Framework Development Stage involves targeting suppliers for elimination and, in some cases, an immediate elimination of inactive or unused suppliers. First, as the SBR process stresses, sub-criteria to *criterion 1: amount of past purchases from a supplier* and *criterion 2: number of products purchased from a supplier* need to be identified and applied to the list of 1322 suppliers that are chosen for the testing. During one of the SBR team meetings, these sub-criteria were further defined to better serve the purpose of the initiative. Figure 21 exemplifies the sub-criteria applied to GSS.

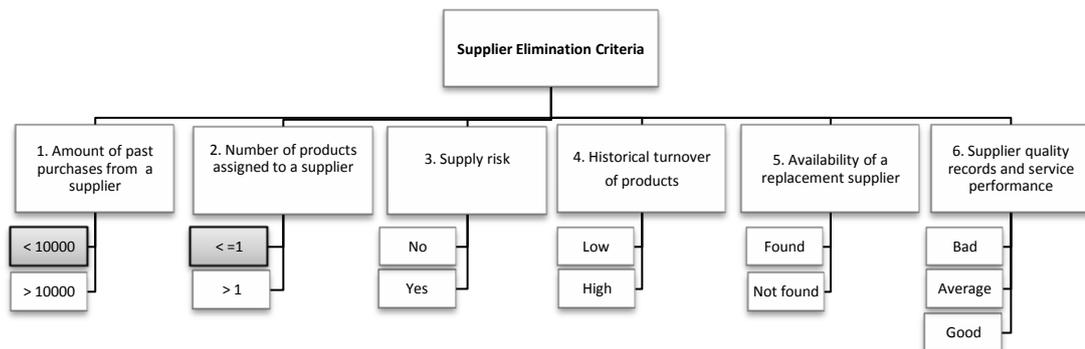


Figure 21. Supplier elimination criteria and sub-criteria.

As demonstrated in Figure 21, it is possible to define sub-criteria to each criterion. This would help to breakdown the supplier base into desirable sub-groups, and plan or prioritize further supplier elimination activities.

In this testing phase, the researcher applied the first level sub-criteria (highlighted in the above Figure 22) of both criterion 1 and 2 to the list of 1322 suppliers. The application of these sub-criteria led to the identification of a group of 145 suppliers that shared similar characteristics. These suppliers were all selected to supply one product at the most and were suppliers from which GSS purchased with less than 10000 Euros in 2011. Given this fact, the researcher decided to set the priority to this group of suppliers. In the latter phase, another group of suppliers could be targeted by applying the second level sub-criteria or, if needed, by re-defining these sub-criteria.

After a careful analysis of this targeted group of suppliers, it was revealed that 75 suppliers out of 145 were inactive. This means that, at the moment when this testing took place, these suppliers were neither assigned any products nor involved with any business for GSS (0 product purchased and 0 purchasing budget). However, with these 75 suppliers, a deeper investigation was needed to understand the reasons why they were inactive. To do this, the researcher extended the spend analysis over a period of five years and studied the products, if any exist, that were purchased from these suppliers sometime in the past. After this investigation, it became apparent that these 75 suppliers were: (1) either inherited through past corporate acquisitions, but never activated, (2) were selected at some point to supply products, but the actual purchase did not happen, or (3) the product they originally supplied became obsolete and thus terminated from the department product offerings. After eliminating 75 suppliers out of 145, the remaining 70 suppliers that were utilized to supply 70 different products, were classified as “targeted for elimination”.

The activities described above as well as the results from the Framework Development stage are schematized in Figure 22.

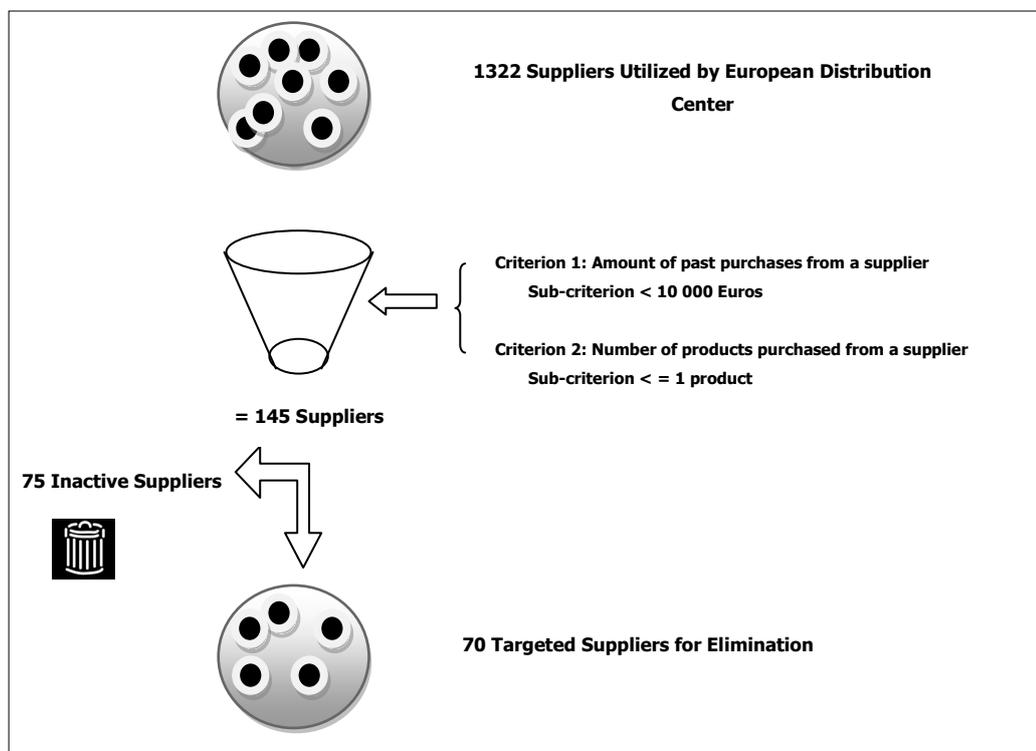


Figure 22. Framework development stage: targeting suppliers for elimination.

As it can be seen in Figure 22, the outcome from this stage was an immediate elimination of 75 inactive suppliers and a list of 70 suppliers targeted for elimination which required deeper product analysis as well as the validation of the remaining supplier elimination criteria.

To summarize, this stage is simple, straightforward, but more time consuming than the first stage. However, to perform it successfully, availability and access to certain data is needed. Next, the supplier elimination criteria need to be methodically developed, according to the need of the entire department and the state of the supplier base. Finally, the activities described above required an involvement of a technical specialist and the sourcing manager. The purchasing department involvement was limited to electronically blocking suppliers or providing the original supplier's information and material data.

### 6.3 Implementation Stage

Once the preliminary list of 70 suppliers targeted for elimination is identified, this stage involves analyzing the products to be resourced. First, as the SBR process stresses, each product has to pass the conditions specified by *criterion 3: supply risk* and *criterion 4: historical turnover of products* as well as *criterion 5: availability of a replacement supplier*.

In reality, during the test it meant that, to be able to eliminate a supplier, the products to be resourced had to fulfil three conditions: (1) the product should not be utilized in manufacturing new equipments or pose any quality or supply risk to NEB department. In practice, it means that, unless an approval is received from NEB, neither the product is resourced to a replacement supplier, nor the targeted supplier eliminate. (2) The product should have a high turnover as specified by SBR team, so that it is not considered for termination. If not, the product could be terminated in accordance with the GSS rules and material management policies. This could potentially eliminate immediately a supplier too. Finally, (3) a replacement supplier should be found unless agreed otherwise, for example, to implement the one-time buy process and then eliminate the targeted supplier.

The outcome from the implementation stage is schematized in Figure 23.

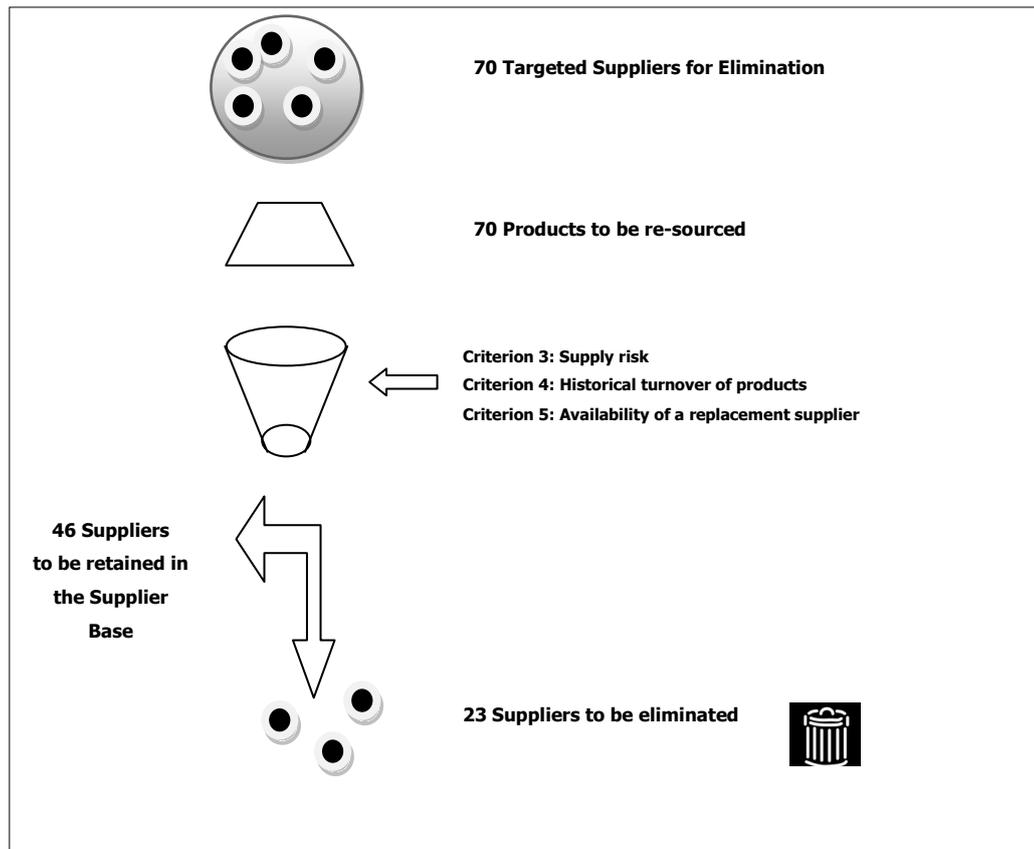


Figure 23. Implementation stage: analysis of products & determining the final list of suppliers to be eliminated.

As depicted in Figure 23, once the steps stipulated by the SBR process were performed, the researcher was able to differentiate between the suppliers to be eliminated from those to be kept in the supplier base. Concerning the results from the implementation stage, 23 suppliers were eliminated, while 46 suppliers had to be retained in the GSS supplier base because the supplier elimination criteria (criterion 3, 4, and 5) were all met.

It is important to note that this stage can be complicated with many intervening stakeholders and sub-steps. Additionally, the products had to be analyzed on an individual level. For clarity purposes, it may be necessary to list all the steps and sub-steps performed in this stage as well as the involved stakeholders. Table 8 summarizes the steps, their aims and the involved stakeholders.

Table 8. Implementation stage: sub-steps and the involved stakeholders.

Step/Sub-step	Aim	Stakeholders
Evaluate the supply risk of products (validation of criterion 3)	<ul style="list-style-type: none"> <li>- Make sure that Products to be resourced are not utilized by NEB department or do not pose any quality or supply risk</li> </ul>	<ul style="list-style-type: none"> <li>- Researcher</li> <li>- Other technical specialists</li> <li>- Sourcing Manager</li> <li>- R&amp;D and PCM</li> </ul>
Analyze the historical turnover of products (validation of criterion 4)	<ul style="list-style-type: none"> <li>- Take decisions related to product termination</li> <li>- Study the possibility to implement the one-time buy process</li> </ul>	<ul style="list-style-type: none"> <li>- Researcher</li> <li>- Other technical specialists</li> <li>- Material and data specialist</li> <li>- Product portfolio manager</li> <li>- Sourcing Manager</li> </ul>
Collect the product specifications (OEM Ref, drawings)	<ul style="list-style-type: none"> <li>- Make sure that every detail is available to resource products from another supplier</li> </ul>	<ul style="list-style-type: none"> <li>- Researcher</li> </ul>
Supplier contact	<ul style="list-style-type: none"> <li>- Send request for quotation (RFQ)</li> <li>- Compare received RFQs</li> </ul>	<ul style="list-style-type: none"> <li>- Researcher</li> <li>- Suppliers</li> </ul>
Availability of a replacement supplier (validation of criterion 5)	<ul style="list-style-type: none"> <li>- Make sure that a replacement supplier is found to products to be replaced</li> <li>- Study the possibility to implement the one-time buy process</li> </ul>	<ul style="list-style-type: none"> <li>- Researcher</li> <li>- Suppliers</li> <li>- Supplier's master data specialist</li> </ul>
Select replacement suppliers & eliminate targeted ones	<ul style="list-style-type: none"> <li>- Select replacement supplier</li> <li>- Block eliminated suppliers</li> </ul>	<ul style="list-style-type: none"> <li>- Researcher</li> <li>- Supplier's database specialist</li> <li>- Sourcing Manager</li> </ul>

As it can be seen from Table 8, the implementation stage consists of multiple steps that incorporate certain sub-steps. In most of the steps, many stakeholders' involvement is required. This shows the importance of having dedicated specialists from different functional backgrounds when conducting such initiatives.

To summarize, the implementation stage, is complex and time consuming. Overall, the performance of this stage depends upon the availability and the clarity of data. Furthermore, the unresponsiveness of suppliers or others internal key stakeholders can significantly hamper the progress. In these situations, it is important to prioritize the tasks in a way that the tasks that do not require much involvement are performed first and those more complicated ones are left for a later step.

#### 6.4 Results and Evaluation of the Process

The testing of the SBR process resulted in the elimination of 103 suppliers which represent a reduction of 6, 6 % of the entire supplier base. During the testing process, most of the eighth steps were implemented which confirmed the applicability and the validity of the proposed process. However, considering the fact that the researcher only tested the process over a limited group of suppliers, it was not possible to perform the last evaluation stage and the SBR initiative is far from being completed.

During this testing, a few challenges aroused. First, a conflict of interests among different teams has delayed some activities. In addition, some stakeholders have been reluctant to share certain data related to the suppliers or the spend. In such cases, the higher management needs to step in to align the cross-functional interests and foster the collaboration among the involved stakeholders. Finally, it is important to note that the SBR is time and labor-intensive, thus having the financial resources and the needed time is critically important for the successful implementation of the initiative.

Concerning the risks of such an initiative, it is true that reducing the number of suppliers could potentially generate supply risk as this implies higher dependence on fewer suppliers. This is the reason why the SBR team need to make sure that other processes such as the supplier development and supplier quality certification programs are in streamlined and in place to address these risks.

As for the lessons learnt, there is one important one which can be emphasized. In fact, due to the fact that in GSS many people are involved with the matters related to supplier selection and re-sourcing activities, the supplier base is very dynamic. In fact, the products are resourced on a daily basis which implies that suppliers are selected or deselected rapidly. For this reason, it is important to note that once a step is completed, there is an urgency to proceed with the next step; otherwise, changes may occur in between these activities which would potentially waste the team's efforts.

Finally, based on the testing phase, the key success factors that could be stressed are: (1) good communication throughout the entire process, (2) reliable information and correct data, (3) clearly defined roles between the SBR team, (4) commitment from each stakeholder, and finally (5) an on-time execution of the assigned tasks.

## 7 Discussion and Conclusions

This Section provides a summary of the study and its initial purpose, and suggests a set of managerial implications to discuss. Finally, the validity and reliability of the study is examined.

### 7.1 Summary

The current literature on the supplier base management emphasizes the importance of reducing the number of suppliers utilized by a company. The concept offers significant benefits to companies; some business practitioners argue that a company is only as good as its sources of supply. Moreover, practical experiences in different businesses show that by reducing the number of suppliers and concentrating purchases, the purchasing costs can be reduced by an average of 10% (Catasta et al).

The aim of this Thesis was to assist the case company department (GSS) to effectively manage and improve the performance of its supplier base. The objective was to develop a process that describes all the activities to be performed in order to successfully reduce the number of its suppliers. The eighth-steps process was developed in this Thesis which describes methodically all the activities that lead to a supplier base reduction. It provides the case company department a systematic, repeatable and documented tool that could be used whenever the need to control the supplier base arises.

Overall, the testing results were promising and the long-term outcome from a supplier base reduction initiative can create a manageable supplier base that will comprise a list of preferred suppliers to collaborate with, as an integrated part of the supply chain. One of the other benefits is that this Thesis sheds light on the root causes of the problem, namely the swelling of the supplier base. Actually, during the root causes analysis of the GSS oversized supplier base, it became apparent that factors such as data and material management, as well as the stock transfer policy need to be reviewed. For instance, the rules related to material creation and stock transfers need to be re-defined and their application monitored. Additionally, the analysis revealed the need for taking courageous decisions regarding the product termination and the management of obsolete stocks. By taking these corrective measures, GSS can efficiently control the supplier base and prevents its future expansion.

## 7.2 Practical Recommendations

The key recommendations for management derived from this study are several. Firstly, an analysis of the department's current supplier base and business practices revealed a need to review certain sourcing practices, since at the moment there seem to be no clear strategy to manage the supplier base. Currently, GSS is too busy expanding its business, acquiring new customers, and growing its product offering. It is concentrating enormously on ensuring profitability through increased selling to customers, and re-sourcing activities. It has become clear that certain sourcing practices seem to take the course of random activities driven by cost reduction without a long-term consideration of the total cost of ownership of the products.

To control costs, especially in the worsening economical situation, GSS may look into its supplier base as a place for potential savings. One of the tools that can be used in generating savings is the supplier base reduction. The concept needs to be considered strategically but not as a quick-fix. For this reason, a winning sourcing strategy needs to define the supplier selection and the supplier elimination criteria in accordance with the case company business needs and the end-customer requirements. The approach is, in this case, reversed as it starts with the customer and then works backward to define the supplier selection criteria and, thus, the sourcing strategy. It is now time to abandon the belief that what matters for a customer the most is the price. In fact, it does to a certain extent, but not solely. In the spare parts business, the availability of the parts, the speed, the clarity of the product specifications, seem to be even more appreciated by customers. However, once these elements fall short, especially if combined with high prices, the customer may be pushed to base his decision-making on the price.

Secondly, the current collaboration design between different departments in regard to purchasing or material management seems to hamper the efficiency of the sourcing activities. In fact, many stakeholders are involved with the matters related to prices, supplier selection or re-sourcing activities. This leads, in some cases, to deviation from the guidelines and confuses the suppliers. In this case, it can be necessary to re-design the way the suppliers are communicated with. In this new structure, supplier contact and communication may be limited to a dedicated team which will act on behalf of the

entire department to perform most of the routine tasks, such as sending the RFQ, re-sourcing activities, and the database update.

Thirdly, a reduction in the size of the supplier base cannot only concern the decision about which suppliers to eliminate and which ones to retain. The suppliers that remain should be treated differently from how they were dealt with before because of the increased level of GSS dependency. For this reason, it is suggested that special attention should be paid to the suppliers' aspirations and the needs arising from this enhanced business relationships, and to switch to a long-term contract-based relationships.

### 7.3 Reliability and Validity

The quality of this study is ascertained based on its reliability and validity. To ensure that a study is valid and reliable, Yin (2009: 40) suggests certain tactics to be followed. He argues that these tactics should be applied throughout the study not just at the beginning. To reinforce both the validity and reliability issues, the researcher used the tactics summarized in Table 9.

*Table 9. Tactics used to ensure reliability and validity in this study.*

Tests	Used Tactic
<b>Reliability</b>	<ul style="list-style-type: none"> <li>- Development of a rigorous research design</li> <li>- Methodical development and recording of each activity in the proposed process</li> <li>- Use of different data sources: interviewees from different teams, numerical data</li> <li>- Use of different data collection methods: interviews, researcher's own experience, literature review</li> </ul>
<b>Internal Validity</b>	<ul style="list-style-type: none"> <li>- Scoping the topics of interest</li> <li>- Use of semi-structured interviews</li> <li>- Strict interviewees' selection</li> </ul>
<b>External validity</b>	<ul style="list-style-type: none"> <li>- Use of literature and available best practices to develop the proposed process</li> <li>- Testing of the proposed process</li> </ul>

As indicated in Table 9, to ensure reliability, the researcher, first, reviewed the available research methodologies and selected the appropriate one to address the research objective. This has allowed the development of a clear research design and the progress of the research in a structured and recorded way.

Additionally, the researcher carefully used multiple data collection methods and data sources to address the same research objective. In fact, the interviews and the researcher's experience at the case company, as well as the literature review, constituted the substance of the data collection process. About 20 interviews were held with different stakeholders about the business problem. This has allowed the researcher to assess the problem from multiple perspectives and arrive at a set of concrete conclusions.

Concerning the internal validity, this was, to some extent, reinforced because the researcher is an employee at the studied department directly concerned with matters related to purchasing and suppliers. This situation has permitted faster learning and contextualization of the process as well as the possibility to make grounded research.

To ensure the internal validity, during the literature review and preliminary investigations, the researcher narrowed down the topic of interest. The preliminary interviews were in the form of open-end interviews with different stakeholders in order to get more insights and familiarity with the business problem and its context. As a means for achieving greater internal validity, the researcher has then clearly defined the activities that could lead to the achievement of the research objective. One of the activities was the interview selection process which was carefully planned, with the interviewees meticulously selected in order to collect the correct data. During these interviews, the *yes and no questions* were avoided in order to give the interviewees a chance to present their own opinions. The interviewees were selected, first, based on their relation to the supplier base problem and, second, on their position in the organizational hierarchy.

The findings from this study are relevant to GSS because the testing of the proposed process has resulted in an effective elimination of 103 suppliers. Moreover, since the GSS supplier base is a constituent part of the entire supplier base of KONE Corporation, the reduction of the GSS supplier base could be seen as a first step towards a final re-structuring of the case company entire supplier base. After certain adjustments, other departments could potentially utilize the findings from this study to conduct a SBR initiative.

Potentially, there are several consequences that could arise from the application of the proposed process. As mentioned earlier, one of the common risks of a SBR is the increased dependence on fewer suppliers. This study, however, stresses the importance of developing a supplier development program to mitigate these risks. Further research may need to develop these programs and further define the supplier's performance key indicators. Future research may also be needed in developing a commodity strategy that would determine the right number of suppliers required per each product group.

Concerning the external validity, it appears to be difficult to evaluate it since critics typically emphasize that single case studies offer poor basis for generalizing (Yin 2009: 43). The generalization beyond the case company cannot automatically be done. Thus, before making any claim for generalization, it is important to replicate the process in other companies. Once such direct replication has been made and the results proved to be similar, the external validity could be more boldly claimed and the finding of this study generalized. Nevertheless, it is important to note that the conceptual process was developed based on the relevant literature and the available best practices which help to reinforce the external validity.

In conclusion, this study compiled many important aspects of the supplier base management. Since an oversized supplier base is a common phenomenon in many manufacturing companies, the findings of this study could be seen as a potential approach of solving this problem.

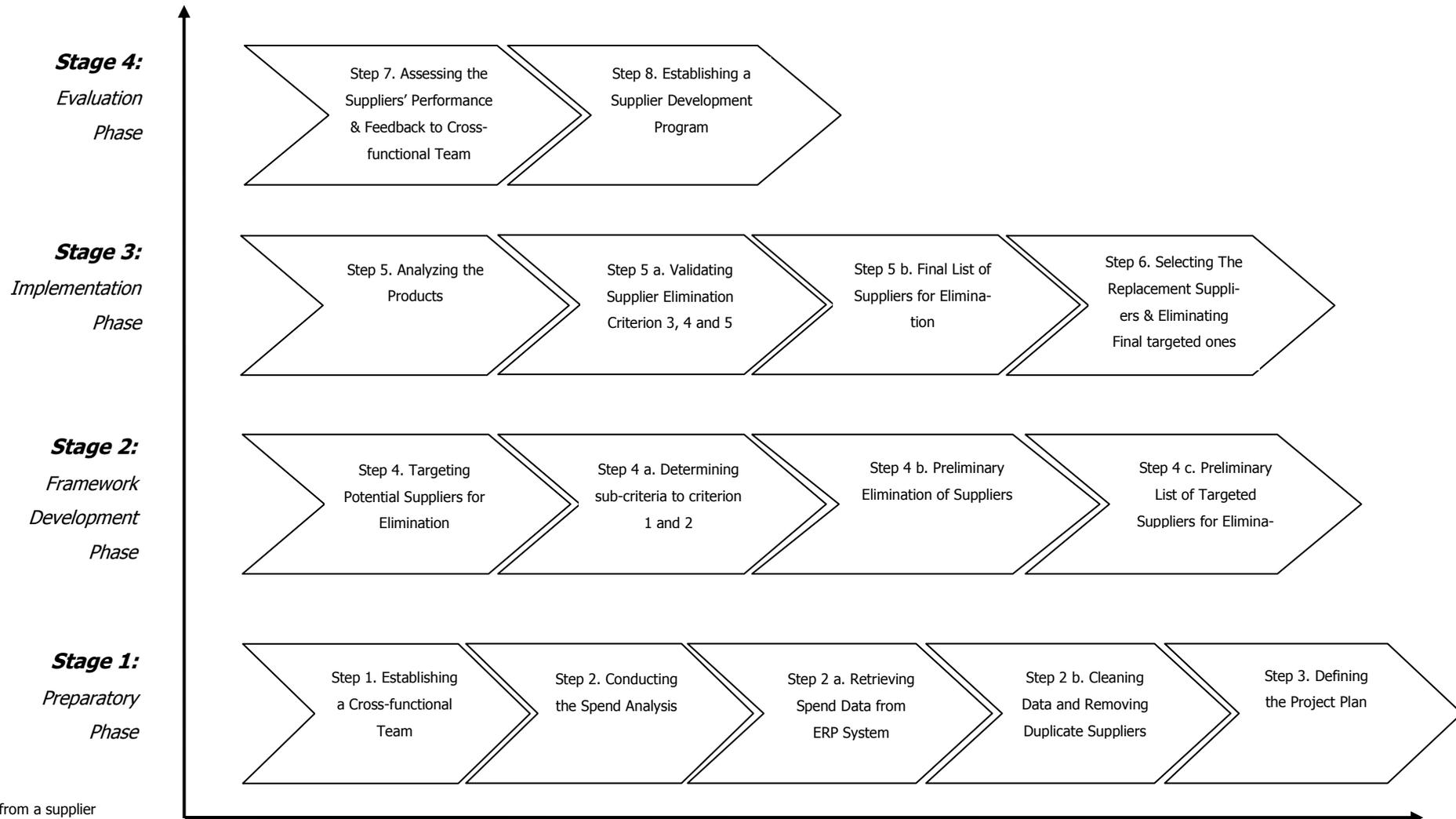
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## The Proposed Process of Supplier Base Reduction



**Supplier Elimination Criteria**

- Criterion 1: Amount of past purchases from a supplier
- Criterion 2: Number of products assigned to a supplier
- Criterion 3: Supply risk
- Criterion 4: Historical turnover of products
- Criterion 5: Availability of a replacement supplier
- Criterion 6: Supplier quality records and service performance

### Schema Representing the Results from the Process Testing

