International Supplier search & selection

Ruud Jelte van Groenewoud
October 2010

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Management summary

The purpose of this study was to model the international search and selection process for new suppliers of mechanical components. Beforehand it was assumed purchasing managers include knowledge about geographical clusters of potential suppliers in their search, and the study was aimed at discovering if and how this practice relates to the overall search and selection process.

A conceptual model was developed from relevant theory. The study used the qualitative method of semi-structured interviews to test this conceptual model. Interviews were held in March 2010 with eight respondents active in the (international) purchasing of mechanical components. The interviews examined whether the knowledge about clusters of suppliers of mechanical components was included in the search and selection process. The analysis of regions and the practice of searching for suppliers and the selection process of suppliers were also addressed in the questions.

Results of the study indicate that clusters are included in the search and selection process of suppliers. The results indicate that a search for clusters and subsequent cluster analysis are the steps of the location search process. After search and analysis, a focused supplier search within the most attractive cluster is carried out. Coexisting to the cluster search and attached supplier search, a general supplier search is carried out representing the more general efforts for finding suppliers. The purchaser's network serves as most important source for the largest part of the information in these processes, and much of the knowledge is tacit and is not applied consciously during the search.

With regard to the supplier selection criteria, a new criterion is found: the click-factor. This factor incorporates a purchaser's feeling when analyzing potential suppliers. Because of the intangible nature, but significant influence in the decisional process of supplier selection, the click-factor emerged as one of the most important findings of this study. The study finds that on the basis of the proposed criteria the interviewees sort suppliers (qualification) and make a final decision from which supplier to purchase (final supplier selection).

The results indicated clusters are included in international supplier search and selection. The principal conclusion was that the model seems appropriate for finding international suppliers of mechanical components. However, it is only applicable in the context of multiple suppliers having more or less the same competencies. Nevertheless, the study finds interesting results on the practice of international supplier search and selection, and finally, the study adds to the field of supplier selection criteria.

The improved model is depicted in Figure 1: Proposed model.

Keywords: international purchasing, supplier search, international sourcing, cluster search

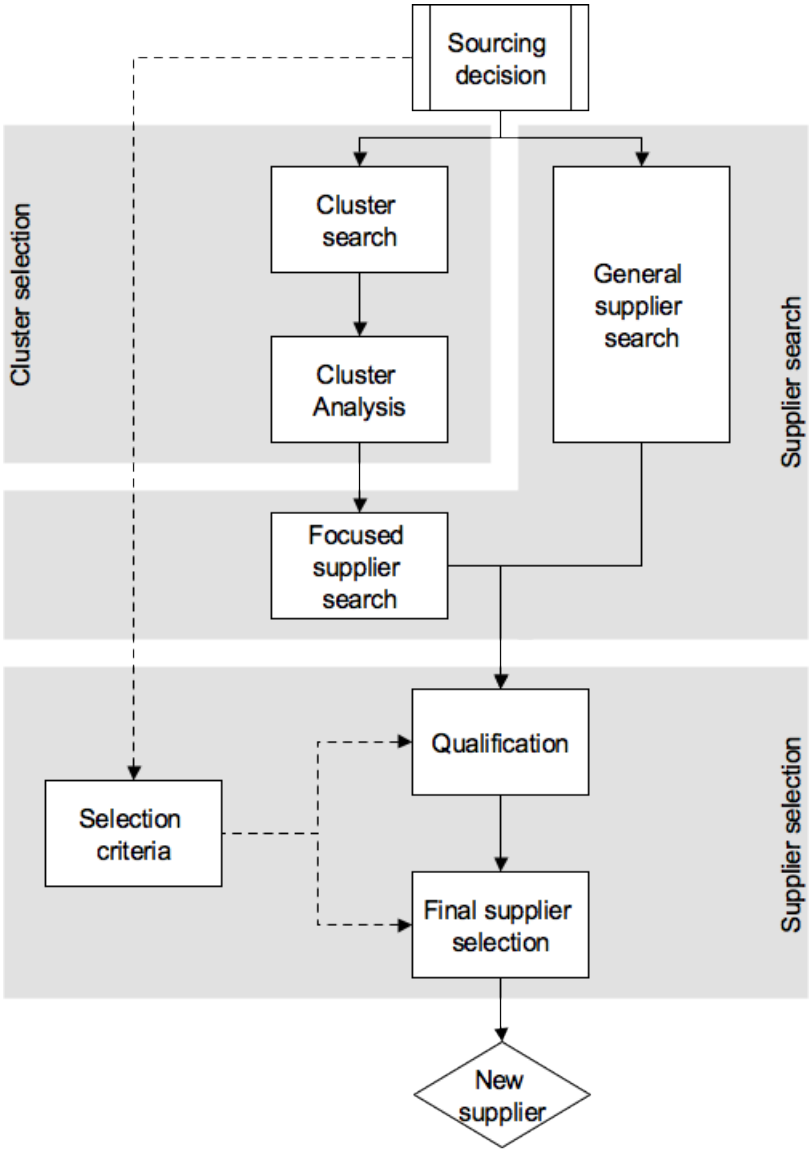

Figure 1: Proposed model

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Abbreviations

AHP	Analytic Hierarchy Process (Decision making theory)
DEA	Data Envelopment Analysis
CBR	Case-based-reasoning
FDI	Foreign Direct Investment
IP	Intellectual property
MAUT	Multi Attribute Utility Theory (Decision making theory)
MCDM	Multi Criteria Decision Method (Decision making theory)
MNE	Multi National Enterprise
MOP	Multiple Objective Programming (Decision making theory)
SME	Small and Medium sized Enterprise
VPA	Vendor Profile Analysis (Decision making theory)

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Over the past months I experienced great pleasure in working, thinking, talking, writing and editing my master thesis for my study International Management. The topic of my master thesis is the opposite from my bachelor's thesis on the topic of sales, enabling me to gain insight into "the other side" of sales while carrying out this study. Now that I reached the point of finishing this study, I must say I have gained more than solely a new insight in purchasing.

Being able to finish this master thesis in Kuala Lumpur perfectly fitted my ambitions in both academic and personal development. Meeting the inspiring person Toon Moors was a tremendous source of new insights on both academic and personal level. I cannot recall someone having more impact in both these areas the last period. For that, I would greatly like to thank you Toon!

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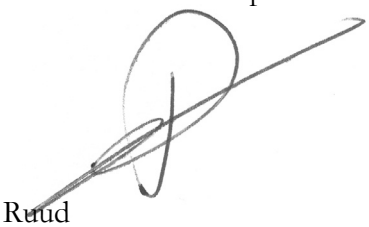

Ruud

1. Introduction

1.1 Background of the research

In the light of graduating for the study international management, this study addresses the practice of international supplier search and selection. The context of the study is small and medium enterprises (SMEs from hereafter), where the organization is sourcing mechanical components. This SME context is particularly interesting because Pressey *et al.*, (2009) found SMEs gain much from external resources, and thus the search and selection of good international suppliers would be of particular benefit. The sourcing of mechanical components draws my personal attention because of my background in engineering management.

The search for suppliers is one of the tasks within purchasing. Purchasing itself has become an increasingly important business function and according to Quintens, Pauwels and Matthyssens (2006), organizations need to put a continuous effort in finding the best supply chain in order to stay competitive within the fast moving global marketplace. Overby and Servais (2005) add to this that the increasing strategic importance of purchasing as business function is driven by factors like reducing numbers of suppliers due to the globalization of the market, increased demands on suppliers, the ongoing efforts to cooperate with suppliers and shorter lead times. Sourcing is thus found to be an important business function within organizations.

Opposed to the benefits of international sourcing such as lower price, better quality, more options and access to world market technologies (Overby and Servais, 2005), organizations also face different risks. Motwani *et al.* (1999) find that poor quality is the main factor of risk involved with international sourcing. Next to quality, Overby and Servais (2005) identify six other obstacles related with international sourcing: delays in transportation; exchange rate fluctuations; costs of travel; language problems; quantity of paperwork and finally inspection procedures.

Related to these risks the overall objective of purchasing is reduction of this purchase risk, the maximization of overall value and the establishment of long-term relationships and closeness between supplier and purchaser (Chen, Lin and Huang, 2006). Muralidharan *et al.* (2002) add to this statement nearly all material managers view the selection of suppliers as the most important decision problem in today's competitive business environment. Accordingly, Chen, Lin and Huang (2006) emphasize that purchasing is increasingly seen as a strategic tool by top management; a major barrier to entry is being built when long-term relationships are formed with suppliers and argue supplier selection will become an important issue for effective supply chain management.

The evolving perception of the purchasing function can be noticed in the following changing general descriptions of purchasing. From being considered a simple administrative task for obtaining goods at the lowest price possible, it has evolved to a major strategic function contributing to the success of an organization (Gadde and Håkansson, 2002 and Gelderman and Albronda, 2003). The following citation from the paper of Gadde and Håkansson (2002) about the traditional view of efficiency in purchasing in the 1980s illustrates a view from the past:

"*Price has been the principal yardstick by which manufacturers have traditionally selected their suppliers. By spreading their purchases among several suppliers, it is argued, manufacturers can achieve the cheapest price and the greatest assurance of a secure flow of material (Dillforce, 1986, p. 3).*"

This is opposite to the more recent definition of purchasing given below by Van Weele (2009). This definition illustrates a broader spectrum of activities, and an increased importance attributed to purchasing nowadays:

"*Purchasing [is] the management of the company's external resources in such a way that the supply of all goods, services, capabilities and knowledge which are necessary for running, maintaining and managing the company's primary and support activities is secured under the most favourable conditions.*"

Purchasing appears to get more and more important, and receives increased attention in an organization's daily business. It would suggest international supplier search and selection has gained much attention in today's academic research.

While identification and selection of international suppliers is regarded as one of the most important decision problems (Muralidharan *et al.*, 2002), remarkably little attention in academic research was, to the best of my knowledge, paid to these two interwoven steps. Overby and Servais (2004) notice research in sourcing to date is focused on three main areas. First, barriers and motives experienced with supplier selection and rejection, secondly the process of deciding which supplier to choose from a list of potential candidates and thirdly the relationship of organizations with suppliers. Quintens *et al.* (2006) notice relatively little research has been done in the field of international sourcing and supplier selection, despite that the perception already exists for decades that "supplier selection is purchasings most important responsibility" (Zhang *et al.*, 2003). Although Zhang *et al.* (2003) remark the number and quality of research is increasing, it still falls behind other research fields in international business (Quintens *et al.,* 2006) despite its relative strategic importance.

Since apparently little research has been done on the total search and selection process for international suppliers, it would be practically relevant to study this concept. Awareness of how international suppliers are actually located and found by purchasing managers could improve effectiveness of searching.

1.2 Research problem

From the discussion above, we can conclude that purchasing has become an increasingly important business function with opportunities for improvement. International purchasing knows a series of benefits, particularly interesting for SMEs but little attention is paid to the search and selection process of suppliers in academic research. From the perspective that clusters (this term is explained below) are included in this process, this study addresses the problem of international supplier search and selection in the following manner:

"*What model is appropriate for SMEs to select a cluster, and the best supplier within this cluster for the sourcing of mechanical components?*"

In the research question above, a few terms are used which require a brief elaboration for basic understanding on what we are talking about. Firstly, clusters are defined as a geographical concentration of interconnected businesses and associated suppliers, institutions and facilities. Why it can be meaningful to analyze clusters for finding good suppliers is explained in Porter's (1990) theory of clusters of competence. Section 2.2.1 International search for clusters elaborated more comprehensively about Porter's (1990) cluster theory and reason why a cluster search is a good method for finding good suppliers.

Secondly, the research problem solicits that it would be practical to define 'sourcing'. Previously the evolving perception of sourcing was addressed, in order to fully explain this, we first shed our light to the broader field of 'outsourcing' to narrow it down to what 'sourcing' actually means, and take away any misconceptions about the interchangeability of these terms. Observing the word 'outsourcing', one might notice it stems from the words 'out' and 'sourcing' which could also be referred to as external sourcing (Franceschini et al. 2003). 'Outsourcing', however, is defined as the strategic process of specializing in the organizations' core competencies and contracting out the other –non-core competence - functions within the organization (Cheraghi *et al., 2003*). This differs from (international) sourcing in the way that 'sourcing' is defined as "the activity of searching and obtaining goods, services and other resources on a possible worldwide scale, to comply with the

needs of the company and with a view to continuing and enhancing the current competitive position of the company" (Quintens *et al.*, 2006). Summarized, sourcing is making sure the right goods or services arrive at the right time, at the right place, at the right price (Sarkis and Talluri, 2002).

Thirdly, mechanical components addressed in the research question include parts for, or partly assembled, machines. Examples are products such as standard and machined parts, sheet metal parts, electrical and electronics parts. The images below illustrate examples of typical mechanical components.

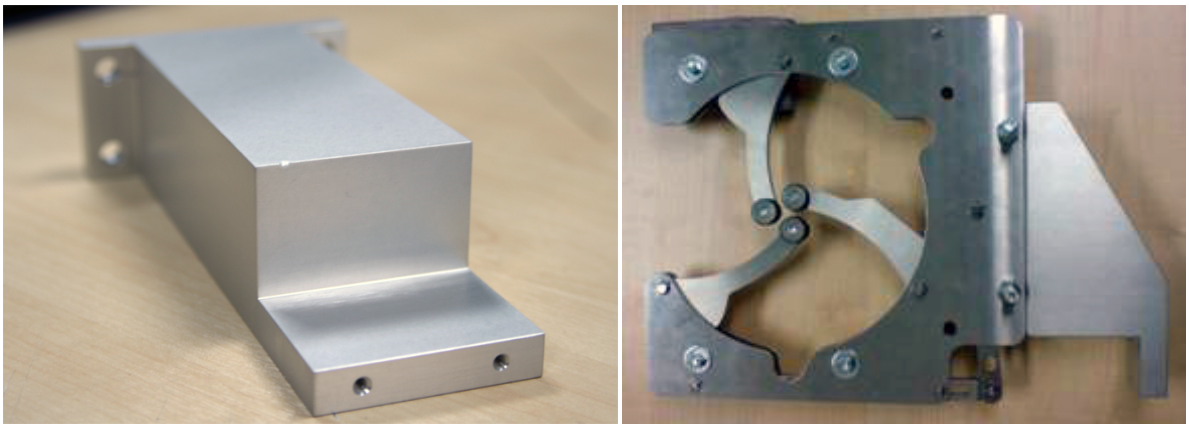

Figure 2: Mechanical components

For this research it is assumed the search and selection process starts with the intention from the purchaser to invest in a long-term relationship with new suppliers. In this case, long-term relations are built on multiple deals over a period of time. This implies the new supplier and supplied parts are important for the purchasing organization, and thus the search and selection process is consequently attached importance.

The study focuses to study an overall working method instead of the detailed exploration of particular steps within the model. Since a large body of knowledge exists on supplier selection models, this topic receives lesser attention during this study. Furthermore, although the value of decision-making methods is deeply recognized, it is desirable to make the most valuable contribution possible with this study. Hence, this study aims to further explore the general pattern of cluster- and supplier selection within the practice of searching for suppliers internationally.

1.3 Research strategy

In order to come to a solid conclusion with regard to international sourcing, a deductive research strategy is adopted. The current body of literature is studied with the intention to develop a conceptual model and several theories will be combined in order to develop a model regarded as most efficient in cluster and supplier selection.

After the model is developed from theory, the study will test the model and develop an improved version from these tests. The developed conceptual model is tested by means of eight in-depth interviews with in-field experts, in this case being international purchasing managers from different organizations spread through The Netherlands.

The data drawn from these interviews is used as a basis to test the conceptual model and, when necessary, to design an improved version of the model.

1.4 Outline of the thesis

Chapter 1 states the background and research problem and describes the overall research approach taken.

In Chapter 2, literature about the relevant subjects is discussed. First, theory about cluster selection methods is discussed, followed by an elaboration on supplier search and selection. The remainder of the chapter is concerned with discovering the limitations that apply in a small and medium sized context, and the chapter ends with a presentation of the conceptual model derived from theory.

Chapter 3 explores the methodology used for researching the proposed conceptual model. In the first part, the conceptual model is operationalized in order to carry out the research most efficiently. In the second part of the section, it is found conducting semi-structured interviews match the type of research problem of this study. Chapter three ends with a discussion on the data processing of the found results.

Chapter 4 explores the results found from the interviews. The first subsection elaborates briefly about the subject under study. In the second subsection, results from the interviews regarding international cluster selection are presented. The third subsection is concerned with a presentation about the results about the international supplier selection. The chapter ends with conclusions regarding the results of the study.

Chapter 5 is concerned with the improvement of the conceptual model to reflect the results. First, the conclusions regarding the theoretical propositions of the conceptual model are drawn. In the second and final section of chapter five, the theoretical model is presented.

The aim of Chapter 6 is drawing conclusions regarding the research problem. The first subsection draws the final conclusions about the theoretical model. The second section gives a reflection about the study and sets it in perspective. In this subsection the results relative to the research problem and the total process of carrying out this study are considered. The final subsection of chapter six makes recommendations for further research.

2. Theoretical framework

2.1 Introduction

The first acts of trading among nations exists from the 19th century B.C., when an Assyrian (Iraqi) merchant colony was located at Kanesh in Cappadocia (Turkey) (Stearns, 2001). Since then, trade among nations has grown and increased in size, intensity and complexity. In the ancient times, vessels with Indian and Egyptian goods travelled to Aden (Yemen) (Young, 2001) and the Silk Road was established between the Chinese Han Dynasty and the Roman Empire. In the Middle Ages Guangzhou (China) was the world's greatest seaport and trade between India and Aden intensified (Donkin, 2003). Even later, in 1598, a Dutch vessel returned 275.000 kilograms of East Indian products (Donkin, 2003) to The Netherlands. This was the basis for world's first multinational corporation, the Dutch East India Company (VOC) (De Vries and Van der Woude, 1997). More recent developments are the establishment of the European Free Trade Association in 1960 and the World Trade Organization (WTO), which illustrates the growth and increasing complexity of trade among nations and regions.

As can be seen from the previous examples, trade among regions exists for many centuries and is often found to be an interesting concept to study. A few centuries ago, trade was more concerned with for example bringing back spices and other products from India to Europe. Nowadays trade is a much more complex process, and organizations specifically search for complex products or services to import from abroad. Since the world has opened up regarding international trade, borders disappeared and globalization effects changed the environment organizations face. Organizations face more risks because of new competition, previously protected from by their local governments. However, globalization also means having access to new opportunities such as suppliers traditionally less interesting or completely inaccessible.

Chapter one formulated the research problem, which is concerned with international supplier search. In section 2.2, the theoretical foundation is laid for the search and analysis for clusters by exploring theory about this subject. The field of international supplier selection is addressed in section 2.3. The boundaries experienced by small and medium enterprises (SMEs) are studied in section 2.4. The conclusions of this section add to the perspective in which the conceptual model will be regarded. Finally, section 2.5 presents the conceptual model built from the theoretical study in the previous sections.

2.2 Cluster selection

From what can be observed from the introduction above, from ancient times certain goods originated from specific regions. In this section, A.T. Kearney's (2003) model for cluster selection is introduced and this section finds that specific regions are still important sources for specific goods. Hence, this section presents the theoretical justification of cluster search and –analysis, which are the basis of the two steps taken in the region selection.

A.T. Kearney (2003) addresses a model for country selection for international business venturing. Employees of A.T. Kearney (2003) developed a three-phase framework for country selection. Phase one in this model is concerning a general country selection; in this phase the model narrows down the universe of countries by using widely available data for measurement of attractiveness, such as presence of multinational corporations, availability of skilled labour, degree of IT and business-maturity. The remaining regions are evaluated in a focused region analysis, involving an analysis to find the best matching region in terms of business continuity. The final step in the model involves a business venturing location decision. The model is depicted in Figure 3: A.T. Kearney (2003) model for international business venturing.

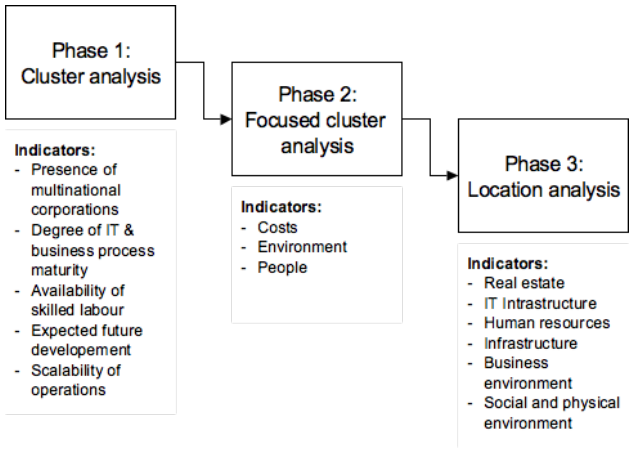

Figure 3: A.T. Kearney (2003) model for international business venturing

Although this model is focussed on business venturing instead of sourcing, two arguments can be used for following the main approach suggested by the A.T. Kearney (2003). First, the A.T. Kearney (2003) model can be used as a general method for identification of attractive clusters. Secondly, the main objective of finding attractive clusters is the same. Hence, this approach can be followed although a different interpretation of the steps would be desirable in order to make the model valuable for international sourcing. Having these arguments in mind, the A.T. Kearney model for business venturing is used as overall guidance in the first two steps of cluster selection and - analysis.

2.2.1 International search for clusters

In the A.T. Kearney (2003) model, the first step is to identify clusters worldwide. This step intends to narrow down the search for suppliers of mechanical components from everywhere in the world, to a few important clusters. Hence, the search is limited to the most attractive clusters to source from.

Why it can be meaningful to analyze clusters is explained by Porter's (1990) theory of clusters of competence. Porter (1990) argues the existence of geographic concentrations of competent organizations. These concentrations are being formed because of the competitive advantage of interconnection among these concentration organizations, suppliers and relevant and supporting institutions in a sector. Porter considers these geographical concentrations of industries to positively influence production and innovation, giving the cluster an even greater competitive edge against its rivals not located in these clusters. Also Porter finds the advantages to be multiple and diverse: the organization's suppliers, competition, and employees all benefit from being located in a cluster. High availability of educated employees, stimulation of innovation due to dynamic employee exchange and organizations and suppliers working closely together thus stimulating availability of products all have a positive effect on the competitive advantage of organizations in clusters. This feeds an ever-increasing competitive advantage and thus increases relative attractiveness of the organization's products. In conclusion, Porter finds that when organizations group in a geographical region they become increasingly competitive. In this study, clusters are perceived as the clustering of organizations in a geographical region.

The research question implies that selecting a cluster is the first step in the search process for suppliers of mechanical components. Basically, the angle of incidence in the research question is that the universe of suppliers is narrowed down to one or a few specific sourcing clusters where the best suppliers are situated and thus good suppliers are found.

Research indeed finds certain groups of products are often purchased in specific geographic clusters (Overy & Servais, 2003). Hence, amongst others, the identification of purchasing flows from specific geographic clusters would imply searching for these clusters is indeed a logical first step in the A.T. Kearney model in order to find attractive suppliers (Figure 4: Conceptual model (Cluster search)).

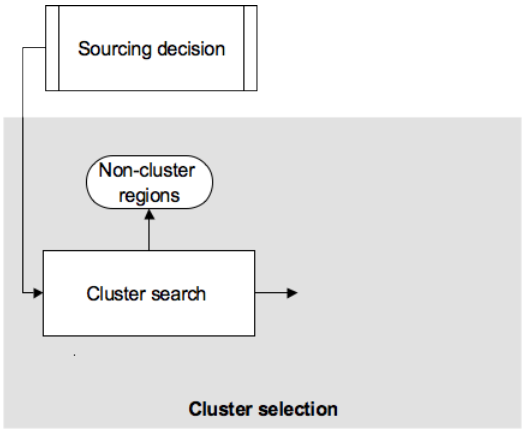

Figure 4: Conceptual model (Cluster search)

2.2.2 Analyzing the found clusters

In the cluster search, a few attractive clusters are identified and selected. In the second step of the A.T. Kearney model, an analysis distils the most attractive business-venturing cluster found in the cluster search. For this end, the A.T. Kearney model uses 30 factors to measure attractiveness. However this study focuses on international sourcing, which makes utilization of the proposed cluster analysis factors by A.T. Kearney impractical. In this section, the proposed factors from the A.T. Kearney model are replaced by factors readily applicable for cluster analysis for the purpose of international sourcing. Given the fact that the A.T. Kearney model is focused on finding a cluster for business venturing, two arguments can be used why the proposed cluster analysis factors are not practical to use. Firstly, the proposed factors for analyzing the found clusters in the cluster search are unusable since it measures the investment climate in a cluster. Secondly, another method exists for analyzing clusters for sourcing of mechanical components that can replace the less appropriate factors proposed by A.T. Kearney. To address the research problem at hand, the proposed cluster analysis factors by A.T. Kearney are replaced by more suitable factors.

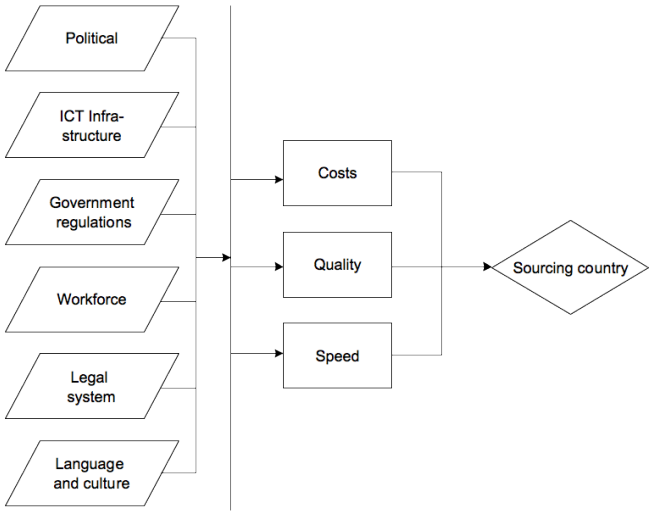

Figure 5: Sourcing cluster selection framework (Palvia, 2004)

Palvia's (2004) framework for analyzing clusters reflects the search for suppliers of mechanical components better than the A.T. Kearney framework. Palvia (2004) recognizes the influence of six decisional factors in the main analysis of from which cluster to source: political, ICT infrastructure, government regulations, workforce, judiciary and legal system and the factor of difference in language and culture. The final choice is based on these six factors, which determine in conjunction with the most favourable conditions costs, quality and speed, the most favourable cluster to source

from. Practically, this means the cluster with the lowest total costs, delivering the best quality with the shortest lead time will be chosen above the other options, although the six main analysis factors are of influence as well. Palvia (2004) based the analysis of which cluster is most attractive to source from thus on six main factors, and three final decisional factors (see Figure 5: Sourcing cluster selection framework (Palvia, 2004)).

By means of the discussed model, clusters can be analyzed and ranked on their own specific characteristics. The goal of this analysis is to find the closest match, relative to the purchaser's own characteristics and wishes to overcome most problems faced with international sourcing while maintaining its benefits.

Analyzing the clusters found in the cluster search to identify the most attractive clusters would be, on basis of the factors for analysis of sourcing clusters, a logical second step in the search for international suppliers (Figure 6: Conceptual model (Cluster selection))

2.2.3 Conclusion

This thesis tries to fill the gap in literature by finding an answer to the questions "where" in the field of international sourcing.

For the first step, a selection is made between virtually every country and cluster worldwide that can host possible suppliers. From the theories of Porter, it can be learned searching for clusters of suppliers is a comprehensive and effective way of locating best in class suppliers. Identifying relevant clusters of competent suppliers could be a first step to finding a good potential supplier of mechanical components.

In the second step, the clusters from the cluster analysis are evaluated to find the most attractive cluster to source from. Palvia (2004) has proposed a framework for the analysis and selection of clusters and countries. Utilizing the typology of this framework in the second phase, thus analyzing the different clusters selected by the cluster analysis limits the necessary work and acknowledges the six most important differences to keep in mind.

Concluding section 2.2 and drawing conclusions with regard to the conceptual model, a cluster search and subsequent analysis are expected to be the first two steps taken in the search process (see Figure 6: Conceptual model (Cluster selection)).

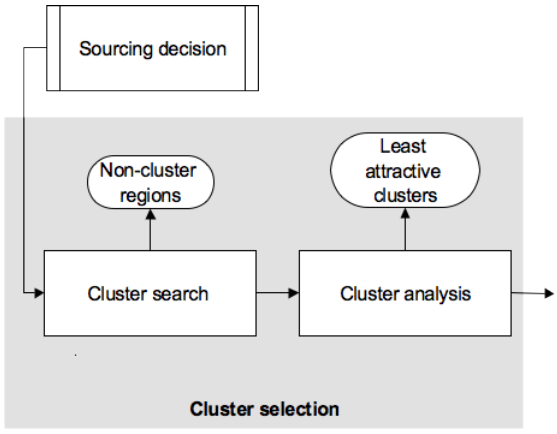

Figure 6: Conceptual model (Cluster selection)

2.3 International supplier selection

The objective of the study is selecting the best supplier from the found cluster. The objectives of this paragraph are to explore relevant literature on the subject of supplier selection, and consequently develop the remainder of the conceptual model.

Surprisingly, most models assume a list of available suppliers is miraculously available. One clear example is the model from De Boer (2001) who assumes that, after the problem- and criteria formulation, one directly begins with supplier qualification and final selection. However, before any considerations can take place, a supplier search within the found clusters has to be carried out in order to have available any potential candidates to choose from.

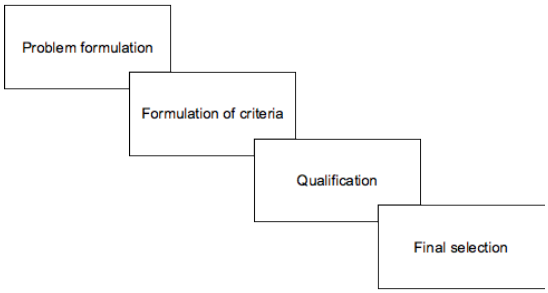

Figure 7: Supplier selection process (De Boer *et al.*, 2001)

After a supplier search within clusters, the found suppliers have to be selected in a defendable method. Contrary to the field of supplier search processes elaborated about in 2.3.1 International supplier search, much has been written on the subject of supplier selection methodologies. Before exploring the literature in detail, a short overview of findings about this process if given to explain choices made.

Research found nearly all material managers regard supplier selection as one of the most critical processes, and supplier selection is considered a key strategic decision that is prone to errors (Wadhwa and Ravindran, 2007). Hence, a full assessment of the varying strengths and weaknesses of suppliers is recommended by for example Muralidharan (2002) before proceeding to order placement. A structured approach in order to come to a defendable decision in international supplier selection would simplify this task. Therefore this subject gained much attention in literature recent years. De Boer (2001) identified four main phases in the supplier selection process, as shown in Figure 7: Supplier selection process (De Boer *et al.*, 2001). First, in the problem formulation phase, the question to buy or not to buy is asked by the purchasers; the type of consideration which falls outside the scope of this thesis. Secondly, the supplier selection criteria are considered: on what criteria are suppliers evaluated and what weight is attached to these criteria? Thirdly, qualification of suppliers sorts the found suppliers to workable smaller sets of potential candidates. Fourth and finally, the final selection phase decides among the found acceptable suppliers from the qualification phase. This process finds the best suppliers from the available options. From the steps taken in the approach from De Boer (1998), two types of supplier selection can be distinguished. These approaches will be discussed briefly to define the direction taken in this study. Firstly, single deal and multiple deal models can be distinguished with accordingly an attached importance to the supplier. Single deal models are concerned with buying with a supplier only once under most favorable conditions, mostly price. Multiple deal models, however, are concerned with recurring purchases with the same supplier. Consequently, other more complex conditions are more important in this context. The research problem defines this choice for multiple deal searches, implying a weighted search and selection of suppliers.

Secondly supplier selection can be divided in 'new task' situations and 'rebuy' situations (see Table 1: Supplier selection situations (De Boer, 1998)). New task situations are essentially more difficult because data about the new supplier is unknown. Rebuy situations fall into evaluation and relationship management processes, which essentially fall in supplier relationship management and thus fall outside of scope of this study (see for examples: De Boer, 2001). This study focuses on the 'new task' situation, thus where data about new suppliers is unknown.

Table 1: Supplier selection situations (De Boer, 1998)

	New task	Modified rebuy (leverage items)	Straight rebuy (routine items)	Straight rebuy (strategic/bottleneck)
Problem definition	Use a supplier or not? Varying importance	Use more, fewer or other suppliers? Moderate/high importance Repeating decision	Replacing the current supplier? Low/moderate importance Repeating decision	How to deal with the supplier? High importance Repeating evaluation
Formulation of criteria	No historical data on suppliers available No previously used criteria available Varying importance	Historical data on suppliers available Previously used criteria available	Historical data on suppliers available Previously used criteria available	Historical data on suppliers available, yet very few actual selections Previously used criteria available
Qualification	Small initial set of suppliers Sorting rather than ranking No historical records available	Large set of initial suppliers Sorting as well as ranking Historical data available	Large set of initial suppliers Sorting rather than ranking Historical data available	Very small set of suppliers Sorting rather than ranking Historical data available
Choice	Small initial set of suppliers Ranking rather than sorting Many criteria Much interaction No historical records available Varying importance Model used once	Small to moderate set of initial suppliers Ranking rather than sorting Also: how to allocate volume? Fewer criteria Less interaction Historical data available Model used again	Small to moderate set of initial suppliers Ranking rather than sorting Fewer criteria Less interaction Historical data available Model used again Single sourcing rather than multiple sourcing	Very small set of suppliers (often only one) Historical data available Evaluation rather selection Sole sourcing

With respect to the choices made before, the model from De Boer *et al.* (2001) is taken as overall approach. Because of including a qualification step before the final supplier selection, the approach of De Boer *et al.* (2001) is considered to take an efficient approach by reducing the large amount of potential suppliers quickly. This justifies following the approach of De Boer *et al.* (2001) in the supplier selection phase.

This section is structured using the model from De Boer (2001) as overall guidance. First, section 2.3.1 is exploring the literature written about supplier search. Secondly, in section 2.3.2 the literature about supplier selection factors is explored and elaborated about. Thirdly, a brief light is shed on supplier qualification in section 2.3.3. Fourth, the final supplier selection is briefly elaborated about.

2.3.1 International supplier search

Before supplier qualification and -selection processes can be conducted, suppliers need to be identified in the most attractive clusters. This section finds several methods of supplier search, although little research has been found on the practice of international supplier search. Nevertheless, a few useful approaches can be advised for in the conceptual model and this study might add to this point.

The study of Overby and Servais (2005) found several sources are utilized in the international search for suppliers. These methods include finding new suppliers through trade fairs or exhibitions, through directory services or other references, through own exports or sales agents, through advertisements in journals or newspapers, or through other suppliers. It should be stressed that these methods are practiced by Danish SMEs, but the results can still be of valuable use in this research.

Searching for suppliers within the clusters found from the location selection phase eventually generates a shortlist of suppliers to begin a supplier qualification and selection (Figure 8: Conceptual model (Supplier search)).

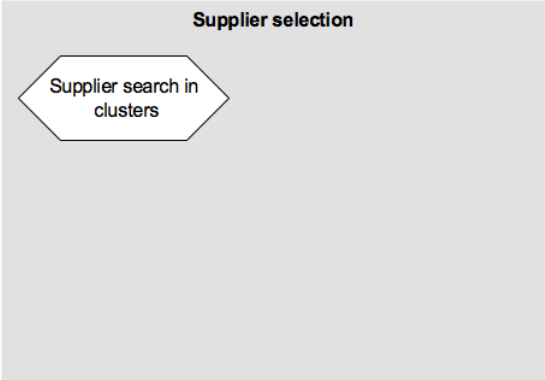

Figure 8: Conceptual model (Supplier search)

2.3.2 Supplier selection criteria

To follow the model from De Boer (2001), the second step consists of the establishment of supplier selection factors. Supplier selection factors play an important role in the decision making process of which supplier to choose, since all possible suppliers are measured on these factors. This section explores literature about the supplier selection factors to date.

Traditionally, suppliers were selected in basis of few factors: their ability to meet quality requirements, price offered and compliance with delivery schedules was decisive (Muralidharan *et al.*, 2002). However, in the early days of international purchasing literature, Dickson found, in his study in 1966, twenty-three key-factors on which manufacturing firms select their suppliers. Many studies repeated the research topic of supplier selection factors from Dickson in today's globalized business environment. Although the top-three remained relatively constant, new factors showed up replacing some of the 23 factors, and other factors are were found to be "*passé*".

Nowadays, many more factors seem to be taken into consideration (Muralidharan *et al.*, 2002). The literature review of Cheraghi *et al.* (2004) recapitulate 86 papers on this topic in the timeframe 1990-2001. They derived a top-30 of most important key factors for supplier rating with quality ranking first, delivery second and price third. Accordingly, Zhang *et al.* (2003) found a somewhat similar top three, with price first, quality second and delivery third. Overby and Servais (2004) find a slightly different set of factors with the constant and main important factors being price, availability, quality and delivery dependability and side factors being international orientation, product technology and mutual trust and knowledge. Flexibility in production processes, required travel expenses, IP risk, communication problems and currency fluctuations all also found to be taken into account (De Technologiekrant, 2010). Although many factors seem to be important, it appears that price, quality and delivery are the top three of most important supplier selection factors in most studies.

One of the proposed sets for structured measuring of international supplier selection factors is proposed by Min (1994). Min (1994) proposes in his international supplier selection framework eight factors to measure international suppliers on:

1. Quality
2. Delivery
3. Price
4. Technical capability
5. Financial position
6. Facility
7. Flexibility
8. Service

Min (1994) argues supplier selection attributes should be used to measure the supplier selection factors to be able to compare these factors effectively; "most decision makers cannot simultaneously handle more than seven to nine criteria when making a decision. As such, it is possible to break down the complex problem into more manageable sub problems through the multi-levelled decision hierarchy". It is thus desirable to structure attributes on which suppliers are measured under the most important supplier selection factors, in order to make a defendable comparison and decision (see Figure 9: International supplier selection criteria from Muralidharan (2002), adapted from Min (1994)).

Although elaborated about later in the operationalization of the model (section 3.2.4 Supplier selection factors), the remark should be made that Min's (1994) model in this study is adapted by the factors proposed by Muralidharan (2002). In line with the research problem of finding suppliers of mechanical components, Muralidharan *et al.* (2002) proposes a set of supplier selection factors specifically focused on the selection of manufacturing organizations. Since under the 'new task' situation no historical data of suppliers can be taken into account, the framework of Min (1994) is adapted by the newly proposed set of criteria from Muralidharan *et al.* (2002). The implication is that the proposed "past performance attitude" (not available in this study) is replaced by Min's factor "Financial position" indicator.

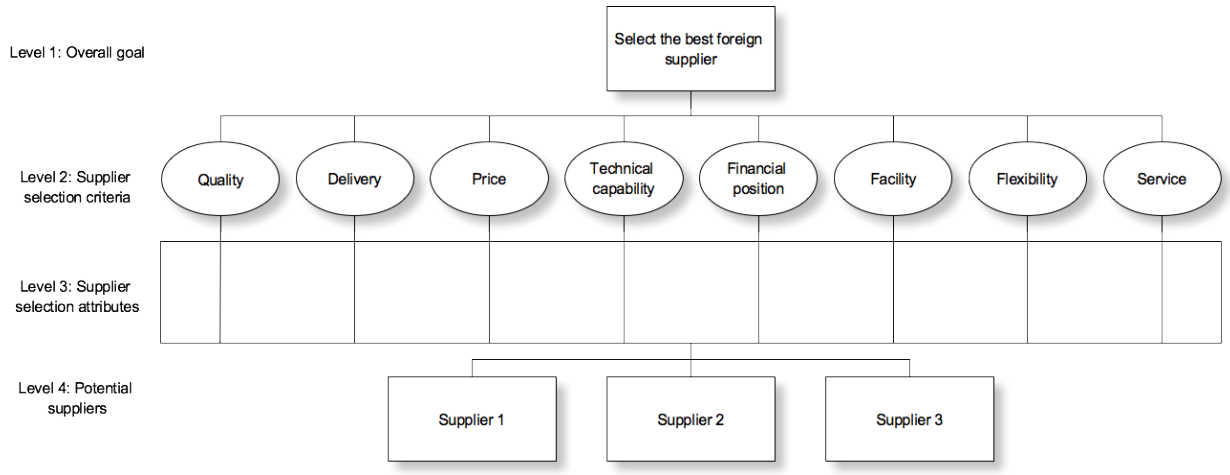

Figure 9: International supplier selection criteria from Muralidharan (2002), adapted from Min (1994)

Finally, two arguments can be made to use the proposed set of supplier selection factors. First, using the international supplier selection model from Min (1994) and adapting it with the measurements from Muralidharan (2002) is structuring the important consideration of supplier selection factors in a defendable and more up-to-date way. Second, most international supplier selection models do include factors of culture and international trade barriers. These issues are already considered in the cluster analysis, and suppliers who have serious problems regarding these issues are already excluded from the analysis taking these factors in account. By focussing the supplier selection factors on the product dimension, the involved analysis will be more efficient and fits more within the little resources managers in SMEs have.

Thus making use of the set of international supplier selection factors proposed by Min (1994) would be, after updating the set with the criteria from Muralidharan (2002), a logical set of supplier selection factors to use on the conceptual model (Figure 10: Conceptual model (Supplier selection criteria)).

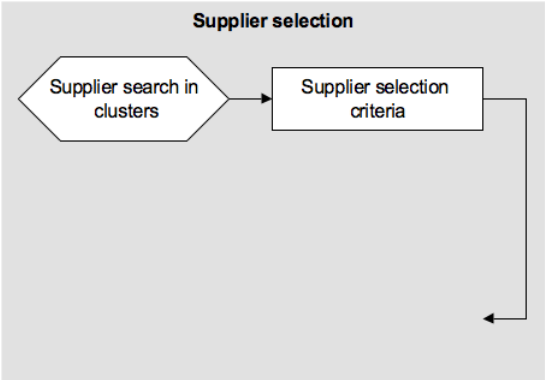

Figure 10: Conceptual model (Supplier selection criteria)

2.3.3 International supplier qualification

The set of supplier selection factors is already important in the supplier qualification process that follows.

In the supplier qualification process, the amount of suppliers found during the supplier search is reduced: no direct choice between suppliers is being made during qualification and this step is consequently more of a sorting than a ranking process. Supplier qualification is determines which suppliers are *acceptable*, while supplier selection is more focused on the reduction of the number of potential suppliers. This is probably also the reason why supplier qualification did not receive any extensive attention in academic research (yet).

However several methods can be distinguished (De Boer *et al.*, 2001):

Name	Method	Measurement	Complexity
Categorical methods	Qualitative sorting of suppliers based on the historical data and the purchaser's previous experiences. Suppliers receive an overall rating on the same scale, making comparison easy. In this way, three categories of suppliers emerge.	Categorising suppliers as 'negative', 'neutral' or 'positive' by ticking a checkbox on a list of measurements aimed at measuring supplier selection factors.	Low
Data envelopment analysis (DEA)	By comparing the most favourable sets, suppliers (or when comparing initial bids) can be classified into either being efficient or being inefficient.	Suppliers are rated on the outputs (i.e. performance) and in the weighted sum of inputs (i.e. costs).	High
Cluster analysis	These methods compare items statistically using a classification algorithm. This results in a classification of clusters of comparable suppliers.	The measurements are assigned numerical attributes, and a calculation is made when the differences between the items within clusters are minimal and when the differences between the clusters are minimal.	High
Case-based-reasoning (CBR)	These systems fall into the category of artificial intelligence (AI) approaches.	From a database the decision makers is provided with information and experiences from similar decision situations before.	High

All the methods listed before are aimed at sorting suppliers. This distinguishes the qualification phase from the final supplier selection; the final supplier selection step concerns making a "best" choice. Qualification, on the contrary, is about globally sorting interesting and not interesting suppliers.

In conclusion, because of the availability of time and resources of SME's purchasing managers, a categorical method would seem to be the method with least effort. It sorts the suppliers in three groups of which the most attractive group will be analyzed in the final supplier selection (see Figure 11: Conceptual model (Supplier qualification)).

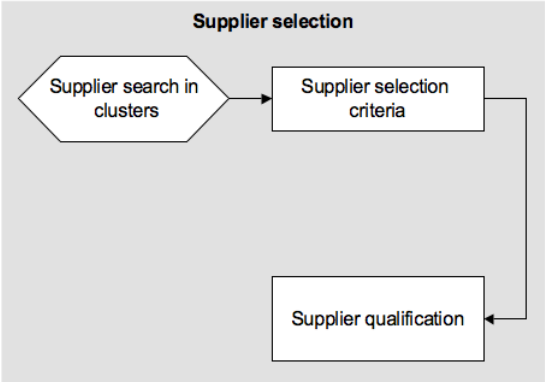

Figure 11: Conceptual model (Supplier qualification)

2.3.4 Final supplier selection

The final step in the search and selection of international suppliers is making a selection among the remaining alternatives after the qualification phase. Many frameworks and methods have been developed in the field of final supplier selection and one may find final supplier selection methods with an ever-increasing complexity. This section briefly explores a few relatively simple methods, since this study is defined within the paradigm of the SME purchasing manager.

The paradigm of the SME purchasing manager limits the number of models to consider. Many of the final supplier selection methods involve different decision-making techniques, criteria and a range of types of uncertainty. Involving of all these factors of influence in the conceptual model could make it a very complex and a hard to use method and would not address the research problem at hand. However, it is hard to find an "optimal" way for selecting suppliers, and organizations appear to use a variety of methods (Chen *et al.*, 2005). Many of the methods, however, can align in one of the following five general methods (Wadhwa and Ravindran, 2006):

1. *Total cost approach*

This approach takes the quoted price as starting point and each constraint is replaced by an appropriate cost factor. The supplier with the lowest total costs is the most attractive and awarded the business.

2. *Multi attribute utility theory (MAUT)*

MAUT is most useful in an international context, since it can handle multiple conflicting attributes most common in international supplier selection problems.

3. *Multi-objective programming*

This type of supplier selection model is very flexible, allowing a varying number of possible suppliers and suggests volume allocation by supplier. Despite these advantages, working to a solution and deciding which supplier to choose is a complex task.

4. *Total cost of ownership*

TCO is both a methodology and philosophy. It includes many purchase-related costs and thereby looks beyond the 'superficial' price of purchase.

5. *Analytic hierarchy process (AHP)*
The AHP approach is a multifactor decision making tool, which also incorporates subjective or qualitative considerations. AHP structures the approach on the determination of the scores and weights for the criteria and hereupon bases the decision. Based on the completeness and objectivity of this type of supplier selection, it has been argued to be the better technique to execute.

A few other methods also are used to the final supplier selection problem, but are less common. These include mathematical programming methods such as linear programming, goal programming and mixed integer programming.

Many methods (such as MAUT) seem to be more applicable in the international context involved in this study. However, the cluster analysis step is concerned with minimizing influence of international factors. Suppliers who make it into the final supplier selection are located have at least comparable characteristics regarding regional influences. Including international context factors again in this decision would render the total process to be inefficient. Therefore, including the AHP decision-making method would be easier. The final argument for choosing for the AHP decision-making method is efficiency. All the methods listed in final supplier selection are aimed at deciding among the short list which supplier is the best option to source from. Since the supplier selection factors are weighted, and suppliers are scored in the AHP decision-making tool, it can be considered to be a fast and reliable way of deciding which of the suppliers to choose from. Hence, with respect to the boundaries of the SME purchasing manager (see next section), the AHP decision-making method is the most logical method to choose for the final supplier selection (see Figure 13: Conceptual model).

2.3.5 Conclusion

The subject of supplier selection gained much attention in literature in recent years. De Boer *et al.* (2001) identify four main steps in the supplier selection process, consisting of a sourcing decision, identification of important supplier selection factors, supplier sorting phase known as qualification and finally a final supplier selection.

The challenge concerned with supplier selection within this study is that in the context of new supplier search little or no historical data is present. Effort can be put in the measurement of suppliers' performance beforehand, but a real objective image of a supplier is only known after having experience with the supplier in question. This reflects supplier relationship management and is expressed in the framework of De Boer *et al.* (2001) in the other supplier selection phases (modified rebuy and straight rebuy).

Supplier selection factors guide the analysis of suppliers to address the problem that no historical data is present. The most important supplier selection factors found in literature are quality, delivery, price, and technical capability, financial position of the firm, facility, flexibility and service (Min, 1994). These main supplier selection factors can be measured by attributes proposed by Muralidharan (2002).

In the supplier qualification phase, the suppliers under consideration are analyzed by means of the categorical method. The suppliers are ranked in expected performance on basis of the supplier selection factors. It should be noted, since no historical data is available, suppliers should be rated on prospective data.

The final supplier selection is made through the AHP decision-making method. Because of efficiency concerns, AHP would be the most logical choice.

Finally, the supplier selection of the conceptual model is constructed as displayed in Figure 12: Conceptual model (Supplier selection).

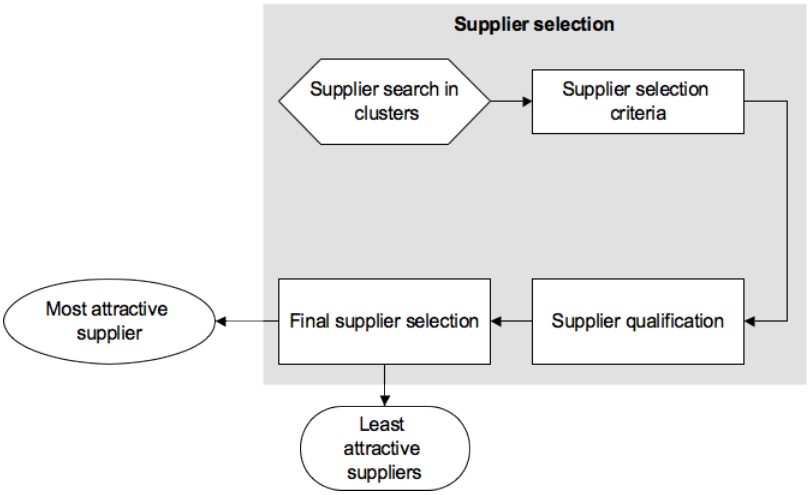

Figure 12: Conceptual model (Supplier selection)

2.4 Small and Medium sized Enterprise limitations

2.4.1 SME Boundaries

The boundaries SME purchasing managers face are addressed in this section of the study. The section explores four themes of relevant literature, and addresses the implications of these boundaries for the conceptual model.

Firstly, we can discover how strategically important sourcing is for SMEs. There seems to be some controversy regarding importance of sourcing. Pressey *et al.*, (2009) found SMEs gain much from external resources, and tend to rely heavily on these sources. This would suggest SMEs would make extensive use of comprehensive strategic purchasing plans in order to secure the continuity of business activities. However, Pressey *et al.* (2009) also find purchasing receives low status in SMEs, particularly attributed to lacking resources. Notwithstanding the gain from purchasing, SMEs attach low status to this.

These findings might suggest that the skill set needed for purchasing in SMEs is different. Research however finds no difference in the overall skill sets needed for successful sourcing abroad between SMEs and larger organizations (Overby & Servais, 2004). SMEs did not find international trade to be more difficult, except for logistics management, which required relatively more resources to manage. Thus, SMEs do not experience sourcing as being more difficult than their larger counterparts.

This can be explained by the fact little difference has been found between risks faced by small or large firms, although SMEs have less resources available to overcome bad decisions and tend to go 'belly up' faster (Overby & Servais, 2004). The most significant differences were for countertrade, product technology and local content, in which larger firms viewed to be more influential. This is opposed to bigger incentives: Pressey *et al.*, 2009 find SMEs particularly benefit from making the right decision, in this case in the field of purchasing.

With these findings in mind, it can be considered interesting that the purchasing function itself appeared not to be very sophisticated in many SMEs (Zhang, 2003). For example adoption of modern techniques such as e-business activities, were virtually nonexistent (Zhang, 2003). In most of the times the owner or a few close key employees perform the purchasing function within an SME, which presumably explains the lack of awareness in SMEs that purchasing might have a great influence on profitability when sophisticatedly executed (Pressey *et al.*, 2009). The purchasing function receives low attention in SMEs, and appears to be not very professional.

Contrary to the findings discussed, other research make opposite statements. Research among Welsh SMEs businesses, finds purchasing is rated highly in importance among 18 business practices leaving behind only team working, waste reduction, leadership and strategy (Quayle, 2003). Furthermore, Scully and Fawcett (1994) found international sourcing to be widespread among SMEs, a decade later still supported by Overby and Servais (2005) who found Danish SMEs sourced both within the European Union and outside. The motivation of the Danish SMEs was not domestic unavailability but a desire to attract lower prices and better quality (Overby and Servais, 2005). In line with the found increased strategic importance it is found "many SMEs lack competence in purchasing transport services and a subsequent lack of 'purchasing power' may cause SMEs to be treated as 'order takers' rather than 'order makers'" (Holter *et al.*, 2008). These studies clearly find SMEs to attach more importance to sourcing or find SMEs to experience more difficulties.

2.4.2 Conclusions

Concluding, SMEs do not have more problems in international sourcing, except for logistic management, which is found to be a more difficult task. Purchasing requires no more skills for SMEs purchasing managers, but little resources are available to carry out this important task. Also, international sourcing is found to be of little importance in some SMEs. These organizations might consequently approach sourcing in a more unstructured way compared to the organizations perceiving sourcing as being a more important activity.

The information required for the individual steps in the model, especially for the cluster analysis, is ideally widely available. SME purchasing managers might be unable to buy expensive information from professional sources. Furthermore, the number of steps to be taken should be reduced to a minimum, because the same reason applies of having little resources available.

2.5 Conclusions

The conceptual model for searching and finding a suitable supplier can be developed from the theoretical background introduced in the previous sections.

The location selection stage starts with a worldwide search for clusters, followed by the selection among the found clusters in the cluster analysis. This cluster analysis analyzes with the international context, selecting the cluster matching the closest with the purchaser's own environment.

The second phase of the model, the supplier selection, begins with a supplier search. Output of the supplier search is a number of suppliers, which form the input of the supplier qualification. The establishment of the supplier selection factors follow after the search for new suppliers. These supplier selection factors are of influence on the decision-making processes of supplier qualification and supplier selection. Supplier qualification sorts the found suppliers to generate a shortlist for the final supplier selection in which the best supplier is chosen among the list of alternatives.

In the supplier qualification, found suppliers are sorted on expected performance on basis of a categorical ranking method.

The best suppliers from this step make it consequently to the final supplier selection phase, on which a more thorough analysis is performed and a decision is made.

Finally, this evolves in the conceptual model as shown in Figure 13: Conceptual model.

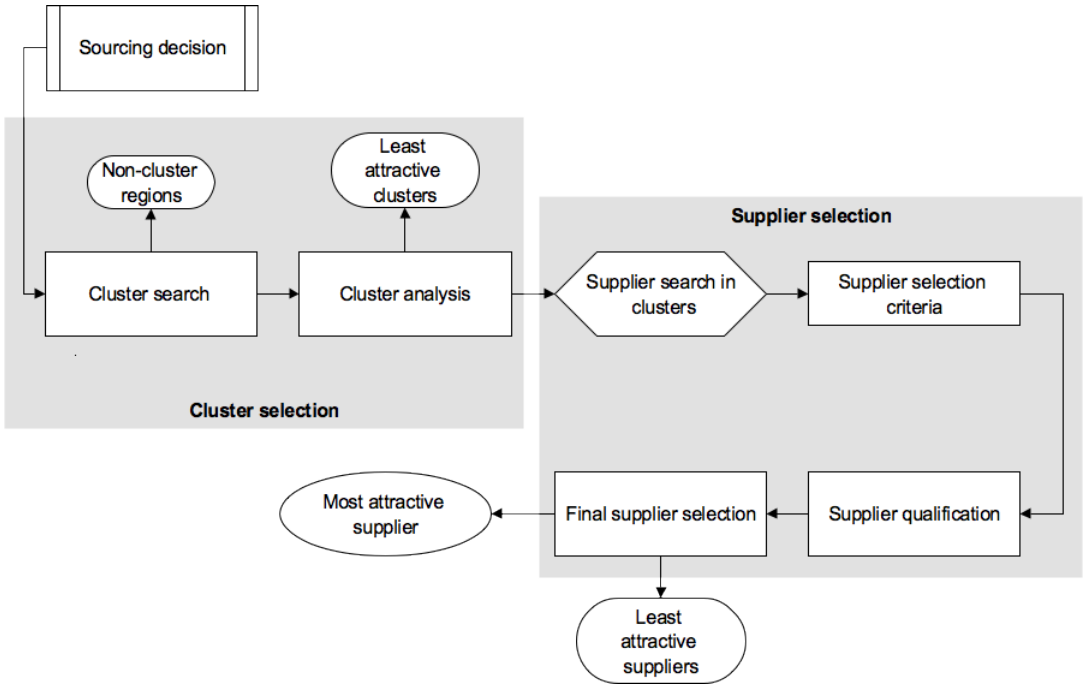

Figure 13: Conceptual model

3. Operationalization of the model

3.1 Introduction

In chapter two, the conceptual model has been developed from existing theory. This chapter addresses the most suitable methodology to test the validity of the conceptual model. Chapter two has three main objectives and results.

Firstly, this chapter presents how the different steps found from the literature can be measured in practice.

Secondly, this chapter explores the best the approach to test the conceptual model. The nature of the central research question "*how*" to find international suppliers, provides the ground from which to choose the most suitable research strategy. Finally, the chapter addresses the data processing. After the gathering of data, proper processing is important in order to draw valid conclusions.

3.2 Conceptual model

Many topics in the field of cluster- and supplier search and selection may be addressed and discussed. The aim of operationalizing the steps from the conceptual model is to be able to recognize any steps taken by the participants, even if the steps are not consciously made and not clearly addressed by a participant. Operationalizing the steps also helps in discussing the fields of the study more concrete by using the measurements proposed in this chapter.

All steps from the conceptual model are operationalized in the same sequence. Obviously the steps of sourcing decision and relationship management, which fall outside of scope of this research, are not operationalized.

3.2.1 Cluster search

The first step that is measured when testing the validity of the conceptual model is the search for clusters of competence. As can be learned from chapter two, relatively little research exists on the subject of cluster search.

A.T. Kearney (2003) proposes five measurements on which to operationalize the searching for clusters. First, the presence of relevant multinationals could indicate the presence of a cluster, since one of the findings of Porter suggests supporting industries would be located there to support the operations of such multinationals. Secondly, the degree of IT and business maturity might be an indicator of clusters since operations are unable to establish without these factors. Thirdly, theories would suggest a large pool of talent and thus the availability of skilled labour are a factor on which to identify clusters as well. Fourthly, an expectance of high future development indicates the talents housed in clusters. Fifthly and lastly is the scalability of operations. The indicators proposed by A.T. Kearney (2003) are listed in Table 2: Operationalization cluster search.

Table 2: Operationalization cluster search

Dimension	Operationalization	Indicator
Search type	Cluster search	Presence of multinationals Degree of IT and business maturity Availability of skilled labour Expected future development Scalability of operations

Because some clusters might be developing and/or increasing or decreasing in importance, it might be difficult to make a clear distinction between 'attractive' and 'not attractive' clusters. Of the clusters found in the cluster search, the top of the heap, depending on the size but with a maximum of the two best, is taken into account in the cluster analysis.

3.2.2 Cluster analysis

The second step in the conceptual framework involves the analysis and comparison of different cluster clusters found in the first step. As discussed in the literature review, Palvia's (2004) model is used for evaluating the found clusters. This section will find measurements for the six factors proposed: political, ICT infrastructure, government regulations, workforce, judiciary and legal system and the factor of difference in language and culture.

Beim and Lévesque (2006) propose the indicators in a different perspective, but the factors are rearranged for this purpose (see Table 3: Operationalization of cluster analysis). It can be justified to alter their proposed measurement system since Beim and Lévesque (2006) stimulate rearrangements: "The criteria employed here should not be interpreted as a prescription. Decision makers whishing to approach a country selection problem with MCDA methodology are encouraged to add or delete criteria based on their industry and situation." Although no there is not made use of a MCDA decision-making approach in the analysis involved in this study, the proposed factors are still valuable indicators, especially since the proposed sources from which the indicators can be measured are accessible for anyone. Lastly, not all factors are covered by their proposition but including the factors in the appendix would be a valuable contribution.

There is an important reason for using the proposed information sources by Beim and Lévesque (2006). Because practical and trustworthy sources are included to measure the factors, it can be regarded as a valuable and practical proposition with the research problem in mind. This is because an incomprehensive gathering of necessary data can be performed by anyone, thus making the method feasible for SMEs with scare resources.

It should be noted much data for the measurement of the indicators is country-specific whereas the search in the cluster analysis is cluster specific. Despite this, the proposed sources are taken as good sources for gathering necessary information for two reasons. Firstly, much country specific information applies to clusters simultaneously. For example: a nations political stability applies also for a cluster. Secondly, cluster specific information can also be found next to the country specific information. For example, cluster specific information can be on the Internet, via local information services or via potential suppliers. Using this more specific information is advised. In Appendix A the list of proposed information sources on the indicators, proposed in the article of Beim and Lévesque (2006), is included.

Table 3: Operationalization of cluster analysis

Dimension	Operationalization	Indicator
Cluster selection	Political	Bureaucracy Corruption Government stability Degree of human rights and political freedom
	ICT Infrastructure	Total amount of ICT spending relative to purchasers country
	Government regulations	Import/export duties Value added tax
	Workforce	Level of education Levels of skills Hourly wage

Legal system	Crime rates Risk of intellectual property Business law Environmental, workplace and safety regulations Labour regulations
Language and culture	Language Local customs Cultural proximity

When using the model, Palvia (2004) recommends six favourable measurements. Palvia (2004) argues the political factor in the supplier's country should preferably be comparable (or closest possible) to the 'home' country. The ICT spending is important in the model on a 'more is better' scale for facilitating communication and collaboration; the countries should have a somewhat similar level of ICT infrastructure. Government regulations such as import/export duties, value added tax differ a lot among even many regions within countries; the more relaxed such arrangements, the more attractive the cluster. Workforce quality differs among clusters as well and is argued as being somewhat of a key determinant. Although a higher quality workforce is more attractive, it comes with the price of being more expensive. In case of a legal dispute a stable legal system is desired for example for fair court ruling. Finally the language and culture factor is also argued to match as closely as possible.

Clusters are compared on the political, ICT infrastructure, government, workforce, legal system and language and culture factors, ultimately distilling in costs, quality and delivery speed as proposed by Palvia (2004). Clusters are to be ranked in attractiveness, of which the best two clusters are selected to perform the supplier search in.

3.2.3 Supplier search

Overy and Servais (2005) argue methods of performing the practical step of supplier search within the remaining cluster(s). The aim of this step is to come to a short list of possible suppliers to source from. Table 4: Operationalization of supplier search lists the practical steps taken by organizations in the search for suppliers.

Table 4: Operationalization of supplier search

Dimension	Operationalization	Indicator
Supplier search in clusters	Initial methods of search	Supplier contacted us Through trade fair or exhibition Through directory or other reference Replied to advertisements in journals or newspapers Through another supplier Any other form of contact

3.2.4 Supplier selection factors

The fourth step of the conceptual framework concerns the establishment of the supplier selection factors.

Min (1994) finds that the most important factors are quality, delivery, price, technical capability, financial position, facility, flexibility and service (see 2.3.2 Supplier selection criteria for an elaboration about this subject). These factors are largely decisive for selection of suppliers and are operationalized in Table 5: Operationalization of supplier selection factors. The proposed indicators

of Muralidharan *et al.* (2002) are guidance in the operationalization of all the factors, except for price since Motwani *et al.* (1999) propose a very sophisticated measurement of price. For sake of completeness in the international context, price is broken down according to this proposition.

Table 5: Operationalization of supplier selection factors

Dimension	Operationalization	Indicator
Supplier selection factors	Quality	Percentage rejections
		Inspection methods
		Following TQM, JIT practices
	Delivery	Flexibility in delivery schedule
		Delivery speed (lead time)
		Transport costs (see also '*Price*')
		Dependability (meeting delivery schedule)
	Price	Unit price
		Export taxes
		International transportation costs
		Insurance and tariffs
		Brokerage costs
		Letter of credit
		Costs of money
		Inland freight costs
		Risk of obsolescence
		Costs of rejects
		Damage in transit
		Inventory holding costs
		Technical support
		Employee travel costs
		Survey and inspection costs
		Quotas
		Customs
		Consolidation/deconsolidation
		Container leasing
		Role of offset – under/over invoicing
	Technical capability	R&D facilities
		Range of products
		Problem solving ability
		Availability of technical manpower
	Financial position	Credit rating policy
		Liquidity
	Facility	Capacity utilization
		Infrastructure
		Machinery
	Flexibility	Reaction to changes in volume,
		Changes in product mix
		Changes in design
	Service	Availability spare parts
		After-sales service

3.2.5 Supplier qualification

Supplier qualification addresses the sorting of potential suppliers in order to reduce the list of potential suppliers. In the supplier qualification phase the found suppliers are sorted on basis of expected performance by means of a categorical method.

Suppliers are rated as either 'negative', 'neutral' or 'positive' on basis of expected performance in the future (De Boer *et al.* (2001)). In this way, a ranking of different alternatives is generated which serves as input for the final supplier selection. Data for performing the supplier qualification is gathered by visiting the potential supplier by the purchasing manager.

3.2.6 Final supplier selection

The final supplier selection concerns making the 'best' choice between the 'positive' suppliers from supplier qualification.

In the final supplier qualification, it is proposed the AHP decision-making method is executed to make a fair and weighted final decision. All supplier selection factors are rated (on a 1/10 scale) for all remaining suppliers. Scores are consequently corrected by weights for the supplier selection factors, because not all supplier selection factors are found to be equally important. For a more detailed elaboration of the AHP decision making method see Appendix B: Decision making methods.

3.2.7 Conclusion

The operationalization of the conceptual model is visualized in Figure 14: Operationalized model.

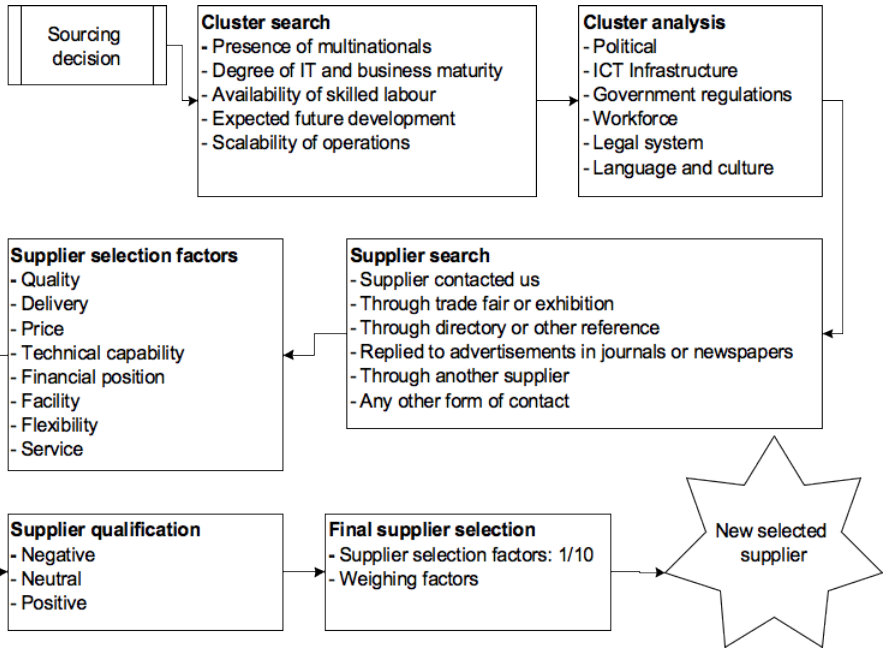

Figure 14: Operationalized model

3.3 Research design

The operationalization of the conceptual model explores enables practical exploration of the validity of the model. This section is concerned about the best approach taken in the exploration if the conceptual model is valid.

This section firstly explains the overall approach taken in the study. Section 3.3.1 is concerned about this matter. Secondly, this section describes the approach taken to test the conceptual model.

Section 3.3.2 explains the number and characteristics of the interviewees involved with the study.

3.3.1 Research approach

Within the research literature, Yin (2003) provides a framework for research with multiple interviews. Because the framework provides a structured research approach with valid results, this approach was chosen to answer the research question for international sourcing.

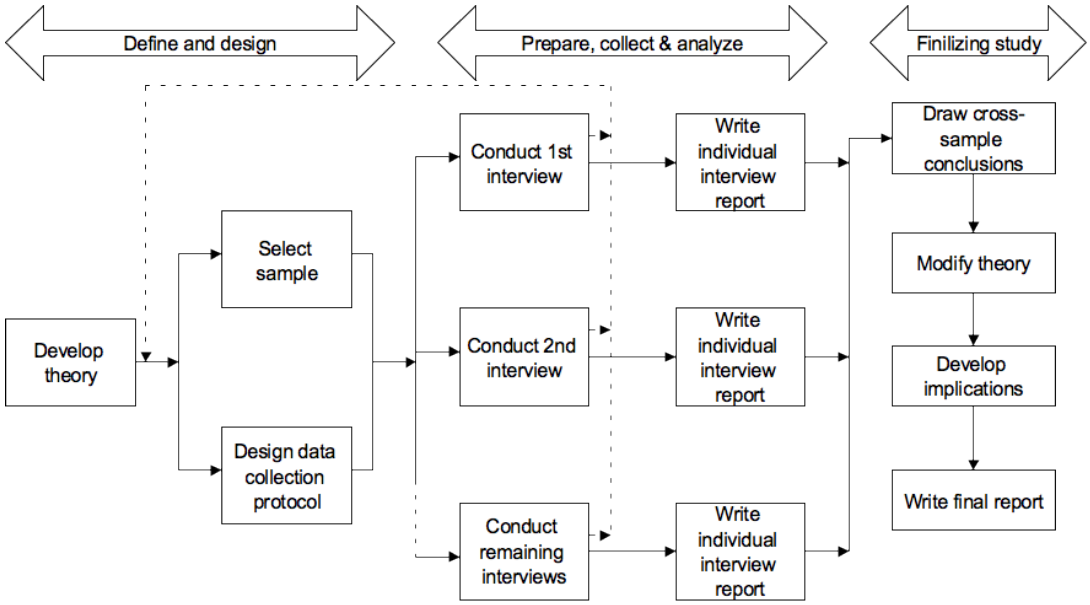

Figure 15: Research framework (adapted from Yin, 2003)

The framework of Yin consists of several steps. In the first 'Define and design' step the conceptual model is developed (before in chapter two). Consequently, the sample and data collection protocol are established (done before in chapter two). In the subsequent 'Prepare, collect & analyze' step, the interviews are being carried out and reports of all interviews are written, both about the content and context of the interview. Finally the data gathered in step two is analyzed with appropriate tools for data analysis. Possibly, the conceptual model should be adapted to reflect research outcomes and implications can be derived from research findings.

An important aspect in the framework is the dotted line that represents a feedback loop. In the case when some interviews provide important discoveries; it may lead to reconsideration of the original conceptual model. It may be required to redesign the study before proceeding further. Such redesign may incorporate the selection of alternative participants or changes in the data collection protocol.

3.3.2 The interview

Because this study involves testing of the conceptual model from chapter two, a deep understanding of the process of supplier search and selection is sought. Yin (2003) argues one of the best ways of gathering data when a deep insight is required is by performing semi-structured interviews with experts in field. This approach makes a deeper understanding of the context and processes of international supplier selection possible, and is most appropriate of finding an answer to the "how" question at hand (Saunders *et al.* 2007). Therefore, the approach to make use of multiple face-to-face semi-structured interviews is used in this research.

A few important characteristics should be kept in mind when taking this approach. The interviews should be -according to Saunders *et al.* (2007)- open-ended, in-depth and semi-structured of nature with the researcher keeping an unbiased attitude. Personal contact makes judging the quality of the responses possible and creates commitment for the interviewee to cooperate. When using for example a questionnaire, these important advantages for data collection would be more difficult to deal with. In order to overcome the ethical issue of confidentiality and prevent bias in sharing information, the interviewee may refuse answering questions anytime and all data is confidential and cannot be traced back to a person.

In this study, the interviews consist of two parts. The first part addresses the typical supplier search and selection method utilized by purchasing managers and explores the working methods and experience of the interviewees. In the second part, the conceptual model is proposed and discussed in order to establish its relevance and applicability.

The interview questions are covered in Appendix C. The questions reflect all facets of the conceptual model. A pre-test with concern to the structure and clarity of the interview questions was carried out to assure no problems arise when the interview is taken. This pre-test was necessary to have a chance to adjust the interview script in case of any confusion about the questions.

The interviews were carried out in March 2010. The interviewees' daily activities are concerned with purchasing, preferably with the role of the decision maker in the search and selection process of suppliers. The researcher visited the interviewees in their own office, in a calm and quiet environment to stimulate interviewees to openly share experiences. The discussion is recorded after explaining that the recording only serves the purpose of later transcription and will strictly be kept confidential. Interviews last for approximately one hour. To prevent bias as much as possible, the researcher has a neutral attitude during the interview and is well prepared. Furthermore all participants receive a small information set about the study, explaining the purpose of the interview, the topics to be discussed and a statement of confidentiality.

3.3.2 Sample population and size

Because of restrictions on time and resources it would be logical to use a non-probability sampling method (see Figure 16: Sampling techniques (Saunders *et al.*, 2007)) in order to limit the work done but still come to valid results. In this particular instance, purposive selection of a homogeneous sample of participants is desirable, because the type of research approach taken in this context asks for in-depth insight into the topic.

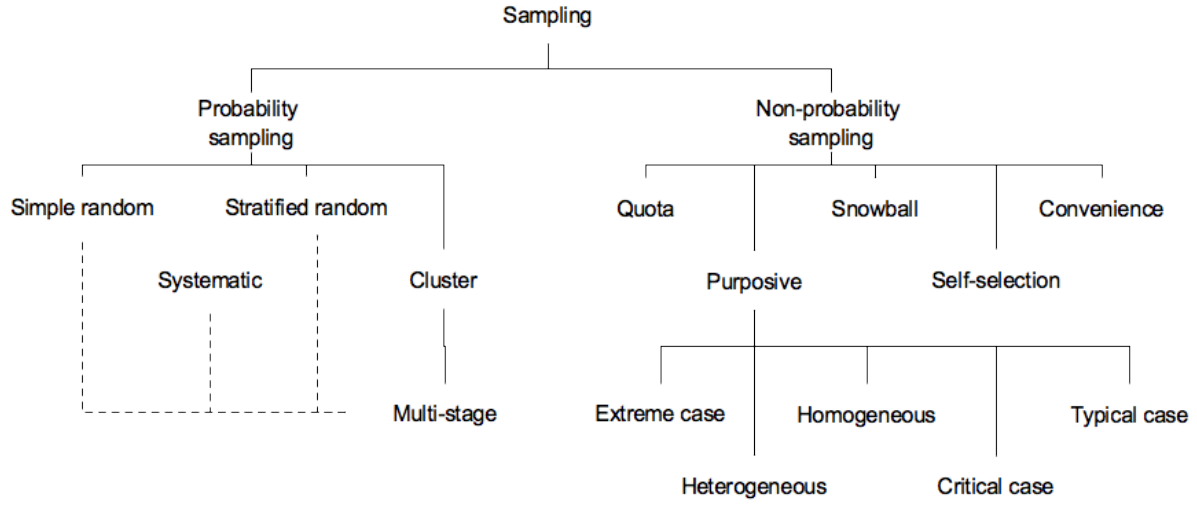

Figure 16: Sampling techniques (Saunders *et al.*, 2007)

Because this study aims to be purposive instead of seeking statistical significance, it employs semi-structured interviews (Miles and Huberman, 1994). When the sample size is homogeneous, a sample of 10-15 cases is justified (Skulmoski & Hartman, 2007) but interviewing should continue until saturation of findings occur (Miles and Huberman, 1994). Since all participants are employed in the same sector and field of expertise, the most important variables are homogenized thus justifying such a sample size. Though the aim is to optimize internal validity, the research can be extended by a follow up study.

3.4 Data processing and reporting

By coding the concepts from the conceptual framework using indicators, the concepts are operationalized and can be measured. The indicators link the data found in the interviews to the dimensions and concepts from the conceptual model.

The nature of qualitative data of being non standardized, demands data processing and analysis to be thought over in advance to prevent the inability to analyze the data afterwards (Saunders *et al.*, 2007). Saunders, Lewis and Thornhill (2007) identify four main steps in this process: first the categorisation of data, secondly unitising the data, then recognizing relationships and finally developing theories in order to reach conclusions. In this study, the approach of Saunders, Lewis and Thornhill (2007) was taken.

The first activity described in their study is the classifying of data found during the data gathering process in categories. These categories will consist of the main steps taken in the model. The categories are derived from the theoretical framework. All data is grouped in these categories, and all data within the categories are grouped under their respective unit. These units address the different topics found within the data or within the theory found from the literature study. For example, data could be unitized for the supplier selection factor 'quality'.

Data is consequently displayed within the categories and units in order to recognize relationships between the different sets. Finally, the conclusions are drawn from this displayed data. Upon these conclusions, the conceptual model is changed where necessary.

4. Results from interviews

4.1 Introduction

After the theoretical review of chapter two and the discussion of the research approach in chapter three, the data found during the interviews is presented in chapter four: results. This chapter is concerned with the display of the data regarding each of the concepts under study. Data analysis done in this chapter focuses on answering the research question at hand, given in section 1.2 Research problem.

In this chapter, first, the characteristics of the participants are briefly discussed. Secondly, results regarding the cluster search and selection are discussed about in section 4.3. Thirdly, section 4.4 discusses the results found regarding international supplier search and selection. Finally, the chapter ends with a section in which conclusions are drawn regarding the conceptual model.

4.2 Subjects

Giving a satisfactory answer to the research question at hand depends on the participants chosen to conduct the study with. All participants except three were fulltime purchasing managers from small and medium sized enterprises located through The Netherlands. All participants included, hold an important purchasing function in the organizations at the moment the interview was taken. One of the participants had a background as service manager, and two were the managing directors of the organization also concerned with purchasing. All of them were practising a full time job, and had several years of experience in the field of international purchasing.

The final sample consisted of eight participants. Table 6: Interview participants displays the characteristics of the sample. Because saturation of findings occurred after this number of interviews, eight interviews were regarded as sufficient to build a valid improved model.

Participant number	Job title	Company features	Interviews
A	Global purchase leader	Automotive	11 March 2010
B	Managing director and Purchasing manager	General machinery	12 March 2010
C	Service manager and Purchasing manager	General machinery	15 March 2010
D	Senior buyer	General machinery	18 March 2010
E	Purchasing manager	General machinery	23 March 2010
F	Senior buyer	General machinery	23 March 2010
G	Senior buyer	Aerospace	24 March 2010
H	Purchasing manager	Defence, aerospace, general machinery	25 March 2010
I	Managing director	General machinery	April – June 2010

Table 6: Interview participants

4.3 Cluster selection

4.3.1 Cluster search

All interviewees (8/8) recognize the existence of clusters, after being confronted with the conceptual model and can easily recall the most important clusters of the concerned industries. It appears from the data that purchasing managers are able to recognize clusters and use them as source for potential suppliers.

Although clusters seem to be identified and serve as a good source for potential suppliers (7/8 interviewees confirm this), the actual identification and assessment of clusters seems an unconscious task. An interviewee felt it "very weird and difficult to admit. I am recognizing a type of weakness now, but I have to admit I am working in this way." During the interview, all but one of the

interviewees became aware of the existence of clusters and including clusters in searching for suppliers, although clusters are not searched for in a structured manner. One interviewee noticed the conceptual model makes an unconscious working method conscious and structured, thus being able to improve it and make smarter choices.

Five of the eight participants indicate awareness of the whereabouts of clusters play an important role in the search for new suppliers. Interviewees indicate new suppliers are sought in clusters when needed; "when I search for a new supplier, I consciously start looking in a certain region because I know I can find a good one there."

The interviewees make an important note on the applicability of cluster search and associated analysis for suppliers in clusters as single source (5/8 interviewees). The recognition and search of clusters is regarded as a very important source for new suppliers (3/8 interviewees confirm this), although interviewees do not regard the method as the single source. It is regarded as one of the steps taken in the total process of supplier search. Supplier search via cluster search is regarded by the interviewees to simplify the task of finding potential suppliers, but other search practices are executed parallel to this.

Three interviewees indicate experience in purchasing in the respective field of industry seems an important source in the identification process of clusters. Cluster search is regarded as a passive, continuous analysis with the most important information sources being the media and the purchaser's social network like "customers, suppliers, and all other information coming in". A specific search for a best cluster to source from has not been found, but purchasing managers seem to have adopted an unstructured approach and "continuously anticipate to changes in the market".

Customers often force purchasing managers to (start) a search for suppliers in certain clusters (4/8 interviewees confirm this). However, interviewees see that customers go to clusters as well; "you can imagine that I want to put my salesmen in clusters of customers. I also want to have my suppliers near my customers in order to be able to give the best support."

4.3.2 Cluster analysis

Purchasing managers do make an assessment between the different clusters before sourcing (6/8 interviewees confirm this), although this assessment is based on experience and is also being carried out unconsciously. As one interviewee said, "I do not unconsciously begin to source from Iraq. Speaking for myself I would never source from Iraq, even if there would be a cluster. So yes, I do make an analysis."

Participants agree on the six proposed factors in their judgement (6/8 interviewees confirm this), including the final decisive factors being cost, quality and speed. However the interviewees attached different weights to these factors (4/8 interviewees confirm this); it appears to be a very personal approach. To mark the difference, one interviewee would never purchase in Iraq because of disagreement of the country's political standpoint, while another interviewee said "the subject of child labour, it's a very big issue right? Well, I don't care; let them work for me. No one will notice anyway."

Other factors, such as political, are basically determining where to source in certain industries. For example in defence or airplane industry, products can only be sourced from a few Western countries because of political reasons. Other interviewees agreed on being aware of clusters, but because of geographical distance were not taking them into consideration and keep sourcing "next door". Some purchasers require their suppliers to be geographical close since loss of speed is unacceptable. Geographical proximity and on-time delivery is sometimes even classified as more or less a precondition before suppliers are considered. Other reasons are a less attractive workforce and difficulties with other cultures. Thus, the proposed cluster analysis factors are playing a big role in

determining where to source, but interpretation of these factors is very personal, depending on the product and industry wide regulations (5/8 interviewees confirm this).

4.3.3 Other findings

Currently, finding suppliers in clusters is more or less a coincidence although cluster search and analysis is definitely recognized by the interviewees. Interviewees stress the search for clusters is not being done systematically (7/8 interviewees confirm this). One interviewee recognized he works this way, and now that he is aware of this, he is able to organize his efforts more efficiently. More interviewees find realising the working method and being able to optimize it (4/8 interviewees confirm this), would be very useful and would "save a lot of money and effort in the future."

It is found that interviewees are passing through the cluster search and selection process, but the strategic importance of the product determines the steps taken (3/8 interviewees confirm this). The more strategic important the product is for the organization; the more steps are taken.

Interviewees notice when a supplier has a unique selling point with some of its products, they might not be located in a cluster (6/8 interviewees confirm this). Nevertheless, interviewees indicate that the supplier should have a very unique selling point for purchasing managers to consider sourcing products very far from the preferred cluster.

4.4 International supplier selection

4.4.1. International supplier search

Supplier searches in specific clusters can take six different approaches, as found during the interviews.

First, being the most often recalled method, was searching for suppliers via Internet (7/8 interviewees confirm this). However, several practices of supplier search within this medium can be distinguished. One of the interviewees searches via Google Products by typing in the required type of product and scanning all outcomes, "sometimes hundreds of thousands". Other, more industry specific ways, are by using online directories or websites specialized in searching for products (see Table 7: Online directories). One participant made use of the business focused social network site Linkedin to put out advertisements for the products. A disadvantage of Internet is also noticed in the form Chinese organizations setting false expectations with their website.

Table 7: Online directories

Online specialty locators
http://www.kompass.com
http://www.madeinchina.com
http://www.alibaba.com
http://www.google.com/products
http://www.linkedin.com
http://www.findapart.com/
http://www.bigmachines.com/

Secondly, the purchasing manager's professional network (7/8 interviewees confirm this) is often recalled as the most important resource for finding new suppliers. This network consists of contacts like competition, suppliers, customers and contacts from the sales channel. Most interviewees indicate new suppliers are often suggested by one of their contacts. It is found that the interviewees let the network decide which suppliers are found, taking for granted the limitation to find only second-degree contacts. The reason behind this is that the business culture is deliberately restricting the search for suppliers outside in the supply chain. "The supplier has got to have the same business culture. If the cultures don't match, it will not work out. Business cultures are often found industry-wide and thus network-wide. Therefore I do not find suppliers from other industries." One very

clear example limiting organizations to source in the same supply chain is the approved vendor list an organization receives from customers in airplane and defense industries.

Thirdly, agents who are searching for possible suppliers in specific clusters are being used (2/8 interviewees confirm this), although not on a regular basis. The difficult communication and the large chance on failure both are reasons for organization to preferably not make use of this possibility.

Fourth, but regarded as less important source, are exhibitions (3/8 interviewees confirm this): "I am only there to been seen. But only sometimes, not on a regular basis." Interviewees see exhibitions not as a primary source for suppliers, but regard it as a good place to extend the important network.

Fifth, governmental organizations (2/8 interviewees confirm this) such as embassies and consulates are used in finding international suppliers, but this was found only when a focused search was conducted. A few interviewees know about trade delegations but never participated in one, though it is recognized as somewhat important because this was a way to find suppliers outside of their network. Some interviewees indicated to use other governmental organizations, particularly the local chamber of commerce.

Finally one interviewee indicated he finds new suppliers by means of their sales force, who are trying to sell products by just paying visits to the interviewee.

Interestingly, the interviewees tend to develop a two-way approach in this supplier search (4/8 interviewees confirm this). When searching for suppliers in a specific cluster, information sources with access to specific local information such as government institutes, chambers of commerce or regional directories are consulted. The second search practice for suppliers include a more wide, unfocused and continuous search and can take all approached found in the study, including the more specific search practices. Hence, interviewees take on a two-way approach: a focused search within clusters and a continuous unfocused search with multiple approaches.

4.4.2 Supplier selection criteria

All interviewees agreed on analyzing possible suppliers on supplier selection factors (8/8 interviewees confirm this). Measurement of the selection factors was implemented differently with the least structured based on "looking deep into his blue eyes during some small talk" and the most structured a predetermined process with questionnaires, audits and multiple (unannounced) visits.

4.4.2.1 Price and delivery

Delivery and price seem to be very important issues (8/8 interviewees confirm this) and for a supplier to be interesting these factors are to be rated as "good" relative to the offerings of other suppliers. However, the weight of the factors is dependent per product. Delivery schedules agreed on should be met but it seems to be difficult to establish the commitment of the supplier beforehand, although delivery conditions play an indicating role afterwards.

Price, however, is a more comprehensive factor since making long-term price agreements is based on trust. "I do not want my supplier to be relieved after our price agreements end after four years, increasing it subsequently with a 20% because he was making a loss on it." Fluctuations in price are unable to be established beforehand, especially in an international context.

4.4.2.2 Quality

Quality is found to be the most difficult factor to measure (8/8 interviewees confirm this), since interviewees regard it as a concluding factor: "quality can not be measured beforehand. We got to have had multiple deliveries before we can determine the real quality of a manufacturer. Sometimes the first few deliveries are perfect! After that: all rejects coming in."

Interviewees have a few practices for trying to overcome this problem. First, auditing and test checking the quality assurance activities within a supplier's business processes gives the most reliable outcome. Secondly, interviewees set up their own purchasing offices and quality control departments near the suppliers in order to be able to check quality themselves. Thirdly, interviewees see a certain kind of quality assurance in the customers these suppliers already have. Interviewees indicate much effort is put in the process of checking quality beforehand, even though it is indicated to be difficult to control.

4.4.2.3 Feeling

One of the most decisive factors found in this study is not taken into account in the conceptual model: "feeling" (6/8 interviewees confirm this). Interviewees indicate the measureable factors are very important in the final supplier selection, but one of the most important factors in this process is the purchaser's feeling with the supplier. One interviewee's vision about this is that "I can make a matrix, score a supplier on the factors and weight the outcomes. But in practice, it doesn't work exactly this way. Sometimes we proceed with a customer who does not have the best score, but I have more trust in." This factor of feeling can greatly influence the final supplier selection stage.

A more concrete definition of this "feeling" can be described as a having a click with a supplier. One interviewee subdivides click intro three main areas with the first acceptance, the second trust and the third having a connection. Accepting differences in culture is often hard but needs to come from two sides in order to be able to work with each other. Trust is build during negotiations, other communication such as email and telephone calls, and if both parties comply upon agreements. A connection with a supplier is based on a similar organizational culture and atmosphere.

This click-factor cannot be measured in any quantitive way and plays an unconscious role in the total process of supplier selection. Controversially this click-factor plays an increasing role when the product to be sourced gains in importance (6/8 interviewees confirm this).

Important grounds on which this click-factor is based are the physical visits to the potential supplier's manufacturing facility and the type and ease of the short relationship thus far.

4.4.2.4 Importance of factors

Defining which factors are of most importance is found to be heavily dependant on the product to be sourced (6/8 interviewees confirm this). Importance assigned to individual factors is found to be dependent on the strategic importance of the product. For example, some interviewees regard quality as precondition for some products to start a relationship with a supplier. Others assign a weight to this factor, letting poorer quality play a role in the decisive process.

Interviewees regard products lesser important being more price sensitive. More supplier selection factors play a role when products are more important to the organization.

4.4.2.3 Determination of supplier selection factors

It is also found that the supplier selection factors are not determined sequentially in the process of finding a supplier, but are established during the sourcing decision (3/8 interviewees confirm this). Factors determining the specifications of product or supplier are set beforehand, sometimes even in a document. Potential suppliers are sought after and rated on the 'fit' on basis of these documents. Thus, supplier selection factors do influence the decision process although they are not established during the process.

4.4.3 Supplier qualification

Supplier qualification seems to happen unconsciously, but interviewees do qualify suppliers (5/8 interviewees confirm this). One practice found, was that purchasers are sent a questionnaire in order to measure some of the supplier selection factors beforehand. Some suppliers will appear to be not useful, or even do not respond at all and thus are not taken into the final supplier selection process.

The remaining suppliers are ranked on the three-point scale as proposed (either positive, neutral and negative or on a scale equal to this), and the best are evaluated in a more comprehensive analysis.

It is found suppliers are not only to be rated on the supplier selection factors, but also basis of the click-factor. The determining factors in this phase remain most often price, delivery conditions and expected quality.

4.4.4 Final supplier selection

The interviewees also support the existence of a final supplier selection stage (5/8 interviewees confirm this). Suppliers are evaluated on supplier selection factors, which are ranked in importance by means of attaching weights. Suppliers are only considered when a positive result is booked, and only after that orders will be placed.

However, all interviewees indicate they use a simple matrix with weighted criteria to come to a decision. These criteria are assigned weights subjectively, instead of doing this systematically such as the AHP decision-making method suggests. The methods found during the study do not compare alternatives each other, but interviewees assign scores to the weighted criteria. This is a much more unstructured method of evaluating alternatives than was conceptualized during the literature review. The reason for this can be found in that interviewees recognize the fact that some things are very difficult to measure in other cultures (4/8 interviewees confirm this). "How do you measure, for instance, financial stability in Brazil? You might have a very positive feeling with a supplier, but if you can not support it in your matrix you can not make a defendable decision." Therefore it seems the feeling-factor is very important; to overcome (international) problems on which no defendable decision can be based but a purchasing manager has a "feeling" it will work out. Interviewees add to this point experience in visiting and negotiating with suppliers determines for a great deal the ability of developing such feeling and the interviewee's network is a good source of information about foreign suppliers.

Reasons for not finding an AHP in this results can be explained as that purchasing managers of SMEs in certain industries might have little time and resources to use a more theoretical and structured way of decision making. Hence it can be presumed the Dutch purchasing managers involved in the study might have a more entrepreneurial spirit and have consequently a lower need for theoretically defendable decisions: they act more on 'gut feeling'.

Finally, political influence is very important in a few industries determining to a very large extent possible suppliers. Not much supplier selection takes place in these instances because choices are already very limited. The purchaser's network and local political influence of the supplier play a very significant role in the aerospace and defense industry.

4.4.5 Other findings

The overall execution of the model heavily depends on the strategic importance of the product sourced and the type of relationship to be established with the new supplier (6/8 interviewees confirm this). If a relationship is expected to last for a long time and a great strategic importance is attached to it, interviewees indicate a more thorough search for a potential supplier is desirable and more steps in both the cluster selection and the supplier selection phases are made.

In the first part of the interview, the interviewees indicate they do not have a predefined way to search for suppliers; "we do not have a crystal clear flowchart on how to find suppliers." (5/8 interviewees confirm this). Moreover they are not conscious about if they have any structured way of finding them, but do indicate the need for a model to guide their efforts. "There is no clear way how we find suppliers. Do I need one? Yes!" A more efficient way of finding possible suppliers and thus saving time, money and increasing the possibility to find the best possible supplier in the field are identified advantages of the model.

After confronting the interviewees with the model and explaining implications of the different steps taken, all interviewees except one agreed on the model describing –to a large extent – their searching activities (6/8 interviewees confirm this). The interviewees also stress the cluster selection is a very unconscious but continuous process. It is also indicated the model is really applicable when multiple suppliers have more or less the same competencies (7/8 interviewees confirm this). When a supplier has a unique selling point, it is hard to follow the model since only one supplier has this specific competency.

4.5 Conclusion

After confronting the interviewees with the model, almost all agreed this model was to a large extent describing their working method.

Interviewees agree on the proposed method of cluster search and analysis. The cluster search and analysis is found to be a continuous task running in the unconscious mind of the purchasing manager and not on the list of daily tasks, but can be seen as experience. Interviewees indicate the knowledge about clusters to change with changes in the market, often from which the information comes from customers. Moreover, interviewees see a cluster analysis not as a single source for new suppliers. Cluster analysis factors are measured very differently, and the interviewees establish weights through gathered information and personal judgement.

Interviewees also confirm the existence of a cluster analysis, which is embedded in their way of working but stress this process is unconscious and never-ending. The interviewees agree on the proposed cluster analysis factors but indicate the final decision is based on cost, quality and speed. In certain industries sourcing is limited to a few clusters or geographical regions because of strong political forces from direct or indirect government regulations.

Interviewees indicate suppliers might be located outside clusters, when these suppliers are in possession of a unique selling point.

International supplier search

It is found the supplier search within specific geographic clusters can take on six different approaches. First, Internet is used by using sources such as online directories and social networking sites though interviewees are aware of the false online identity. Also the professional network seems to be very important. Agents are used rarely, exhibitions are less important and most interviewees indicate only being there to extent their network contacts. Governmental organizations are important in indicating potential suppliers in a certain cluster and finally a supplier's sales force might work occasionally.

Supplier selection factors

Potential suppliers are analyzed on supplier selection factors. Most named factors are price, quality and delivery, although some interviewees regard this as preconditions and do not even weight these factors. Supplier selection factors are weighted differently, this variation differs per product and strategic relevance to the organization. Of the supplier selection factors, quality is found to be hard to measure in advance despite of being one of the most determining factors. Interviewees indicate they have three practices for measuring quality beforehand, first being auditing and test checking on-site. Second is the establishment of purchasing departments and quality departments in important clusters to ensure quality is measured before it leaves to Europe. Third, purchasers might look at what clients the potential suppliers already have.

One of the most decisive factors can be described as a 'click-factor'. This click-factor is based on three "feelings", namely accepting differences, between purchaser and supplier and having a connection with the potential supplier. The interviewees use physical visits and the type of brief relationship as the most important sources to base the feelings of this 'click-factor'.

An overall importance to the supplier selection factors is difficult to assign, since importance depends heavily on the product to be sourced and differs per case. Finally, interviewees indicate the supplier selection criteria are not established as a sequential step in the model, but are established beforehand.

Supplier qualification

Interviewees indicate supplier qualification happens unconsciously, because placing sample orders might be already the supplier qualification. Interviewees stress a general feeling about the supplier is important in this phase, and sets the basis for the next phase of final supplier selection.

Final supplier selection

Final supplier selection is carried out by evaluation on supplier selection factors, which are weighted on their importance. No "objective" method such as proposed in the AHP decision-making method is found during the interviews. Coexisting with the criteria is the immeasurable 'click-factor', which also determines the final choice to a great extent. However, political influence might determine which suppliers will be chosen in the final supplier selection in certain industries, skipping the other steps forcing the purchasing manager choose between only a few options.

Other findings

The overall degree of execution of the model depends on the strategic importance and type of product to be sourced. Some interviewees indicate they do not run through some kind of supplier search and selection at all, but are carrying out a pragmatic type of supplier selection. Supplier selection factors are established beforehand and influence both qualification and final supplier selection to a large extent.

The model is found to be of great use when multiple suppliers in a different number of clusters have more or less the same competencies.

5. Improved model

5.1 Introduction

In chapter 1, the motive and context for starting this study was discussed. Chapter 2 explored relevant literature and developed a conceptual model. In chapter 3, the operationalization of the conceptual model and the research method to test this model was addressed. After interviewing experts knowledgeable about the subject, chapter 4 discussed the results. This chapter links the results of the interviews to the conceptual model, and develops a new proposed model. Section 5.2 discusses the findings from the interviews in relation with the finding of the theoretical framework. Section 5.3 discusses how these new findings could be interpreted.

5.2 Findings

5.2.1 Cluster selection

Cluster search

This study has found good results to the question of awareness of clusters with purchasing managers and the involvement of this phenomenon in their daily work practice. Section 4.3.1 found the interviewed Dutch purchasing managers recognize clusters as such and involve clusters directly or indirectly in their search for new suppliers. Moreover the study has found that clusters are regarded as important source for new suppliers, though it might not always be a source very consciously addressed. Interviewees appear to act upon clusters of competent suppliers, thus supporting Porter's (1990) 'clusters of competence' theory in this special way. The results of this study relate clusters to the supplier search process of the Dutch purchasing managers involved in the study. Hence the first step in the cluster selection can be justified (see Figure 17: Theoretical model (Cluster selection)).

Table 8: Facets of cluster search

Cluster search
Network
Tacit knowledge

Cluster analysis

For the second step in the conceptual model, the cluster analysis, this research has also found good results. Section 4.3.2 finds the proposed cluster analysis factors of Palvia (2004) are important considerations when analyzing clusters. Interviewees appear to use the proposed six cluster analysis factors, with the final decision being based on cost, quality and speed. Findings are thus consistent with Palvia's (2004) model but it can be added that the factor of politics is decisive in certain industries, determining where to source and thus limiting sourcing clusters. It is justified to add in the theoretical model a cluster analysis after the cluster search, using Palvia's (2004) proposed measurements (see Figure 17: Theoretical model (Cluster selection)).

The study also gives a comprehensive view on the total cluster selection process carried out by the Dutch purchasing managers involved in the research. Section 4.3.3 finds the cluster search and – analysis to be a continuous and subconscious task. Market knowledge is a logical requirement and comes with an increasing number of years in the specific field of industry. It is found that this (tacit) market knowledge of the purchasing manager is highly valued, because it simplifies the cluster selection process. The models included in the theoretical framework of chapter two, however, are focused on conducting a purposive search. This differs from the results, where decisions in cluster selection for supplier search are found to be an unconscious and never-ending task for the purchasing manager. The reason for this difference might be found in the fact that purchasing is a

daily function with many small decisions asking continuous analysis and adaptability to the decision maker.

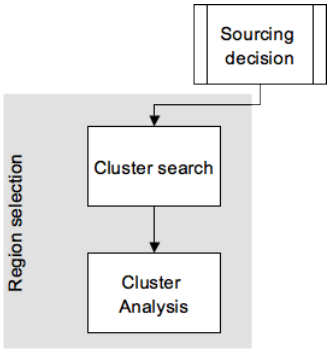

Figure 17: Theoretical model (Cluster selection)

Cluster Analysis
Political
ICT Infrastructure
Government regulations
Workforce
Legal system
Language and culture

Table 9: Facets of cluster analysis

5.2.2 Supplier search

This research finds interesting results on the practice of supplier search. Section 4.4.1 found six different search practices can be distinguished in two different ways. The findings from this study are more or less consistent with the research of Overby and Servais (2005), who find five ways of supplier search but make no distinction between search practices. This study particularly adds Internet to the list of general sources, but is still supporting the results found earlier.

However, this research distinguishes two ways of supplier search. Section 4.4.1 found supplier search can take on a more focused supplier search within specific clusters and a broader, unfocused supplier search. For specific cluster searches, more direct search practices such as gathering information from governmental organizations is used, while for unfocused searches more indirect approaches are taken such as visiting exhibitions or building a network. This implies that the two separate ways of supplier search can be added in the model (see Figure 18: Theoretical model (Supplier search)).

Table 10: Supplier search

Supplier search sources
Internet
Professional network
Agents
Exhibitions
Governmental organizations
Supplier's sales force

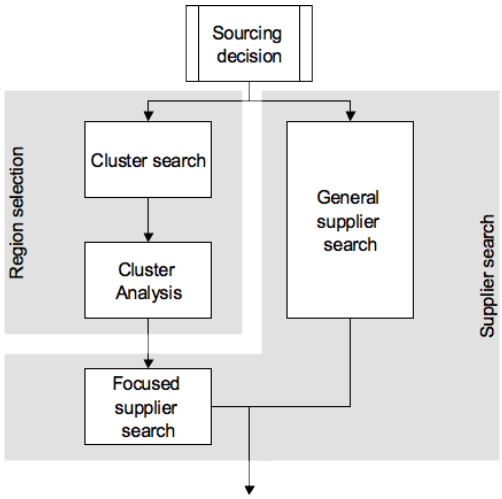

Figure 18: Theoretical model (Supplier search)

5.2.3 Supplier selection

Supplier selection criteria
This study finds interesting results on the supplier selection criteria. Section 4.4.2 found the Dutch purchasing managers fully support the proposed factors for supplier selection. The study finds all factors are used in daily practice although the different interviewees utilize varying methods of measuring the different criteria. The 'click-factor' is found as ninth and very important factor.

The study finds the click-factor reflects acceptance, trust and connection and influencing the sourcing decision. Consequently this click-factor is added to the list of selection criteria in the theoretical model. This click-factor cannot be measured via measureable units, but involves "subjective measurements". Including the click-factor is valuable, since it does not only reflect the results of the study but it stimulates non-experienced purchasing managers to develop this skill and include this factor of "feeling" in their decision. This click factor makes research findings appear to be somewhat inconsistent with the supplier selection factors proposed by Cheraghi (2004), Zhang (2003), Min (1999) and Overby and Servais (2004). The reason for this inconsistency might be found in the fact this research was conducted among Dutch purchasing managers in small and medium sized enterprises, who might have a more entrepreneurial spirit than the subjects in other researches. These purchasing managers might use a less rigorous way of measuring and decision-making than found in literature.

Concluding, the criteria are established beforehand when the sourcing is made and are influencing both supplier qualification and final selection. The supplier selection criteria are adapted from the conceptual model in Figure 19: Theoretical model (Supplier Selection Criteria).

Table 11: Supplier Selection Criteria

Supplier selection criteria	
Quality	Facility
Delivery	Flexibility
Price	Service
Technical capability	Click-factor
Financial position	

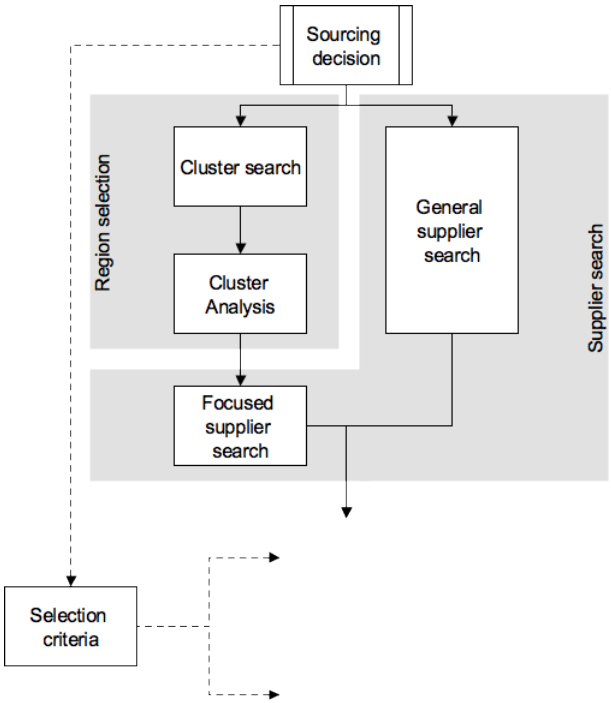

Figure 19: Theoretical model (Supplier Selection Criteria)

Supplier qualification
This research has found support on the sorting process of suppliers. Section 4.4.3 found that the Dutch purchasing managers sort suppliers before a final supplier selection. This research finds also that supplier qualification is found to be an unconscious and often practical step; this sorting process is often initially not intended to sort suppliers. Hence, this research finds qualification can also be done in a subconscious way. Suppliers are ranked on basis of a three-point scale, as proposed in the conceptual model, although most purchasers rank suppliers unconsciously. This may differ from earlier findings because De Boer's model reflects supplier selection for larger organizations that take a more theoretical grounded approach, while this research was done in SMEs.

Concluding, supplier qualification is added after potential suppliers have been found (see Figure 20: Improved model). The supplier selection criteria are influencing the sorting process, thus supplier qualification, in this step.

Final supplier selection
This research found the final supplier selection stage to be executed differently compared to the literature findings. Section 4.4.4 found suppliers to be rated on their scores of the supplier selection factors, although by a limited number of interviewees. Furthermore the "click-factor" plays a significant role in making the final supplier decision.

Concluding it can be justified only to a certain extent that the supplier selection criteria are accurately measured in the final supplier selection step, although not as proposed by the AHP decision making method. More importantly, the study finds SME purchasing managers decide more on a 'feeling'-basis than on measureable facts (see Figure 20: Improved model).

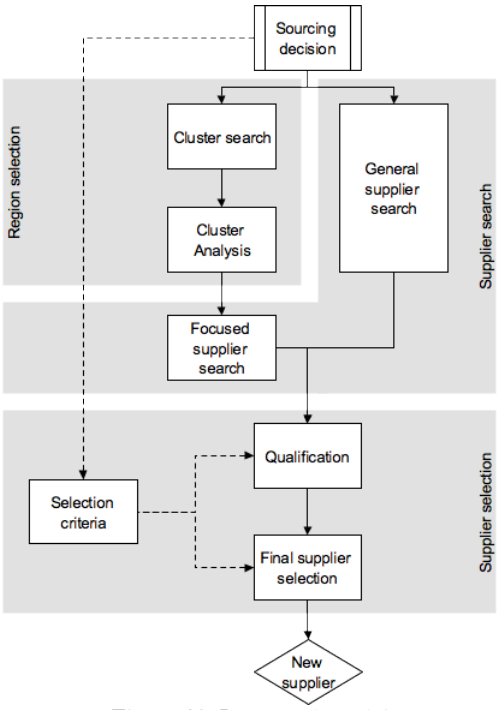

Figure 20: Improved model

Putting together all the knowledge received after the study, the operationalized model as illustrated in Figure 21: Operationalized steps of the improved model can be derived.

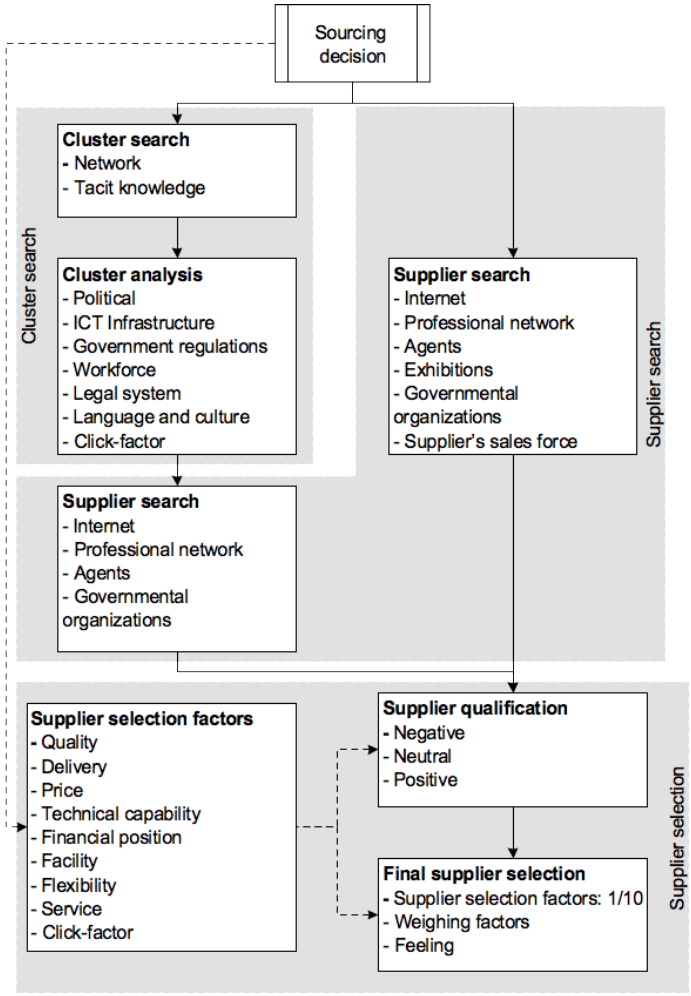

Figure 21: Operationalized steps of the improved model

5.3 Discussion

The research finds good results about the number of steps taken in the search and selection process of suppliers. Section 4.4.5 found the overall execution of the model to be dependant on the strategic importance of the product to be sourced or targeted type of relationship with the supplier. Findings suggest products with a lower importance are sourced taking fewer steps in the model than products with more strategic importance to the organization. Reason for this result could be that Dutch purchasing managers carry out a more careful search for suppliers that will become important to the organization. Strong relationships with good suppliers are very valuable, thus time and effort are devoted to this search process. Less important products and suppliers are abandoned and found more easily without a heavy negative impact to the organization. This search and selection requires consequently less effort.

This study finds interesting results about the purchasing manager's experience in relation to the search and selection process of international suppliers. Having such experience is considered an easier way of finding suppliers on a worldwide scale than purchasing managers lacking such experience.

This research has also found strong results about the 'click-factor'. Section 4.4.2 found the click-factor to be a very important factor in the supplier selection criteria. The click-factor seems even to be somewhat decisive for purchasing managers in the supplier selection stage. On the base of this click-factor, experience in the field of industry is considered very important for a fast attribution of value to this factor. Furthermore, this click-factor is considered to give guidance through the supplier selection process as a whole. One possible reason why this factor plays a significant role is the Dutch interviewees are working in small and medium enterprises, and attach lesser value on strict measurement of supplier selection factors, as might be done in larger organizations. For example the measurements proposed by Muralidharan (2002) might be developed in the light of general applicability, thus for defendable decision-making in larger organizations. In SMEs, this defendable decision-making might be less strict and more decisions could be based on feeling.

This research has interesting results regarding how purchasing managers conduct their search. Section 4.3.1 and 4.3.2 found cluster identification and analysis are passive and unconscious processes conducted by the Dutch purchasing managers. Section 4.3.3 found the search process for new suppliers is a continuous and also an unconscious task. Moreover, it is found the information sources of both these processes are mostly based on network, implying the information gathered is subjective and defined within this network. Following the model by conducting a directed search for new suppliers using multiple information sources proposed, presumably finds new suppliers outside of the network. However, it may be presumed that if the search process for new suppliers is largely dependant on the purchaser's network, the "best" suppliers in field might remain unreachable. Adopting a structured way of searching for and selecting the found suppliers might address this problem.

6. Conclusions

6.1 Conclusions

The study develops a model from theory, and tests it via interviews. Following this method, an in-depth representation of the selection of a cluster and the best supplier within the cluster has been developed.

The study finds the search can be initiated in two ways: both a cluster search and selection with associated focused supplier search and a general supplier search can be followed. To come to the best supplier within the best cluster, a ranking of suppliers and a final selection on basis of 9 supplier selection factors are made.

Regarding the characteristics of the model, the study found the following main points:

- Knowledge about international clusters is included in the search for international supplier, although often this knowledge is unconsciously included in this process;
- Clusters are analyzed by different factors and a (unconscious) choice is made, which cluster is the most attractive to source from;
- Market knowledge from sources such as customers or the network plays an important role in the decision where to source from;
- Suppliers can be specifically searched for when having a cluster in mind, but also a continuous and unfocused search for suppliers is carried out;
- The supplier selection factors are supported although 'feeling' is added to the list, since this factor appears to influence the SME purchasing manager's decision greatly;
- Supplier qualification is found to be a unconscious and often practical step, sometimes not even with the intention to determine a set of acceptable suppliers;
- Final supplier selection on basis of a structured method where factors are measured, weighted and the best supplier is picked is partly supported, also acknowledging SME purchasing managers are greatly influenced by an intangible feeling.

6.2 Reflections

The model developed from the data found is, relative to the research sample, a credible reflection of the search and selection process of international suppliers. Nevertheless it might be possible that, while the model found in this study holds in real practice, it may not be the *best* way of finding suppliers. A complete different search and selection method may co-exist next to the method found, or alternate routes may co-exist to arrive at the supplier search stage. The theoretical model represents *a good* method of supplier search and selection, not necessarily *the only* method. The study was bound within its own limitations and assumptions. Nevertheless, the data found in this study strongly suggests that the theoretical model reflects a credible method doing a search and selection with good results. Since this study focuses on exploring this specific method, it gives a valid conclusion to the research question.

Furthermore the research findings may be very applicable in the fields of industry involved in this study, external validity to other industries may be low and thus results may not be generalizable to all Dutch international purchasing managers. Varying industries may incorporate different practices. Furthermore, methods might differ per country or culture and thus the results might not be generalizable to purchasing managers worldwide. However, it can be argued the model found in this specific field of industry works very well for the involved participants.

6.2.1 Results relative to objectives

One of the objectives for this thesis was to model the work method of the search and selection process of international suppliers when purchasing mechanical components. Another objective was to test if and in what way knowledge about clusters is included in the search and selection process.

The challenge was to develop a conceptual model from theory and test it in the real world. Unfortunately very little literature was available on the working method of international purchasing; this thesis makes a contribution in this gap. Testing the model in the real world via interviews was a rewarding process with good results.

The outcome of the study is an improved model, which illustrates the working method of purchasers when searching for international suppliers. The model shows clusters are indeed included in the method under study, although not in the way it was conceptualized and only under certain circumstances. Hence, the model was adapted to give a realistic reflection of the working method after testing it during the interviews.

The study thus gives a detailed description and draws the context of the working method, and prescribes a way of working as searched for in the objectives. The process is mapped by this study and can even be improved for achieving more efficiency.

6.2.2 Process

During the progress of the study it became evident new insights are delivered regarding the knowledge about how international suppliers are searched and selected. Interviewing experts was a good method for gaining in-depth insights in this working method.

Nevertheless, next time I would include a second research method to determine what the "most efficient" path to search for suppliers is. This approach measures the "best" method that the interviewees practice at the moment of the interview, but does not relate to other methods. Including a test to determine what method is actually the most efficient would greatly add to this study, although this might be too comprehensive for a master's thesis because of time constrains.

Furthermore most of the time I conducted this study, I visited the library of the university to work. During this period, it was very hard to keep to the structure of a normal working day. When I visited Malaysia, and worked in the Tonasco office for three months, it did give me a structured daily agenda. If I ever have to do a research again, I would ensure to set more deadlines and keep working in a normal working day rhythm.

6.3 Recommendations for further research

This study finds results about the search and selection process for international suppliers. Though findings of the study in form of the theoretical model may be exciting, additional research should reconfirm the theoretical model and to make the search and selection process more effective.

The first and foremost suggestion for further research would be repeating the study using a different method. This method should take into account every sub step of the model in order to test if the current model reflects the "best" and "most efficient" way of conducting international supplier search and selection. This follow-up study needs to validate and build upon the results found in this study and needs to make the model applicable for broader application.

Another suggestion for follow-up studies would be testing if the model holds in a sample of purchasing managers from other fields of industry. Likewise, it would be interesting to conduct the same research under purchasing managers who intentionally source locally, to see if they would include the approach found during this study also in an international context.

While the theoretical model proposed is specifically focused on the sourcing of mechanical components, it would be interesting to see whether results hold under different circumstances and

industries. The supplier selection criteria should be increasingly specified and it would be interesting to see whether the cluster selection phase would also apply when sourcing takes on a different form. New research could even focus on finding customers through utilizing the proposed method.

Testing what sub factors could be used regarding the practical measurement of the 'click-factor' found in this study can also be an interesting subject. In particular, it would be interesting if further research focuses on the utilization of the click-factor in supplier search when the searcher does not have experience in the particular field of industry. Furthermore, this follow-up study could also address the same problem with regard to the cluster search since experience is a requirement for fast success here as well.

A different approach in research method could be taken to answer the research question in a different way. The research approach limits the research in displaying the method purchasing managers currently adopt, although this may not be the "best" method in class. Testing the efficiency of the method with other research approaches would make the model proven efficient.

Finally, one important assumption being made in this research is once the knowledge exists potential suppliers can be found in a cluster, purchasing managers automatically look at those clusters again when conducting a new search. This could be an interesting subject for further study, since it can also be studied that if purchasing managers have bad experiences with suppliers within certain clusters they consciously try to avoid sourcing in those clusters again.

6.4 Recommendations for practice

From this research, a few main recommendations for practice can be made.

The most obvious recommendation from this research is that it would be wise to make cluster search and analysis a conscious task of the purchasing department. Two findings are on the basis of this recommendation. Firstly, to know the whereabouts and characteristics of worldwide clusters of suppliers gives purchasers awareness of where to source from. Having a predetermined set of places with the highest chance to find a good supplier saves much time and effort.

Secondly, getting information independently of customers and the rest of the network is preferred, since information from the network is bound within its own limitations. Customers should not be the only source for information, but an independent study of opportunities in the market enables capturing interesting value chain possibilities not perceived by others.

When searching for a sourcing partner, minimizing cultural differences between the 'home' country and the foreign cluster is also preferred. Cultural differences are hard to overcome and may bring undesirable pressures to the purchaser. The cluster analysis stage is a perfect step to consider this.

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Appendices

Appendix A: Practical measurements on focused cluster- and supplier selection

Information in this section is directly quoted from *Beim and Lévesque (2006).*

The majority of indices in this article are recommended by the Foreign Investment Advisory Service of the World Bank Group (www.fias.net/investment_climate.html).

1. *Economic Freedom of the World Index*
This ranks 123 countries. Each component ranges from 0 (worst) to 10 (best). Many of the components are based on data published by the International Monetary Fund (IMF) and the World Economic Forum. Components used in our article are: extension of credit; restrictions in foreign capital market exchange/index of capital controls among 13 IMF categories; impartial courts; and law and order.

2. *International Country Risk Index*
Produced by the PRS Group (www.prsgroup.com/icrg/sampletable.html), this index assigns a numerical value to a range of risk components, according to a preset weighted scale. The index varies from 0 to 50, with higher value of the index corresponding to lower perceived risk.

3. *Growth of Real Gross Domestic Product (GDP)*
We obtained 2002 GDP growth estimates from the World Bank publication Global Economic Prospects 2003 (www.worldbank.org/prospects/gep2003). Average annual growth is given in per cent. This measure varies from a minimum of e11.9 per cent (Argentina) to a maximum of 7.8 per cent (China).

4. *Purchasing Power Parity (PPP)*
PPP is the per capita Gross National Product adjusted by purchasing power. The base for the adjustment is the cost of living in the US. Data used in this article was obtained from the World Development Indicators Database (www.worldbank.org/data/icp/pppdata.htm). PPP for the countries for which this database publishes this index varies from 48,080 international dollars (Luxemburg) to 480 international dollars (Sierra Leone).

5. *Index of Economic Freedom*
Published annually by the Heritage Foundation (www.heritage.org/research/features/index/), it includes 50 variables divided into 10 categories: trade policy, fiscal burden of government, government intervention in the economy, monetary policy, capital flows and foreign investment, banking and finance, wages and prices, property rights, regulation and black market activity. The 10 factors are weighted equally, and we were unable to determine the exact composition of each of the factors, or the weight of each variable in its composition. Hence, the use of this index was limited to measures for which no other index seemed adequate. Components used in our model were: property rights; regulation; and doing business.

6. *Doing Business*

Published by the World Bank Group (http://www.doingbusiness.org/), it offers two indices that were used herein. First, an index of labor regulations constructed by examining the detailed provisions in the labor laws as the sum of the employment laws index and the industrial relations law index. This index takes values between 1 and 6, with higher values implying more rigid regulation. It was initially assumed that the "most preferred" level of regulations was 1, and the "least preferred" was 6. These preferences were later adjusted to reflect the preferences of each decisionmaker. Second, an index of entry regulations that takes into consideration the cost and time required to complete all the procedures necessary to establish and to legally operate a business in a given country. To make the data comparable across countries, the World Bank documents the procedures for a hypothetical company with certain unchangeable characteristics. "Number of procedures" is one of the measures available. "A procedure is defined as any interaction of the company founder with external parties, including obtaining all the necessary permits and licenses and completing all the required inscriptions, verifications and notification to enable the company to start operation." The number of procedures for all countries for which data is available varies from 2 to 20.

7. *Corruption Perception Index (CPI)*

Transparency International (www.transparency.org) publishes this index annually. The index is based on 14 polls and surveys from seven independent institutions. A detailed description of the methodology employed to compute the index (in 2001) is available at www.gwdg.de/~uwvw/2001.htm

8. *Freedom House Country Ratings*

The Freedom House (www.freedomhouse.org/ratings/index.htm) has been publishing its "Freedom in the World survey" since 1973. The index is measured on a 1 to 7 scale, with 1 representing the highest degree of freedom. The index has two components, political rights and civil liberties. Those two components were averaged to develop the scores for our measure.

9. *The World Bank Institute Worldwide Governance Research Indicators Dataset*

The governance indicators dataset (info.worldbank.org/governance/kkz2002/mc_chart.asp) reflects a "compilation of responses given by a large number of enterprise, citizen and expert survey respondents in industrial and developing countries". The indicators are given as point estimates on a scale ranging from -2.5 (worst) to +2.5 (best).

10. *Piracy Rates*

Piracy rates are published by the Business Software Alliance (BSA; www.bsa.org). BSA members include Adobe, Apple, Autodesk, Avid, Bentley Systems, Borland, CNC Software/Mastercam, Internet, Security Systems, Macromedia, Microsoft, Network Associates and Symantec. Software piracy is measured as the amount of business application software installed without a licence. Values are in percentage. Software piracy rates were assumed to be an adequate proxy for the lack of protection for all types of intellectual property.

Appendix B: Decision making methods

Methodology in supplier selection

Entrepreneurs, lesser-experienced decision makers and anyone willing to make a more defendable decision can make use of decision methods. Boisot & MacMillan (2004) explain why: entrepreneurs often lack a body of knowledge, leaving the arguments for the decision to what appears to be "right". Many country selection decisions or supplier selections are made ad hoc or with a "gut feel" whereas the use of decision models is less common.

Min (1994) provides a short elaboration on available systematic domestic supplier selection methods including a weighted–point method, a categorical method, a matrix approach, Vendor Profile Analysis (VPA), vendor performance matrix approach and Multiple Objective Programming (MOP) (for a short elaboration of these different methods, see Min, 1994). More recent methods are PROMETHEE/GAIA model (Dulmin & Mininno, 2003), the Multi Criteria Decision Method (MCDM) and the MCDM method based on fuzzy sets (Chen, Lin, & Huang, 2005). Finally the Multi Attribute Utility Theory (MAUT) is explained in own Min's (1999) article.

One of the most recognized methods nowadays is the analytic hierarchy process decision-making method from Saaty (2008). Saaty explains decisions are all about ranking alternatives until the best alternative emerges, which lays ground to the analytic hierarchy process (AHP hereafter) (Saaty, 2008). The theory states alternatives can be weighted against each other, whatever the measurement. This gives the method a great edge over the previous alternatives because of its easy applicability and understandability and does not require costly computer programs such as MAUT decision making does. Saaty decomposes the decisional process into four consecutive steps:

1. Definition and determination of the knowledge sought;
2. Structuring of the decision hierarchy top-down with the top being the goal of the decision, secondly the objectives, through the criteria to the set of alternatives.
3. Construction of pair wise comparison matrices to establish priorities.
4. Utilizing the priorities from the comparisons to weight the priorities from the level below, until all priorities are weighted and a final list of importance of alternatives emerges.

This model can effectively deal with both quantitative and qualitative criteria, making it suitable for application in a framework required not intended to be cumbersome, but with a drive to be understandable.

Saaty (2008) explains in great detail the procedure of the AHP decision-making method. Readers who are interested in this method are advised to read this very clear-cut article.

Appendix C: Interview script

Subject: Worldwide search & selection of suppliers

Date:

Introduction

1. Thank for considering request and help to agree to the meeting
2. Short description of personal background of researcher
3. Explain purpose of research and progress to date
4. Give participant information sheet to keep
5. Tell the participant about the output of the research and what happens with the data obtained from the interview
6. Agreement of confidence and nothing said in this conversation can be traced back to the interviewee or the organization. Interviewee may stop interview upon request.
7. Request that the conversation is recorded for transcription, if interviewee agrees turn on the voice recorder

Start interview

Turn on voice recorder

Part 1: exploring current method of supplier search and selection.

1. Again request permission to turn on voice recorder and to start the interview
2. Ask about what the job description embodies?
3. Ask about experience in field of purchasing
4. How do you search and select for global suppliers?
   a. *Probe: what are the different steps taken in this process?*
   b. *Probe: can you give a real life example of a succeeded search process for a supplier?*
   c. *Probe: can you give a real life example of a failed search process for a supplier?*
   d. *Probe: what is the decisive factor for success or failure for this process?*

→ *The aim of this question is to reveal how participants search for suppliers: are they searching for clusters and performing a type of cluster analysis? If so: on what basis is a cluster analysis performed? If not: how is this search & selection process being performed otherwise? Indicators can be used to measure the type of search process.*

5. What resources for finding a supplier are used if you have a specific cluster in mind?
6. What factors are to be met for international suppliers before you consider one to become your supplier?
   a. *Probe: can you give a real life example of analyzing an international supplier?*
   b. *Probe: what are the most important factors?*
   c. *Probe: what are less important factors?*
   d. *Probe: how are factors that are difficult to measure estimated, for example quality?*
7. To what extent are suppliers evaluated against each other?
   a. *Probe: in what ways?*

Part 2: Propose conceptual model and discuss relevance

8. To what extent do you agree with the overall steps taken in the model?
   a. *Probe: to what extent do you recognize the different steps from the model in your daily work?*

9. To what extent do you agree with the location selection steps from the model?
   a. *Probe: do you recognize the search practices from the cluster search?*
   b. *Probe: To what extent do the proposed regional factors play a decisive role in the selection process?*
      i. *Probe: can you give a real life example of a comparison of clusters?*
      ii. *Probe: what clusteral factors are taken into consideration?*
      iii. *Probe: how are these factors are being measured and where is the data found?*
      iv. *Probe: what is the balance between the clusteral factors?*

10. To what extent do you agree with the supplier selection steps in the model?
    a. *Probe: can you give your opinion on the proposed supplier selection factors?*
       i. *Probe: can you give an example on which supplier selection factors you use?*
    b. *Probe: can you give your opinion on the ranking of suppliers?*
    c. *Probe: can you give your opinion on the final supplier selection?*
       i. *Probe: can you give an example of how you made a decision for suppliers?*

11. If you could give any advice to improve the model, what would it be?

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12. Close interview
13. Thank participant for cooperating
14. Ask if the participant wants to receive a final summary of the study

End interview