FACTORS AFFECTING PRODUCTION LOCALIZATION IN CONSIDERATION WITH THE SUPPLY BASE AND SOURCING PARAMETERS

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Abstract

Over the past years manufacturing firms have moved their production to low cost regions. Many factors lead to the moving of their production and how these factors influence their decision making process. These have been discussed in various literatures. They also source from low cost regions in order to improve their productivity. Not only do they source from low-cost regions but also to actually produce goods in those countries. Many literatures have talked about the impact on some of the factors but little on the impact of supply base and sourcing parameters.

The thesis seek to review the factors that affect production localization decision process and also find out how the supply base and sourcing parameters affects decision making process, whether the supply base and sourcing is really considered and the impact it has in decision making process to localize a new production. Literature review and interviews were used in this process.

Four companies namely Haldex AB, ABB, case company A and B were used for the research. The main factors that are been considered for production localization were found out from the companies and practically the impact of the supply base and sourcing parameters during decision making are presented.

The results from the research questions and the empirical studies is summarized in a framework that will enable readers to know the main factors that affect production localization, how decision making is done and the main impact of the supply base and sourcing in production localization. In addition some benefits of placing emphasis on the supply base and sourcing parameters.

Key words: Production Localization, Localization factors, localization decision, Sourcing, Supply base and sourcing parameters.
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# Table of Contents

**ABSTRACT** .................................................................................................................. 2

**ACKNOWLEDGEMENTS** ............................................................................................... 3

1  **INTRODUCTION** ........................................................................................................ 6

1.1 **BACKGROUND** ...................................................................................................... 6

1.2 **OBJECTIVE** ............................................................................................................. 7

1.3 **RESEARCH QUESTIONS** ........................................................................................ 7

1.4 **PROJECT DELIMITATIONS** .................................................................................... 8

1.5 **PROJECT OUTLINE** ............................................................................................... 8

2  **RESEARCH METHODOLOGY** .................................................................................... 9

2.1 **RESEARCH METHOD** ............................................................................................ 9

2.2 **DATA COLLECTION METHODS** ............................................................................ 12

2.3 **RESEARCH DESIGN** ............................................................................................. 13

2.3.1 Literature review .................................................................................................... 13

2.3.2 Interview questions ............................................................................................... 13

2.3.3 Selection of participants ......................................................................................... 14

2.4 **VALIDITY AND RELIABILITY** .............................................................................. 14

3  **THEORITICAL FRAMEWORK** .................................................................................. 16

3.1 **LOCALIZATION DECISION THEORY** ................................................................. 16

3.2 **MANUFACTURING LOCATION DECISIONS** ...................................................... 17

3.3 **FACTORS AFFECTING LOCALIZATION DECISION** ........................................... 23

3.3.1 The relevance of selection criteria for global production locations ................. 28

3.4 **SUPPLY CHAIN MANAGEMENT** ....................................................................... 29

3.4.1 A Multi-dimensional model for Supply Management ......................................... 31

3.4.2 Supply Base Rationalization/Optimization ......................................................... 33

3.5 **SOURCING** ........................................................................................................... 34

3.6 **TYPES OF SOURCING** ......................................................................................... 34

3.6.1 Outsourcing .......................................................................................................... 34

3.6.2 Insourcing .............................................................................................................. 36

3.6.3 Rightsourcing ....................................................................................................... 37

3.6.4 Sourcing Parameters ............................................................................................ 37

3.7 **RISK OF SOURCING** ........................................................................................... 38

3.8 **MODELS OF MAKING OUTSOURCING DECISIONS** .......................................... 38

3.8.1 Outsourcing Model 1 ............................................................................................ 39

3.8.2 Outsourcing Model 2 ............................................................................................ 41

3.9 **SUMMARY OF THEORITICAL FINDINGS** ......................................................... 42

4  **EMPIRICAL RESULTS** ............................................................................................... 44

4.1 **HALDEX AB** ......................................................................................................... 44

4.2 **CASE COMPANY A** ............................................................................................. 47

4.3 **ABB** .................................................................................................................... 50

4.4 **CASE COMPANY B** ............................................................................................. 54

5  **ANALYSIS AND DISCUSSIONS** .............................................................................. 58

5.1 **DECISION MAKING PROCESS** .......................................................................... 60

5.2 **SOURCING PROCESS AND PARAMETERS** ....................................................... 61

5.3 **HOW THE SUPPLY BASE AND SOURCING PARAMETERS AFFECT THE PRODUCTION LOCALIZATION DECISION** .................................................. 62

6  **CONCLUSIONS** ....................................................................................................... 64

7  **REFERENCES** .......................................................................................................... 66

8  **APPENDIX** ............................................................................................................... 69
LIST OF FIGURES
Figure 1: Types of research methods ................................................................. 9
Figure 2: An outline of the steps in qualitative research (Bryman & Bell, 2003) .......... 11
Figure 3: Method of data collection (Kumar, 2005) ............................................. 12
Figure 4: The behavioral matrix (Hayter, p. 142, 1997) ........................................ 16
Figure 5: Steps in manufacturing location decisions, Schmenner (1982) and Hack (1999) .... 18
Figure 6: Site selection decision levels and factors based on (Hubner, 2007) .............. 22
Figure 7: Visualization of the localization factors, (sodal, 1996) ............................... 24
Figure 8: Relevance of location criteria on a country level, (Global Production, 2008) ....... 29
Figure 9: Competitive Framework in the supply chain (Ernst, 2002, p.120) .................. 30
Figure 10: Supply chain or Supply chain Network (Handfield, 2002) ......................... 31
Figure 11: Multi-dimensional model for supply management, Brito and Roseira (2003) ....... 32
Figure 12: Generalized five stage outsourcing process (Amy z. Zenk, 2003) ............... 36
Figure 13: Sourcing parameters, Anette Brannemo (2005) ....................................... 37
Figure 14: Outsourcing Model1McIvor (2000) ....................................................... 40
Figure 15: Sourcing Model2, Sheshadri K. and Mamata J. (2008) ............................... 42
Figure 16: Impact of the production localization factors ........................................... 45
Figure 17: Impact of the production localization factors .......................................... 48
Figure 18: Five Divisions of ABB (About ABB and Our Businesses, 2011) ................. 50
Figure 19: Impact of production localization factors ............................................... 51
Figure 20: Impact of production localization factors .............................................. 55
Figure 21: Impact of production location factors (Cumulative scores) ......................... 59

LIST OF TABLES
Table 1: Comparison of quantitative and qualitative research approaches (Mack et al, 2005) .................................................................................................................. 10
Table 2: Summary of the Interview process .................................................................. 14
Table 3: Key factors affecting international location decisions (MacCarthy et al, 2003) .... 20
Table 4: Major production localization factors, (Levine, 1991) .................................... 26
Table 5: General Ranking of Production localization factors (Jiaqin Yang and Huei Lee, 1997) ...................................................................................................................... 28
Table 6: Factors affecting production localization ...................................................... 45
Table 7: Factors affecting production localization ...................................................... 48
Table 8: Factors affecting production location ........................................................... 51
Table 9: Factors affecting production location ........................................................... 54
Table 10: Major factors affecting production localization ........................................... 58
1 INTRODUCTION

1.1 Background

Localization is of a Latin origin and “locare” means “to place” (Wieloński, 2004). Localization is the process of selecting the place for specific socio-economic activities. Each place offers certain resources and each economic activity is characterized by certain needs. The best location of a socio-economic activity is where optimum resources exist for it. Resources and needs vary over time and, as a result, the localization of socio-economic activities changes (Wieloński, 2004).

Many manufacturing companies over the years have developed the trend of moving to low cost regions. Manufacturing companies mostly source from low cost regions in order to improve their productivity. Not only do they source from low-cost regions but also produce goods in those countries.

Production localization decision involves firms seeking to locate, relocate or expand their activities. The facility location decision process involves the identification, analysis, evaluation and selection among others. Plants, warehouses, retail outlets, terminals, and storage yards are typical facilities to be located. Site selection starts normally with the recognition of a need for additional capacity. A decision is then made to start the search for the “best” location. Localization decisions are strategic with a high complexity and a strong political nature. These strategic decisions are one of the most consequential decisions a firm can carry out (Hickson et. al, 1986). Questions of localization attract many participants to the decision process who want to influence the outcome of the discussion. All internal departments of the organization want to make their voices and opinions heard. Shareholders, customers, and often government are also seeking to participate in the process (Hickson et. al, 1986). The localization choice for a manufacturing firm may have an impact on the firm’s strategic competitive position in terms of operating cost, delivery speed performance, and firm’s flexibility to compete in the marketplace. International manufacturing is one of the major parts of a firm’s competitive strategy today and beyond. Global expansion will offer the potential to take advantage of economies of scale and entry to new markets (Badri, 1999).

The decision-making process can be grouped into two; the first is based on the identification of the different processes and the second concerns geographical factors thus selection of country, region, community, sites and buildings (Hayter, 1997).

Over the last years many companies has moved from producing internally to buying from external suppliers. Outsourcing in general has an effect on the entire society and ought to be taken into consideration by all stakeholders, the government, companies and unions. There are a lot of different articles and journals on outsourcing but fewer on insourcing. This articles and journals do not examine the consequences on outsourcing on the company’s long term competitiveness (Bengtsson & Berggren 2005).
There are a lot of problems faced by companies when dealing with insourcing and outsourcing decisions in that most companies tend to base their decisions on short-term cost reduction. Companies neglect the risk involved in outsourcing such as dependency on the supplier, the total cost involved, and the loss of skills. Most companies do not have definite models in making sourcing decisions (Brannemo, 2005).

1.2 Objective

Supply base localization is often the last of many operational aspects to be addressed when an overseas manufacturing site is established (Bengtsson & Berggren 2005). Many firms do not lay emphasis and take the supply base and sourcing into their decision making process during production localization.

This thesis seeks to identify and analyze the factors that one has to consider in making decisions for production localization taking into consideration the supply base. Furthermore, the parameters that have to be considered in making sourcing decisions and suitable sourcing models in achieving optimal supply base for manufacturing companies was considered. We also seek to find out how the supply base and sourcing affect the decision making process in production localization and whether it is a main consideration in production localization.

The objective of this research is therefore:” To identify and analyze the factors that affect the production localization decision process in manufacturing firms with the consideration of the supply base and the sourcing parameters”.

1.3 Research Questions

In order to accomplish the objective of the thesis, the following research questions have been formulated.

RQ1. What are the factors to be considered for Production Localization and how do they affect the decision making process?

During production localization one needs to have some set of factors to consider in making good decision regarding localization. We seek to find out the factors that influence manufacturing firm’s decisions in choosing their production locations.

RQ2. What are the practices used in manufacturing firms when making sourcing decisions?

Here it is interesting to know the current practices in manufacturing firms. How they make their sourcing decisions, the people involved, the factors they consider and whether there are standard models they use in making their sourcing decisions.

RQ3. How do the sourcing parameters and supply base affect the localization decision?
This part explains the different parameters that are used in making sourcing decisions. This differs from one company to the other. Moreover we find out the impact of the supply base and sourcing parameters have on production localization decision in manufacturing firms.

1.4 Project delimitations

As per the thesis objective, literatures and journals on production localization decisions and how the supply base and the sourcing parameters affect localization decisions were researched. Unfortunately literature and journals on how the supply base and sourcing parameters affect the decision making process during production localization in manufacturing firms were not found, hence we focused more on the empirical findings to find out what really happens practically with the firms.

Production localization factors and decision making is a broad area but we focused on some factors and the impact of supply base and sourcing in manufacturing firms. Four international companies with foot prints all over the world were interviewed in the empirical studies.

The result of this thesis is practically what happens in the manufacturing firms and the importance they place on the supply base and sourcing parameters among other factors during their production localization.

1.5 Project Outline

This thesis work consists of seven chapters. Chapter 1, the introduction, describes the background of the project which states the problem area. The objective, research questions, project delimitations and the outline of the thesis are also described in this chapter. Chapter 2, research methodology, also describes various types of research methodologies and the specific one chosen for this project. How questionnaires and interviews were carried out are also outlined. In chapter 3, theoretical framework, this area describes the production localization decision theory and the factors that affect localization decision. However the focus is on supply base and sourcing. Various models to consider in making sourcing decisions are also described. Chapter 4, empirical studies, describes what actually happens on the ground regarding localization decisions and how sourcing and supply base affect their decision making process and the interviews results from the companies. Chapter 5, analysis and discussions, the results from both the literature and the empirical study are analyzed in this chapter. Chapter 6, the conclusions drawn in this project are summarized on answering the research questions. Chapter 7, the reference used in this project are presented. Chapter 8, the appended papers are listed.
2 RESEARCH METHODOLOGY

This chapter illustrates the research methods in general and particular reasons for the choosing the research method and about how the interviews, analyses and evaluations of the findings to compliment the research.

2.1 Research Method

According to Bryman (2002) the selection of the research method depends upon the objective of the research and the use of the findings. The research method used in this thesis is a qualitative method instead of quantitative method because the qualitative method is helpful for investing questions like how and why of research instead of calculating exact figures using quantitative methods. The reason for choosing qualitative analysis is mainly due to the complexity of the factors in production location decision making process, sourcing decisions and the sourcing decision models.

![Figure 1: Types of research methods](image)

The chosen qualitative method served the purpose well since the objective of the thesis was to find what will be the best method and tools for identifying the factors, sourcing parameter that affect the decision process.

The qualitative method is advantageous since the research questions can be answered only through qualitative method and also according to the discussion carried out through the interviews it clearly points out that achieving quantitative method out of it is really hard.

A comparison of the quantitative and qualitative analysis is made in Table 1 to get the better understanding between the two research methods.
<table>
<thead>
<tr>
<th></th>
<th>Quantitative</th>
<th>Qualitative</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Framework</strong></td>
<td>Seek to confirm hypotheses about phenomena</td>
<td>Seek to explore phenomena</td>
</tr>
<tr>
<td></td>
<td>Instruments use more rigid style of eliciting and categorizing responses to</td>
<td>Instruments use more flexible, iterative style of eliciting and categorizing</td>
</tr>
<tr>
<td></td>
<td>questions</td>
<td>responses to questions</td>
</tr>
<tr>
<td></td>
<td>Use Highly structured methods such as questionnaires, surveys, and structured observation</td>
<td>Use semi-structured methods such as in-depth interviews, focus groups, and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>participants observation</td>
</tr>
<tr>
<td><strong>Analytical objectives</strong></td>
<td>To quantify variation</td>
<td>To describe variation</td>
</tr>
<tr>
<td></td>
<td>To predict casual relationships</td>
<td>To describe and explain relationships</td>
</tr>
<tr>
<td></td>
<td>To describe characteristics of a population</td>
<td>To describe in individual experiences</td>
</tr>
<tr>
<td></td>
<td></td>
<td>To describe group norms</td>
</tr>
<tr>
<td><strong>Question format</strong></td>
<td>Closed ended</td>
<td>Open ended</td>
</tr>
<tr>
<td><strong>Data format</strong></td>
<td>Numerical (obtained by assigning numerical values to responses)</td>
<td>Textual (obtained from audiotapes, videotapes, and field notes)</td>
</tr>
<tr>
<td><strong>Flexibility in study design</strong></td>
<td>Study design is stable from beginning to end</td>
<td>Textual (obtained from audiotapes, videotapes, and field notes)</td>
</tr>
<tr>
<td></td>
<td>Participants responses do not influence or determine how and which questions</td>
<td>Participants responses affect how and which questions researches ask next</td>
</tr>
<tr>
<td></td>
<td>researches ask next</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Study design is subject to statistical assumptions and conditions</td>
<td>Study design is iterative, that is, data collection and research questions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>are adjusted according to what is learned</td>
</tr>
</tbody>
</table>

Table 1: Comparison of quantitative and qualitative research approaches (Mack et al, 2005)
An outline of main steps of the qualitative research suggested by Bryman and Bell (2003) is shown in the below figure 2.

<table>
<thead>
<tr>
<th>1. General research questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Seeking relevant site(s) and subjects</td>
</tr>
<tr>
<td>3. Collection of relevant data</td>
</tr>
<tr>
<td>4. Interpretation of data</td>
</tr>
<tr>
<td>5. Conceptual and theoretical work</td>
</tr>
<tr>
<td>6. Writing up finding/conclusions</td>
</tr>
<tr>
<td>5b. Collection of further data</td>
</tr>
<tr>
<td>5a. Tighter specification of research question(s)</td>
</tr>
</tbody>
</table>

Figure 2: An outline of the steps in qualitative research (Bryman & Bell, 2003)

The strategy of the research should reflect the subject and objective of the thesis. The strategy can be followed through different research methods. According to journal of business logistics there are eight types of research tools for collecting data such as interviews, surveys, experiments, literature reviews, case studies, content analysis, observation and focus groups.

The initial approach of the thesis is to brief the concept of production localization theories, factors and sourcing decisions; the best way of describing the concept is performing a literature review. Interviews were conducted to collect more data and information about the companies. The study focus on four manufacturing industries is drafted and the analysis is done on the results based on industries and identifies how the supply base and sourcing parameters affect their production localization decisions. Finally the thesis concludes with recommending a five step manufacturing location decision model to the case companies.
2.2 Data collection methods

With regard to Kumar (2005), there are two types of data collection methods for analyzing and answering the research’s objective and questions, which are primary and secondary sources. The following figure shows method of data collection.

![Diagram of data collection methods]

According to the above figure 3, both primary and secondary sources of data collection are used in this research in order to accomplish the objective and the research question. Information gathered using the first approach are secondary sources, whereas the sources used in the second approach are called the primary sources. Data gathered from empirical studies is qualitative data. Saunders, Lewis and Thornhill (2007) cited that qualitative data is more likely to provide such a richness of information than quantitative data. This is a significant reason for researchers to emphasis on qualitative data in order to achieve the research’s objective.
2.3 Research Design

2.3.1 Literature review

The literature section reviews existing literatures in the localization decisions area, focusing on factors affecting the production localization with the consideration of the supply base and sourcing process. Facility location and production locations are terms that can be used interchangeably in this case. According to Hart (1998), literature review is a collection of available documents on relevant topics which may be either published or unpublished. Literature review includes data, information, ideas and evidences which have taken from a definite viewpoint of the specific topic. The viewpoint should have a certain aim and it ought to give the idea about how the topic will be investigated.

The detail of this part is presenting the integration of theoretical background and the result of the finding. First, background of production localization theory and factors are followed. At the end of literature review the results are summarized. The theories that are used in this study are basically related to the production localization decisions and sourcing decisions. The paper also focuses on different journals related to supply chain management, facility location and sourcing models and its parameters.

Initially before framing the interview questions a deep study has been made within the previous research in the area of production localization and to the connected relevant literature. This study was performed to get a better understanding about the concept and also to make the discussions more interesting and interactive during the interviews.

2.3.2 Interview questions

Qualitative interviews are characterized by a low degree of standardization and the answers are never the same. In order to prevent the risk of subjectivity the researcher could choose to interview more than one person and thereby be able to evaluate the accuracy by comparing the answers. The researcher is also able to ask for clarification and lead the interviews in the right direction, giving the possibility to understand every specific situation, which is crucial when analyzing and concluding the collected data (Merriam, 1988; Yin, 2003). The findings from interviews and observations constitute the data that the analysis and conclusion of the study will be based on. In order to complete an interview successfully, the people interviewed had the chance to study the questions before the meeting. At each firm, more than one employee was interviewed in order to make the result of the study as objective and reliable as possible. The authors seek to conduct the interviews like a discussion, where the questions are posed in different order from interview to interview in order to be able to give different resulting questions.
2.3.3 Selection of participants

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Participant’s Designation</th>
<th>Venue and Nature of Interview</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case Company A</td>
<td>VP Industrial Strategy</td>
<td>Video-conference and e-mail</td>
</tr>
<tr>
<td></td>
<td>Manager Global Production Support</td>
<td>Case Company A (face-face)</td>
</tr>
<tr>
<td>Haldex AB</td>
<td>Global sourcing Manager</td>
<td>Telephone and e-mail</td>
</tr>
<tr>
<td>Case Company B</td>
<td>Buyer</td>
<td>Telephone, e-mail and video conference</td>
</tr>
<tr>
<td></td>
<td>Buyer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Buyer</td>
<td></td>
</tr>
<tr>
<td>ABB</td>
<td>Supply Manager</td>
<td>Telephone and e-mail</td>
</tr>
</tbody>
</table>

Table 2: Summary of the Interview process

2.4 Validity and reliability

There are different methods to evaluate the quality of research and the most common ways are through validity and reliability. Yin (1994) defines three types of validity: Construct validity, internal validity and reliability. According to Brymna & Bell (2003) the quality of the research is judged by considering the consistency measurement of the concept referred as reliability (Brymna & Bell, 2003).

Construct validity is a question of whether correct operational measures are used for the phenomenon that has been developed. This has been done through the interviews during the four case studies. We wrote the summary of the interview and sent it to the respondent for review. Each chapter in this thesis has been discussed with professors and persons in the industry to avoid confusion and misinterpretation.

The internal validity was conducted to identify the factors affecting production localization, impact of supply base and sourcing parameters. The factors are analyzed by measuring the success rate of practicing the techniques in the manufacturing industries. The strategy used
for validating is the pattern matching technique, which means validate through literature review and previous research conducted.

External validity is about establishing the area that the research result can be generalized to, in other words: are the results valid outside the specific case study. However, attempt to secure the external validity was to cover each research question with more than one case company study. Also to know the steps involved in Production location decision decisions.

The thesis is made more reliable by using the study case protocol (Yin, 2003), the thesis is documented in a protocol that starts with introduction to the topic, and methodology used, data collection, case study questions and evaluation. The analysis from the case companies shown provides a support for the reader on impact of the factors affecting the production localization.
3 THEORITICAL FRAMEWORK

3.1 Localization decision theory

Decisions tend to be more or less strategic; less strategic decisions necessitate little resources and the decision maker proceed on routines while more strategic decisions have a higher complexity and need more time and personnel to be carried out (Hickson, Butler, Cray, Mallory, & Wilson, 1986).

Decisions concerning localization are strategic with a high complexity and a strong political nature. These strategic decisions are one of the most consequential decisions a firm can carry out since it gives a great organizational change, and have long lasting effects on the firm. Questions concerning localization attract many participants to the decision process in order to influence the outcome of the discussion.

All internal departments of the organization want to make their voices and opinions heard. Shareholders, customers, and often government are also seeking to participate in the process (Hickson et. al, 1986).

According to behavioral theory, decision makers who seek to make decisions that at least meet up the ambition level make decisions. These decisions are based on collected and evaluated information that often is limited. A company’s locational choice is a part of a complex long-term investment decision and the location preferences are reflected by the decision maker and the information that is available (Hayter, 1997).

![Figure 4: The behavioral matrix (Hayter, p. 142, 1997)
The complex range of factors that affect the location decision process can be shown in a model done by Pred (1967) in (Hayter, 1997) called “The behavioral Matrix”, figure 4. Here an interface between factors that influence the ability of information and factors that influence the ability to use the information. The available information is geographically structured as the behavioral environment estimates it. The behavioral environment is the total sum of information sent and received by companies in a specific region or else in a specific sphere of activities. The competence and the characteristics of the decision makers affect the company’s ability to use the information. Companies with the highest level of information and the best ability to use it in the best way are those who possibly will make the finest location decision.

A good location for selection falls within the margins of profitability. It is predictable that companies with high value of information and abilities will locate close to the optimum and those with low value of information will place near the margin of profitability or beyond it; companies away from the profitability margin will not succeed in the location selection. However, firms can have good or bad luck and make unexpected choices. Strategic decisions face uncertainty, which sometimes forces the companies to make unexpected alternatives.

The location choice is a part of an investment decision process, which also comprises other factors such as technology, plant size, marketing, and engineering and design. The locational factors should be integrated in the whole process to make the best possible decision. The decision-making can be separated into two approaches; the first is based on the identification of the different processes and the second comprises geographical factors as selection of country, region, community, sites and buildings (Hayter, 1997). A rational decision is not possible for a person to accomplish due to inadequate and inadequate information, a person not is able to collect and value all information needed. A localization decision that concerns a foreign establishment turns out to be even more complex to make rationally. The required information is communicated in different languages and a person’s ability to handle information is affected by culture. Culture and language factors give uncertainties to a localization decision. This is part of the complexity when locating a firm and makes a rational decision difficult; therefore, localization decisions are characterized by behavioral decision-making (Hayter, 1997).

3.2 Manufacturing location decisions

In the present dynamic environment where change is the merely constant, businesses must analyze the production network. Thus companies have to be flexible in order to respond in a well-timed approach to this dynamic environment. A company may start looking for a new facility location to meet one, several, or multitude of requirements. Among most general requirements, Hack (1999) lists the need for expanded capacity for the development of new products, new markets, or the additional production capacity to satisfy existing markets. In several cases, a new location also may be essential to place modernized production equipment, or to attain higher efficiency and reduce operating costs that exist in the present
outdated facility. Other reasons for changing location include taking advantage of unexploited supplies of raw materials or to get out of high labour cost regions. No matter what are the reasons behind the decision to build a new facility, most location studies involve the same critical factors. Subsequently, company’s management must have a well-defined plan for its overall location analysis program. Hack (1999) and Schmenner (1982) subdivided the manufacturing localization decision process into five major steps as shown in Figure 5.

Figure 5: Steps in manufacturing location decisions, Schmenner (1982) and Hack (1999)

### Step 1: Evaluating the Production Capacity

The production shortfalls can be revealed in different methods and they mainly differ from one industry to another. Schmenner (1982) says that some large US manufacturing companies have implemented proper planning systems with the main purpose of revealing the shortfalls or surpluses in the manufacturing process. Hack (1999) recommends implementing a corporate strategic planning procedure for the companies to comprehend the above mentioned first three steps. The strategic plan must take account of several years and describe the sequential development of the company. The plan should be consider with and incorporated in to any location process as a complex part. This plan will also reveal various issues that to be ignored in the proposed expansion or relocation process.
Step 2: Expansion or a New Facility

There exists numerous factors which affects the decision making process on whether to expand the existing factory or to build up a new one. Schmenner (1982) points that generally, the first priority is given to expand the existing factory but only if there are some problems or limitation with the factory expansion including product proliferation, work force size, and the management prefers to construct a new factory or relocate the existing one. Schmenner (1982) states that if the company wants to keep away from the disorder as the result of too many products in process or to get a hold of rapid growth through cautious management of multi-plant strategy, commonly switches to open a new factory rather to expand the existing one. The merit of a new facility is to have the most modern production systems and the most suitable plant layouts.

Step 3: Establish Facility Specification

Facility specification ought to define what the plant is planned to do. Schmenner (1982) specifies characteristics that should be considered when starting up a new facility, such as

- “products manufactured and output goals for the initial start-up period and beyond
- Size of plant and configuration
- equipment to be used and flow pattern of product within the plant
- Number of workers, sex and age, and skill levels required, in the initial months and as the plant is broken in during the first few years
- labour training that is required to meet the workforce goals
- stance toward the adoption of quality of work life programs, from cross-training to job enlargement to team concepts
- production scheduling and control systems to be employed
- How the plant must interact with other plants and/or warehouses, including supplies or products shipped, modes used, personnel borrowed for troubleshooting, and the like
- Overhead functions such as new product engineering, major raw materials purchasing,
- Direct receipt of customer orders, industrial engineering. Which of these will the plant be responsible for, and which functions it can and cannot expect to take over as it grows
- how the new plant will be expanded subsequently and what will trigger that expansion (Sales goals met, new products introduced)
- What it would take to close the plant.”

Step 4: Identify Key Location Factors

The location factors greatly influence the final decision within the site selection process for a new facility set up.
The location factors can be classified into two categories as,
1. Quantitative categories
2. Qualitative categories

Jiaqin (1997) states the quantitative factors are measurable in the form of numerical values, like the average monthly salary or transportation costs. Qualitative factors include quality of life or business climate, approach toward foreign investment etc which are difficult be demonstrated in numerical values and evaluated by quantitative models. When qualitative factors are considered the location decision process becomes more complex.

Much research has been carried out on the relative importance on the choice of location factors. MacCarthy et al (2003) list the important factors affecting the international location decision process by conducting the Delphi study technique. The relative importance of 13 main factors is identified during the study as presented in Table 3.

<table>
<thead>
<tr>
<th>Table 3: Key factors affecting international location decisions (MacCarthy et al, 2003)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs</td>
</tr>
<tr>
<td>8</td>
</tr>
</tbody>
</table>

It’s clear that cost ranks the first, followed by infrastructure, labour characteristics, government and political factors, and economic factors. The top four factors are likely to have high ratings with the closeness to each other. Proximity to competition and proximity to
parent company’s facilities are two of the low priority factors. In addition MacCarthy (2003) also identifies the top ten sub factor that affects the international location decision process:

- Quality of labour force
- Existence of modes of transportation
- Quality and reliability of modes of transportation
- Availability of labour force
- Quality and reliability of utilities
- Wage costs
- Motivation of workers
- Telecommunication systems
- Record of government stability
- Industrial relation laws

During the Delphi study, it was explained that the consequence of the factors and sub factors can differ by geographical region and nature of industry. Therefore, every industry should have their own set of priorities. Jiaqin (1997) categorized five primary location factors which comprise:

- Location in relation to markets
- Material sources
- Transport cost and services
- Availability and cost of utilities
- Availability and cost of labour

According to Jiaqin (1997) view these primary factors frequently play main role in find out the general search area, when the secondary factors are used to decide a specific location. While Schmenner (1982) presents a general checklist for the factors to be considered by manufacturing location decision making personnel, which could be useful for the process of location search when appropriate sites are recognized. He further classifies the factors in to “Musts” and “Wants”. Beneath “Musts” Schmenner (1982) involve the factors important for site location and “Wants” could also be taken into the consideration.

In addition to this checklist of essential factors for a site selection, Schmenner (1982) summits two considerations that are abandoned during the selection process which might have a large impact on the final decision.

1) The first consideration is towards the attractiveness of the new plant location for the managers and engineers. The attractiveness for the living conditions in the selected area is not considered rather focusing mainly on the availability of labors, costs, and infrastructure. Hence the company faces difficulties in moving the personnel to the new location. Many companies face this problem when they move their companies to smaller towns or regions.
2) The second consideration is the movement of people and material among the facilities. Relatively the cost of interplant movement is not considered in the location selection process, which can result in high transportation cost or more time for travelling between the factories.

**Step 5: Site Selection**

It is clear as from the above discussion that the quantity of analyzed location factors could be devastating and various levels of site selection decisions are conquered by different types of location factors. Hence the complexity of the site selection problem can be made easier through decomposing it into a number of stages.

Much research satisfies the necessary extend of location problem decomposition. Hack (1999), Schmenner (1982), MacCarthy et al. (1995), Vinh (2005), Jiaqin (1997), MacCormack (1994), Hubner (2007) all describe that the problem have to be split into three or four main levels. The different levels are graphically summarized including the key factors relevant for every level in the Figure 6.

![Site selection decision levels and factors based on (Hubner, 2007).](image)

During the level of country selection: factors like market potential, transportation costs, infrastructure and labour could dominate the decision process. In the community and physical site selection quantitative factors such as site infrastructure and openness of local authorities
and to a certain level local cost difference and specific site investment needs affect the location decision process. Hubner (2007) reveals as the site search proceeds, that the number of alternatives decreases while the level of details about the alternatives increases. Hack (1999) refers to that several analysis on location do not necessitate all major illustrated in figure 6 as because the choice of region, state or community might be predetermined or based on numerous apparent factors.

3.3 Factors affecting localization decision

For last 20 years, instability in product markets has amplified due to the internationalization. Competition forces the companies to put great emphasis on quality and differentiation of the products, encourages better reliance on external rather than internal economies of scale, such as networks, and clusters (Scott, 1988). External economies of scale occurs when the size of the industry, not the size of the company, affect the cost per unit. Internal economies of scale occurs when the cost per unit depend on the size of the firm, not the industry (Krugman and Obstfeld, 2003). In the industrial location process companies have to optimize the relationship between company’s customers and the suppliers. Different organizations and different types of processes are grouped together into a definite place, generating external economies of scale (Scott, 1988).

Two of the most important factors today in the localization decision process are prices and mobility. To be able to move the companies if they face trade barriers is of high importance if the company will survive and stay competitive. The company can evade high costs of trade if they open up in a new trade region. The reality that countries in the international market differs in factor price for skilled labor, make industries relocate the manufacturing part of the firm from domestic markets to less developed countries in order to produce at lower costs. By means of avoiding high trade costs and produce at a lower price abroad, a firm can elevate its profits. This is what has turned out in Europe where firms in Western Europe have invested heavily abroad and build or bought new production plants in Eastern Europe (Sodal, 1996). The production cost is frequently related with labor costs, which is one of the causes why firms are moving abroad. The labor costs in Sweden 2002, according to European statistics, Eurostat, were the next highest in Europe with 28.7 Euro per hour. The labor costs in many Eastern Europe countries, were nearly a tenth of the Swedish labor level, in some an eighth (Wallen & Fölster, 2005).

Trade costs are another essential factor and can be separated in to real trade costs as tariffs and non-tariff trade barriers. The industries can only affect trade costs in forms of barriers, tariffs and transport costs if they change location to one with better conditions. Political decisions may be an obstacle for the development of firms if the decisions are not made on a market basis. For instance, when the government is deciding about infrastructure, if it is not well developed, companies will be affected and the market will not be developed. Non-tariff trade barriers are more complex while it concerns obstacle such as different language and culture, but can be reduced with gaining more information of things that are seen as a
difficulty (Sodal, 1996). The most common factors that influence the localization decision of a firm are shown in figure 7.

![Diagram showing factors influencing localization decisions](image)

**Figure 7: Visualization of the localization factors, (sodal, 1996)**

A big market is in numerous cases needed to be successive. It is one reason for the establishment of the large internal market within the European Union. By means of common interests, the countries have cooperated to decrease trade barriers and raise competition in hope to get higher welfare and higher total production. A large market lowers in general the costs, but in the short run, the size is not important when considering about the costs. Even the market structure has to be considered in location decisions. Domestic products have a preference for a long time, which might compel firms to locate in a country where they enclose market potential and in the same way become a part of that country. The tendency is now changing as we now have much global market. The customers can easily order products via Internet from China to Sweden and the movements of firms to countries with lower costs makes the products cheaper for the consumer. People demand different things in different regions, which also affect the market structure and location of firms (Sodal, 1996). The globalization has a huge impact on firm’s localization decisions. There are 24% foreign owned firms in the private sector in Sweden compared with 10% for ten years ago. The foreign owned firms often have clear structures with their subcontractors, which mean that the geographical distance to suppliers is not longer as important as the relation and mutual trust (Wallen & Fölster, 2005). If the customer to a firm moves their production, the suppliers often follow to still be close to the customer and be able to offer the same services (Bellman, 2005).

Several skilled workers, many production stages and small dependence on resources that is abundant geographically exemplify high technology. The mentioned characters could lead to agglomeration, the willingness to move near other similar firms to gain the advantages with
this closeness. Firms may also move to a place where the most skilled workers are situated since the workers are a very important part of the hi-tech production (Sodal, 1996). The firms that are overrepresented in the movement from Sweden today is high-technological firms, the firms that do not have the same technological level has already undergone this change in the 1970s (Bellman, 2005). Firms frequently plan to locate in a region that has grown much lately or has potential to grow large. A developing region with an increasing number of population requires further supporting organizations in the society, for exemplar, education, social functions and hospitals, which is a big opportunity for firms as they get reductions in future trade barriers. Growth is also a part of new technology development, and the new technology results in new products, better production and new possibilities, which make a market or region, grow (Sodal, 1996).

Uncertainty can be exposed in various ways, for example in technology development, trade costs, demand and policy. The rating of uncertainty is of great significance in location decisions and the uncertainty can merely be reduced by knowledge. Still there is an opportunity-cost between investing directly and wait for more information. New possibilities can be lost or a bad decision can be avoided. Information, historical happenings and expectations are fundamental factors to deal with uncertainty (Sodal, 1996).

The last factor that affects the location decision is policy. Policy affects all the factors as mentioned above in one way or another. One example is that the government can chose to support a specific region or the nation by low land or property taxes, different kinds of subsidiaries or other initiatives that reduces the firm’s fixed costs. Support to firms can also be in forms of research and better education that lead to better skilled workers. Laws, regulations and support from the government are of great significance in location decisions (Sodal, 1996). The labor-market policy in Eastern Europe in relation to Sweden is relatively flexible and has lower taxes of profits, which also strengthen the reasons to move the production (Wallen & Fölster, 2005). To move the production abroad is also a way to keep and secure the jobs left in the home country since the sales and profit often improves (Åström et al, 2005).

In the constant seeking of new ways to increase the firm’s profit, firms look for the combination of low costs, relevant competence and high productivity. Firms acquire a good quality range of these qualifications by locating in regions which have and probably will expand in the future. By foreign establishment firms also get the chance to build up other activities in the home country and in the end offer products to a competitive price. The problematic for the firms is that they are forced to lower their costs since they cannot put the costs in a higher price for the customer (Bellman, 2005). Establishment abroad has been a necessary measure to survive in the home country since the competition is very high. Customers are more frequently asking for cheaper products and can be willing to compensate this with quality. Experiences of firms that have moved their production abroad show that the benefits are good, but it also have disadvantages. Difficulties with control of the new plant or subsidiary, cultural clashes, unforeseen costs for education about the production and longer
delivery time, are some. In many cases, the problems have been solved during time and the relationship has developed good (Åström, et al., 2005).

In production localization, there are many factors that affect the localization decision. Many key elements are considered in the choosing of international location process, some of which are not relevant for domestic location decisions such as policies and incentives from host governments, social factors, nature of supply base and the political climate of a foreign country. The suitability of a specific site for proposed facility operations depends largely on what location factors are selected and evaluated, as well as their potential impact on corporate objectives and operations.

The most common factor that influences the decision makers is the opportunity to lower production costs and increase market shares. All factors affect the firms in one way or the other but they are not decisive. The advantages are weighed against disadvantages and a decision is made according to the firm’s needs and wants. Localization factors that have been mostly used in industrial location research generally can be grouped as follows: Market, Transportation, Labour, Site considerations, Raw materials and services, Utilities, Governmental regulations, and Community environment, as shown in Table 4 (Levine, 1991). Location factors can be measured from the angle of qualitative and quantitative categories. In the quantitative numerical values are measured such as cost of lands and tax incentives whiles the qualitative types combines both non-quantifiable factors that impact on the ease of doing business in a particular area, such as labour attitude, business climate, and quality of life. Such factors cannot easily be expressed in numerical values and evaluated by quantitative models. Location selection problems become more difficult when qualitative factors are taken under consideration, because subjective judgments must then be adopted. Some major facility localization factors and a general ranking of location factors are presented in Table 4.

Table 4: Major production localization factors, (Levine, 1991)

| 1. Access to markets/distribution centers | Cost of serving markets  
|  | Trends in sales by areas  
|  | Ability to penetrate local market by plant presence  
| 2. Access to supplies/resources | Transportation costs  
|  | Trends in supplier by area  
| 3. Community/government access | Ambience/cost of living  
|  | Co-operation with established local industry  
|  | Community pride  
|  | Housing/churches |
4. Environmental factors  
- Community attitude  
- State/local governmental regulations  

5. Labour  
- Prevailing wage rates  
- Extent and militancy of unions in the area  
- Productivity  
- Availability  
- Skill levels available  

6. Competitive considerations  
- Location of competitors  
- Likely reaction to the new site  

7. Transportation  
- Trucking service  
- Rail service  
- Air freight service  

8. Utilities services  
- Quality and price of water and sewerage  
- Availability and price of electric and natural gas  
- Quality of police, fire, medical services  

9. Taxes and financing  
- State income tax/local property and income taxes  
- Unemployment and compensation premiums  
- Tax incentive concessions  
- Industrial pollution control revenue bonds  

The importance of production localization factors is also changing as the decision process stages proceed (Haigh, 1990). In the early stage of identifying preferred geographical areas, only a few priority items are considered to identify those regions that satisfy most important criteria, such as the availability of labour or proximity to market. At the stage of selecting specific locations, site-specific factors such as land costs and access to roads may dominate. In the final stage of evaluating a few selected communities, some localization factors may tip the scales in favor of one community over another. A general ranking of production localization factors is presented in Table 5.
Table 5: General Ranking of Production localization factors (Jiaqin Yang and Huei Lee, 1997)

<table>
<thead>
<tr>
<th>Pivotal</th>
<th>Worker productivity</th>
<th>Receptivity to business and industry</th>
<th>Market access</th>
<th>Skills/technical/professional workers</th>
<th>Transportation access</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vital</td>
<td>Living amenities</td>
<td>Market growth potential</td>
<td>Preference of company executive</td>
<td>Industrial building available</td>
<td>Water supply</td>
</tr>
<tr>
<td>Important</td>
<td>Proximity to services</td>
<td>Energy supplies</td>
<td>Attitude towards business and industry taxes</td>
<td>Energy costs</td>
<td>Raw materials/supplies accessibility</td>
</tr>
<tr>
<td>Secondary</td>
<td>Cost of property and construction</td>
<td>Personal income tax structure</td>
<td>Attitudes on environmental control</td>
<td>Financial health of region</td>
<td>Financial incentives</td>
</tr>
</tbody>
</table>

3.3.1 The relevance of selection criteria for global production locations

Mckinsey’s german office together with Darmstadt University of technology conducted a survey known as “ProNet” (production network) involving interviews with over 100 managers at 54 companies, yielding a wealth of data on best practices used by global leader, as well as pitfalls to avoid. The survey results (see figure 8) show that experienced decision maker considers costs as the significant factor while making their production localization decision.

Successful companies see production localization mostly to reduce costs via lower labour expenses and increase sales with greater market proximity. Labour cost has the high relevance in the production localization process. Another sign of their stronger focus on the
opportunities and cost position of their production networks is the greater consideration they give to transportation costs, customs, taxes, duties and possibility of subsidies. The global leaders also see the availability of trained employees as a more important factor.

The importance of the different localization parameters is not only determined by the target country but also their country of origin. German and Japanese companies focus intensely on labour costs when setting up a localizing production in the United States. Conversely, Americans attribute greater significance to transportation costs if they invest in the European countries, which are geographically smaller than the U.S. This reveals that the decision makers get it difficult to discard behavioral patterns that were successful in developing their home markets but may not be transferable to other countries. The manufacturing firms’ country of origin influences which location parameters are considered to be relevant.

3.4 SUPPLY CHAIN MANAGEMENT

A supply chain can be defined as an integrated process which includes the various business entities (i.e., suppliers, manufactures, distributors, and retailers) work together with a focus to

1) Acquire the raw materials
2) To convert the raw materials in to final products
3) To deliver the final products to the customers.

This supply chain is conventionally formulated by the forward flow of materials and a backward flow of information.
Mentzer, et al. (2001) defines supply chain: “A supply chain is defined as a set of three or more entities (organizations or individuals) directly involved in the upstream and downstream flows of products, services, finances, and/or information from a source to a customer.”

Domenica (2002) states that supply chain must essentially be efficient and effective. Here efficient refers to minimize resources use to accomplish specific outcomes and effective means, in terms of designing distribution channels. Efficiency is weighed by product quality, delivery performance, inventory level, and backorders, whereas effectiveness is measured by service quality and the service needs. Long term competitiveness consequently rely on how well the company meets customer preferences in terms of cost, service, quality, and flexibility, by designing the supply chain, which will be more effective and efficient than the competitors’. The constant challenges faced by the companies are to optimize this equilibrium which is the part of the supply chain as shown in the figure 9.

![Competitive Framework in the supply chain](image)

Figure 9: Competitive Framework in the supply chain (Ernst, 2002, p.120)

Many strategic decisions should be made and various activities should be performed in order to optimize the equilibrium under cautious management and design of the supply chain. The supply chain design corresponds to a distinct means, according to which organization innovate, differentiate, and create values (Longitudes, 2004). Capability to design, organizational skills, products, processes and competences are the major challenges for supply chain design and management.

According to Hanfield, 2002, supply chain management is the integration and management of supply chain organizations and activities through cooperative organizational relationships, effective business process, and a high level of information sharing to create high performing value systems that provide member organizations sustainable competitive advantage.

Generally the supply chain structure consists of an upstream supplier network and its downstream distribution channel as shown in the below figure 10.
Mentzer (2001) describes three types of supply chain in relation to the complexity of the supply network:

1. Direct supply chain: includes a company, supplier and customer.
2. Extended supply chain: consists of suppliers of the intermediate supplier and customers of the immediate customer.
3. Ultimate supply chain: comprises all the organizations concerned in all the upstream and downstream flows.

3.4.1 A Multi-dimensional model for Supply Management

To understand the supply networks Brito and Roseira (2003) created a multi dimensional for supply chain management. The model comprises high values as it integrates three different analysis levels. (Figure 11)

1. The **dyadic level** describes the issues of selecting suppliers and relationship types, specifically the links between relationship type and relationship functions and effects.
2. The **portfolio level** pacts with supplier relations, the establishment and development of interaction among different suppliers, and the roles participants play in that process.
3. The **third level** deals with the supply networks – i.e. how far it goes and how valuable it is considered to be.
This model encompasses a number of issues with a good explanation. First, strategy, network theories and positioning are interrelated concepts that condition and are conditioned by the dyadic relationships the company establishes with its suppliers. Second, supplier portfolio may influence the focal company and the net of suppliers at two levels. On one hand, each dyadic relationship may endure the impact of other relationships with suppliers through the mediation of the buying company and, simultaneously, these changes may also condition its positioning and strategy in each of the dyads and its capability to act according to its objectives and expectations. On the other hand, suppliers may establish or develop horizontal relationships among them outside the influence of the buying company. These interactions may have profound effects on both the focal company and their suppliers.

![Diagram](image)

**Key**

- Direct relationship
- Relationship with indirect partners

**Source:** Brito and Roseira (2003)

Figure 11: Multi-dimensional model for supply management, Brito and Roseira (2003)

Third, besides the interaction with its direct suppliers, the focal company is also influenced by the suppliers’ suppliers, which can work either in its favor or against it. The relationships between suppliers and their respective suppliers enhance their network functions and effects. The possibilities of the focal company to take advantage of them depends to a great extent on its network knowledge, its macro and micro positioning, and also on its direct suppliers’
macro and micro positions, i.e. on their ability to mobilize their own focal relationship actors. Finally, regardless of the existence of direct or indirect interaction between the buying company and its suppliers’ suppliers, they are likely to influence the focal company’s network theories and consequently its strategy and positioning.

3.4.2 Supply Base Rationalization/Optimization

Supply base rationalization or optimization is the process of selecting the right number and mix of supplies to enhance efficient operations. It is a continuous process that endeavors to maintain the ideal number and mix of competent supplies. Optimization is also switching of suppliers to improve the supply base not only does it mean adding or reducing suppliers. In doing this one has to categorize it’s spend and identify current and potential suppliers for each category. Below are five categories of ways in rationalizing the supply base (Dominic C. 2006)

Reduce – This is not the only rationalization option as many perceive it. It works best when you have adequate qualified suppliers and the others cannot offer a cost, quality, or other advantages. It should not always be assumed that you are already using the best suppliers just merge spend with a subset of currently-used suppliers.

Increase – It is good on some occasions to also increase or expand the number of suppliers. Fewer suppliers are not always the best. It is better to have two different suppliers who are very good in their respective areas than to have one supplier for both works who will not deliver the same quality and efficiency. During examination, look out for suppliers who demonstrate across categories. Find out if they are truly the best option in each category and what the quantifiable advantages are to using them across categories.

Maintain – Only keep a good work done. So when a good work is done you don’t need to change.

Keep the size, change the mix – Quality of suppliers is more significant than quantity unlike in most firms where the measure of success is simply by numbers. Poor performing suppliers need to be changed for more efficient ones even if you have the right number of suppliers.

Expand then reduce – In this case there is the situation where the supply base needs to be reduced. This situation becomes difficult when the current suppliers are poor and cannot depend on. Hence you introduce new suppliers who are best on the market and later expel the inadequate ones. You need to make sure the new suppliers are very competent and capable of meeting your needs. Then you add them to your pool of suppliers to enhance more choice for further supplier reduction.
3.5 SOURCING

Sourcing is a procurement practice intended at finding, evaluating and engaging suppliers of goods and service. There are different types of sourcing namely Outsourcing, Insourcing and Rightsourcing which are described in section 3.6.

Outsourcing is done for various reasons. Some activities that are frequently outsourced are (Brannemo, 2005)

✓ Home maintenance
✓ Sweeping of chimney
✓ Handling of garbage
✓ IS/ IT
✓ Accounting systems
✓ Distribution

Companies today even outsource critical activities such as

✓ Production
✓ Marketing
✓ Design
✓ Information systems

3.6 TYPES OF SOURCING

3.6.1 Outsourcing

Outsourcing is the process of transferring part of an organizational internal recurring activity and decision rights to an outside provider banded by a contract (Greaver, 1999). According to Larsson Malmqvist (2002) outsourcing is when an external supplier is contracted by a company for something that was previously done internally. Outsourcing is not only when the activity has been carried out internally before giving it out to external suppliers but also finding new suppliers and new ways to enhance the delivery of goods, services, components and raw materials (Lonsdale & Cox, 1997).

According to (Greaver, 1999) outsourcing are carried out by firms for various reasons and benefits such as

1. **Financial driven reasons**
   ✓ generate cash by transferring assets to the provider
   ✓ reduce investment for assets and help improve other purposes

2. **Improvement driven reasons**
   ✓ It helps acquire skills, technology and expertise that one does not have
   ✓ Improve risk management
   ✓ Helps improve operating performance
 credibility and image improves through associating with superior providers

3. **Cost driven reasons**
   ✓ It helps turn fixed cost into variable cost
   ✓ Cost is also reduced through superior provider performance and the providers lower cost structure.

4. **Employee driven reasons**
   ✓ Increase energy and commitment in non core areas
   ✓ Gives employees a stronger career path

5. **Revenue driven reasons**
   ✓ Get business opportunities and market access through the providers network
   ✓ expand sales and production activities
   ✓ Commercially take advantage of existing skills.

There are various process and ways of outsourcing carried out by many companies. Here are five stages of outsourcing illustrated in the figure 12 below.

✓ **Stage 1: Investigation and tendering:** During outsourcing, the company or firm should first identify its core and non-core activities and find out the customers, markets and competitors requirements in setting its objectives. The extent of the outsourcing project is delineated in a business plan. The work plan and baseline for improvement measurements are documented in a process plan.

✓ **Stage 2:** Evaluation: A short list of suitable suppliers is identified through selection criteria. The sourcing is plan is developed as needed and cost model decided.

✓ **Stage 3:** Supplier Selection and development: The final suppliers are decided on, and a concession with the selected suppliers is carried out. A technical evaluation of the chosen suppliers that lead to savings identification needs to be conducted. The implementation schedule and timelines for the selected suppliers are then developed.

✓ **Stage 4:** Implementation: during the implementation phase a team is formed and implementation strategy and schedule are put in place. Shared resources, supply and logistics terms are developed. Both internal and selected suppliers expected results are documented. A periodic progress report is finally conducted on the measurement of the actual result.

✓ **Stage 5** Performance measurement and continuous improvement: Performance monitoring for suppliers is carried out separately and in combination with the process and used by the partners on a routine basis. Assessment of the effectiveness of the operational relationship with the suppliers is gathered. Problems are identified and continuous improvement opportunities are carried out.
The main aim of this stage is to preserve a best-in-class procurement process that is dynamic and flexible to meet changing market condition.

![Generalized five stage outsourcing process](image)

**Figure 12**: Generalized five stage outsourcing process (Amy Z. Zenk, 2003)

### 3.6.2 Insourcing

Most researchers over the years do not focus on Insourcing. There are a lot of literatures on outsourcing but only little on insourcing. In this thesis we try to give different definitions and understanding to insourcing. Insourcing is the transfer of services and products from external suppliers into the firm (Swartling, 2005).

According to Emanuelsson (1998) insourcing is the process where businesses and operations that were formerly sourced from sub suppliers are acquired and added to main operations. Also according to Van Weele (2002) Insourcing is when a company decides to take over strategic activities that were formerly done by suppliers. Some of the advantages of insourcing according to Van Weele (2002) are

- Lower logistics and administrative cost
- Flexible integration of new technologies
- Short time to market
- Faster communication
- The core competence of the firm stays in house.

There are also few disadvantages such as

- Less risk sharing
✓ Large scale production
✓ The cost of investments are high
✓ There is less focus on core competence

In all it can be concluded that activities that were performed by external suppliers before and are being taken over by the firm to be done internally is considering insourcing.

3.6.3 Rightsourcing
Many companies over the decades have been focusing on the concept of outsourcing as discussed earlier and mainly use this concept. With the changing trend and competition in the market companies must react strategically in other to survive in the long run. Therefore the combination of both outsourcing and insourcing can help manufacturing firms optimize their production structure. Rightsourcing is the combination of both insourcing and outsourcing actively in a strategic manner to be competitive now and in the future (Hagg, 2004). In the use of rightsourcing companies ought to consider both outsourcing and insourcing in a strategic way to improve their competitive priorities. In doing this, decision to insource or outsource should be carefully analyzed before taken. Also in making sourcing decisions the production strategy of the company must not be neglected. Sub-optimization must be avoided in order for companies to stay competitive in the long run and companies must also have a continuous process in both outsourcing and insourcing.

3.6.4 Sourcing Parameters
Sourcing parameters are the factors that firms consider in making their sourcing decisions. These decisions are taken by upper management people. This is very essential to avoid sub-optimization. A Cross-functional team works on the sourcing decisions and is well documented. When dealing with external suppliers a contract should always be signed.

In the Figure 13 below are the parameters that affect sourcing decisions in manufacturing firms.

Figure 13: Sourcing parameters, Anette Brannemo (2005)
3.7 RISK OF SOURCING

Sourcing of services and production to various locations across the world has become more evident today. In respect of this still only little research has been conducted to really access the risk associated with sourcing especially when it takes place between different business organizations in different countries and in the international context. In sourcing the most evident risk is becoming over dependant on your suppliers (washer, 1999). Being over dependant on suppliers will result in loss of critical skills according to Quinn and Hilmer (1994). It will be difficult to insource such activities back when there is over dependant on the external supplies since companies from time to time change their core competence.

During sourcing when one over depends on the supplier there is the risk where the supplier builds up expertise and becomes a competitor. As one over depends on the suppliers they get to know the key skills and the company’s core competence which can latter exploit. The supplier has the tendency of selling the knowledge obtained through the outsourcing process to a competitor. There is also the tendency of misunderstanding and problem with intellectual property rights such as who owns it and who has the right to convey it to a third party.

Communication between the parties is another risk associated with sourcing. This result from lack of trust between the companies, improper material flow leading to increased lead time and obviously cost related issues over total cost.

Another risk of outsourcing is the negative impact it can have on the morale and skills of the employees when the aim and specifications of the outsourcing is not clearly communicated. During outsourcing it is important to note that the results from outsourcing are dependent on the employees and their skills. High transaction cost is also a risk during outsourcing. This cost involves the time and effort needed to manage partnership between the parties involved. This includes set up cost, trading cost and competitiveness cost.

3.8 MODELS OF MAKING OUTSOURCING DECISIONS

The issue of whether to manufacture the parts in-house or to buy them from an external supplier plays an important role in the industries and academy for a long period of time. Theories about sourcing decision models have been developed from different perspectives: the cost perspective and the strategic perspective (Probet et al, 2000).

McIvor (2000) developed an outsourcing model that combines the sourcing decisions with all the company’s sourcing strategy. In the following section, two outsourcing model are described. The described outsourcing models explore the different dimension of the outsourcing decision. The description is made to give the reader outline knowledge about the outsourcing models and to know the sourcing parameters.
3.8.1 Outsourcing Model 1

McIvor (2000) developed an outsourcing model based on the three key concepts:
1) The value chain perspective
2) Core competency thinking
3) The impact of the supply base

This sourcing model has a strategic approach built into the sourcing decision process which comprises four sequential stages as shown in the figure 14.

STAGE 1:
This stage identifies the core and non-core activities of the organization. This process is mainly executed with the help of the top level management with the consideration from lower level staffs in the organization. This model structure defines that all non-core activities should be outsourced. The company’s freedom can be influenced by certain industrial relations to outsource the activities that previously have been carried out in-house.

STAGE 2:
This phase evaluates the value chain activities of a company concerning the competences of the company in the core activities with respect to the potential external sources, a benchmarking against the external suppliers.

STAGE 3:
In stage 3, the total cost analysis of the core activities is performed. It identifies the actual and the potential cost for the sourcing activity whether internally or externally.

STAGE 4:
According to McIvor (2000) it is very important to perform a relationship analysis because many organizations built their business relations based on long term contracts. The attempt to establish a relationship with the suppliers should be done especially if the company’s activity close to core competences is outsourced.
Figure 14: Outsourcing Model 1McIvor (2000)
3.8.2 Outsourcing Model 2

Sheshadri Vyankatrao Kulkarni and Mamata Jenamani (2008) proposed a framework on sourcing model whether to use make or buy Analysis (figure 15). In this model the rectangles and the decision diamonds indicate the decision analysis procedure and reason for decision making. The oval symbolizes the decision taken. As illustrated in the figure step 1 and step 2, if the product is strategically important for the company and also having the potential competitive advantage in the market, then the company should produce the parts internally (In-house Manufacture). If there is In-house production capacity shortage, (Step 3) then the product is outsourced or a new component is considered for the first time (step 11). In Step 12 the evaluation of the supplier’s performance is performed for the presently outsourced product and if it satisfies the needs then the product is outsourced to the same supplier. But if the performance is found to be unsatisfactory, search for new potential supplier is carried out in (step 13). In step 14 the supplier market is analyzed and if competition exists then the supplier selection is done besides if there is a monopolistic supplier then step 16, availability and technical knowhow of the part to manufacture internally and in step 17 the cost analysis is carried out to validate the insourcing of the product. In case the production capacity (step 3) exists for a particular product, then the installed capacity should be considered if it could fulfill the demand. Step 4 progresses to benchmark the in-house production process (for quality, cost and effectiveness) with the best external source available in the present market. In step 7 the supplier base market is analyzed in order to find out whether the supplier is competent in producing the product which overcomes the risk of supplier dependency. If there is a high competition in the supplier market (step 8) then the product can be a candidate for outsourcing. Step 10 verifies the redundancy of the existing resources due to the outsourcing the product. If the risk of outsourcing is high for the monopolistic supplier then such parts are partially outsourced.

In step 4 the part which has low strategic importance is not considered for in-house production even if the in-house manufacturing is found to be best option. By outsourcing the part the company focuses on the core competences. To enhance the financial benefits of the company in step 5 the SPP and its value are added as part of the decision. Based on the high GMP value for the product and the value addition in the final product in step 6 product manufacturing option is considered. Otherwise step 7 is followed to analyze the supplier base and follow the remaining procedures.
SUMMARY OF THEORETICAL FINDINGS

From the theoretical framework, many factors affecting production localization decision have been outlined. The main factors that are considered in production localization are cost reduction, to increase market shares, asses to suppliers/resources, environmental factors, labour, transportation, policies and environmental factors. These factors have been identified as the main factors that manufacturing firms consider in their production localization. According to Sodal (1996) two of the most important factors today in the localization decision process are prices and mobility. To be able to move the firms if they face trade barriers is of high importance if the firm will survive and stay competitive. The firm can avoid high costs of trade if they open up in a new trade area. Schmenner (1992) classifies the factors in to “Musts” and “Wants”. Beneath “Musts” involve the factors important for site location and “Wants” could also be taken into the consideration. Some of the factors that are classified as “Musts” are cost and the market.
Decision making process in production localization is strategic with high complexity and a strong political nature (Hickson et.al, 1986). The process must be carried carefully in order to make the optimal decisions. A generalized five step approach in manufacturing localization decisions according to Hack (1999) will help in making good production localization decision. The process talks of first evaluating the production capacity, whether an expansion or new facility is needed, establish facility specification, identify key production localization factors before finally select the location for the facility.

Sourcing is a procurement practice intended at finding, evaluating and engaging suppliers of goods and service. There are different types of sourcing namely Outsourcing, Insourcing and Rightsourcing. Outsourcing is the process of transferring part of an organizational internal recurring activity and decision rights to an outside provider banded by a contract (Greaver, 1999). According to Emanuelsson (1998) insourcing is the process where businesses and operations that were formerly sourced from sub suppliers are acquired and added to main operations. Rightsourcing is the combination of both insourcing and outsourcing actively in a strategic manner to be competitive now and in the future (Hagg, 2004). With the changing trend and competition in the market companies must react strategically in other to survive in the long run hence apply rightsourcing in their activities. During sourcing there are some parameters that are considered in making sourcing decisions. A Cross-functional team works on the sourcing decisions and is well documented. The parameters that are considered are cost calculation, capacity, choice of supply, competitive priorities, core competence analysis, qualitative and quantitative analysis, risk analysis and the logistics aspects. These parameters are carefully examined and this influences how sourcing decisions are carried out and the choice of suppliers that are selected. McIvor (2000) suggested a sourcing model that helps manufacturing firms in making the sourcing decisions. This is based on three main concepts based on the three key concepts the value chain perspective, core competency thinking and the impact of the supply base.

How the supply base and the sourcing parameters affect the production localization is the part where no literatures was found. Hence the focus on the empirical findings to really find out how it affects production localization decisions in manufacturing firms.
4 EMPIRICAL RESULTS

In our empirical studies we seek to find out practically, the factors that affect production localization in manufacturing firms and how the supply base and sourcing parameters affect their decision making process. We present the findings of interviews conducted from Haldex AB, Case Company A, ABB and Case Company B. These findings are based on interviews with people that have knowledge of the decision-making process to establish production abroad. The answers from the interviews have been summarized into three parts according to the research questions:

1. What are the factors to be considered for production localization and how do they affect the decision making process?
2. How do manufacturing firms make their sourcing process and the parameters they consider?
3. How does the supply base and sourcing parameters affect their localization decision process?

4.1 HALDEX AB

Haldex AB is a multinational company with its headquarters in Landskrona, Sweden. The company currently has ten production sites and three distribution centers. They have their manufacturing footprints in North America, South America, Europe and Asia. India and China in Asia, Mexico in North America, Brazil in South America and United Kingdom, Germany, Sweden, Hungary and France in Europe. Their primary business in terms of product range is innovative commercial vehicle technology with focus on brake and suspension products. In terms of market they are operate globally and their research and development focuses on braking systems for truck and trailer markets. They have about 2350 employees and their annual sales (2011) were about 4 Billion SEK.

Haldex mission is to offer proprietary and innovative vehicle technology solutions in certain fast growing niches within the global vehicle industry that improve: safety, the environment and vehicle dynamics. The innovative vehicle solutions of the Haldex business comprises

Product Range Air Controls
- Air management systems
- Air suspension systems
- Electric braking systems

Product Range Foundation Brake
- Actuators
- Automatic brake adjusters
- Disc brakes
- Electronic lining wear sensors
FACTORS AFFECTING PRODUCTION LOCALISATION

The main objective of Haldex’s facility location is to minimize cost, easy access to market and maximize the distribution centers. The main factors affecting their production location are costs, Proximity to markets/customers, legal issues, supply chain factors, capacity and labour.

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<th>S.No</th>
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<td>Proximity to markets/customers</td>
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<td>Capacity</td>
<td>Low</td>
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<tr>
<td>6</td>
<td>Labour</td>
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</table>

Table 6: Factors affecting production localization

The graphical represents the factors affecting the production localization. The impacts are classified under three ranges namely Low, Intermediate and high with the scales ranging from 1 to 6. The range 1-2 comprises the low impact, 3-4 shows the intermediate range, and 5-6 illustrates the high impact. It’s clear from the figure that Haldex categories costs and proximity to markets/customers factors under the high priority, legal issues under the intermediate, and supply chain factors, capacity and labour under low category.

Figure 16: Impact of the production localization factors
During production localization, geographical (transport) nearness to consumers was one of the most important issues considered. Haldex AB considers costs as their main factor in production localization. As any company, the main focus is on maximizing profit through cost reduction. Before they localize in any country, cost analysis is first done on the new facility to ensure profitability.

*Proximity to Market/Customers* is another factor which plays a significant role in localizing production. They need to find out the demand of the market they want to enter and if they can meet that demand. They look at their products and see if they can really meet the market demand. Depending on the manufacturing plant location and the global products, Haldex AB mainly considers the markets i.e. focus on the market share and customer supports on the preferred location. They don’t consider the supply base before making their location decision; rather it does impact on the logistics depending on the volume of the products.

*Legal Issues* is another factor that affects Haldex localization decision because legislation differs from one country to the other. A typical example is when they were moving to America where the voltage of the products produced in Europe (24volts) was different from the demand in America (12volts) which is mainly due to their legislation on their voltage, hence the legal issue of the location should be considered during production location.

*Supply chain* is another factor that affects their production localization decisions. This comprises of where they will buy the component and also manufacture them. In addition, the suppliers that will be used and those who are going to produce. Capacity and Labour has a low impact in their decision making process since they can find the skilled labour easily in the region they localize production.

**DECISION MAKING PROCESS**

In Haldex AB, production localization decision is being carried out by top management comprising of Sales, Product managers, purchasing, Supply chain and Logistics department. Currently there is no recognized model, checklist, right documentation or fixed process they follow in making their decisions. Decision making is more flexible depending on the market support and the customer demands.

During their decision making process Human resource factors, production system and financial factors do not really have an impact as in supply chain management and commercial management.

**SOURCING PROCESS AND PARAMETERS**

Haldex AB uses both existing and new suppliers during localization abroad depending on the market and the product. There is a rigorous supplier selection process and an audit system that they go through in choosing the right suppliers. Haldex AB posses a *comprehensive supplier selection process* in order to meet their criteria due to the critical products (braking
systems) they produce. Hence they cannot afford not to have a good supplier selection system. They undergo a ‘Supplier Monitoring Program’ where they maintain the right quality, right product to deliver in the right time.

Haldex employs Rightsourcing process, the combination of both Insourcing and outsourcing in making their sourcing decision. The core activities are insourced in order to protect the core competence, intellectual property and IT systems and the non core activities are being outsourced. Outsourcing is mainly to reduce cost and also help them give out process that they do not want to invest in.

Currently there is no sourcing model that is being followed. Sourcing decision is made by an informal process depending on the market and the complexity of the product, although there is a make or buy strategy they use. This is to allow flexibility in their decision making process.

The parameters they consider in making their sourcing decision are cost, market, volume, complexity and supply base. In making sourcing decisions locally and abroad, they follow the same process and criteria.

HOW THE SUPPLY BASE AND SOURCING PARAMETERS AFFECT PRODUCTION LOCALIZATION DECISION.

The supply base and the sourcing parameters of Haldex AB don’t affect the localization decision process, but they have a low importance and consideration in their process. This is mainly because the company makes their location decision based on cost, the market support and the customer needs, once the decision is made, supply base and the sourcing parameter are considered. On the other hand Haldex considers the supply base as one of the important parameter for making their sourcing decisions. The main problem faced in the supply base localization is that the company has too many suppliers, hence difficult to find the right suppliers to produce quality products at the right time.

4.2 CASE COMPANY A

Case Company A manufactures equipments for the construction and related industries. Company A is one of the world’s largest manufacturers of wheel loaders, articulated haulers, excavation equipments and compact construction machines. Their main business focus is to create safe and profitable construction equipments for the customers.

FACTORS AFFECTING PRODUCTION LOCALIZATION

The main factors affecting the company’s production localization process are costs, proximity to markets/customers, capacity, legal issues, labour competence and supply chain factors.
## Factors affecting production localization

<table>
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<tr>
<th>Factors</th>
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<td>1 Costs</td>
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<td>2 Proximity to Markets/Customers</td>
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<td>3 Capacity</td>
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<td>4 Supply Chain</td>
<td>High</td>
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<td>5 Legal Issues</td>
<td>Intermediate</td>
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<td>6 Labour</td>
<td>High</td>
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Table 7: Factors affecting production localization

The graphical represents (Figure 17) the factors affecting the production localization. The impacts are classified under three ranges namely Low, Intermediate and High with the scales ranging from 1 to 6. The range 1-2 comprises the low impact, 3-4 shows the intermediate range, and 5-6 illustrates the high impact. It’s clear from the figure that the company categories Costs, proximity to markets/customers, supply chain, and labour under the high priority, capacity and legal issues under intermediate category.

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### DECISION MAKING PROCESS

In Company A, Production localization decision is being carried out by top management and is a very complex process. They have a strategic decision model, checklist, guidelines; methods that they use in making their localization decisions but they do not adhered to it due to flexibility.
In making their decisions commercial management and financial factors are very important issues that influence the decision process. When relating to the product characteristics, Company A uses the combination of both new product design and the old existing core product design for their new facility location. The main reason is if the company localizes in for example in India then they need to have a redesign in their core products not as produced in Sweden in order to meet the Indian market needs and the customer requirements.

SOURCING PROCESS AND PARAMETERS

Case Company A uses both existing and new suppliers during localization depending on which region they want to localize. The suppliers need to have the knowledge, experience and the possibility to meet their volume and demand. For performing the operations within the company’s, long term-relationship with the suppliers is maintained for getting the right product with the right quality. Suppliers are evaluated based on a systematic approach where cost, quality and capacity are analyzed.

Company A make their industrial strategy decisions based on two axis namely footprint thus where they want to be depending on the market and the vertical integration, what they want to do internally and what they have to outsource. Rightsourcing, the combination of both Outsourcing and Insourcing is used in making their sourcing decisions. The non-core activities are outsourced and the core activities are insourced in order to maintain their core competence and intellectual property. In Company A, on the average 70% of the components are outsourced and 30% produced internally. In certain cases, where the local suppliers don’t satisfy the quality demands for the company, they make the decision to source the components from existing plants for the new production plant.

A make or buy strategy is used in making the sourcing decisions. The purchasing and supply chain department are responsible for carrying out the sourcing decisions process and there is a cross functional decision between operations and R & D. The decisions is a top to down management decisions depending on the make or buy strategy deciding what is core and non-core activities.

The parameters that affect Company A sourcing decisions are cost, quality, core competence, capacity, volume and deliverabilities. These parameters are taken into consideration when making sourcing decisions.

HOW THE SUPPLY BASE AND SOURCING PARAMETERS AFFECT PRODUCTION LOCALIZATION DECISION.

In Case Company A, supply base and the sourcing parameters plays a major role in their production localization process. It is one of the main factors that are considered. From the interviews conducted it can be inferred that when they are making a decision to localize in a
new region and for example they have about ten factors that they are considering, the supply base and the sourcing parameters will take 10% of the weighted average.

Normally, Company A tries to localize the new product at their existing localized production plant. For example, Company A has localized the plant in India which helps to expand their new products where the typical supply base has already been placed, hence making their localization process much easier. Contradictorily, if Company A wants to localize the production completely on a new site, a pre-study phase is performed to identify the supply base and if they don’t find the good supply base then the localization is denied for that selected location. This confirms the effect the supply base and sourcing have on their production localization decision.

4.3 ABB

The ABB Group, a leading company in power and automation technologies, employs about 124,000 people in around 100 countries. This multinational corporation is headquartered in Zürich, Switzerland. The long history of ABB goes back to Sweden, all the way to the late nineteenth century. At that time, a man named Ludvig Fredholm established Elektriska Aktiebolaget in Stockholm, Sweden, a company that manufactured electrical lighting and generators. A few years later in Switzerland, namely in 1891, Charles E.L. Brown and Walter Boveri established Brown, Boveri & Cie in Baden, Switzerland, the first company to transmit high-voltage power. It was about 100 years later since the founding of Elektriska Aktiebolaget which at that time was named ASEA (Allmänna Svenska Elektriska Aktiebolaget), and BBC (Brown Boveri & Cie) to merge in 1986 and eventually become ABB (Asea Brown Boveri) as it is known today (About ABB and Our Businesses, 2011).

Both companies have had a long tradition of innovation within the area of electrical engineering, where ASEA historically has focused primarily on high voltage power transmissions and Brown, Boveri & Cie on power plant applications, turbines and generators. Today, ABB is the world’s largest builder of electricity grids and is active in many industrial sectors. The core business today is in power and automation technologies which are further divided into five divisional business areas figure.

![Figure 18: Five Divisions of ABB (About ABB and Our Businesses, 2011)](image)

The strategy of the company for the next coming years is to continue to improve the performance of utility and industry applications while lowering the environmental impact. This will be possible together with technological capability and leadership, as well as global
presence and local expertise. The ABB Group will also continue to focus on core strengths in
power and automation technologies, in compliance with its vision statement “Power and
productivity for a better world” (Mission and Vision 2011, 2008). The corporation strives for
an organic and profitable growth and top-quality products and systems.

FACTORS AFFECTING PRODUCTION LOCALIZATION DECISION

During production localization ABB looks out for the following factors before selecting a
location for their new production. The main objective is to maximize profit through cost
reduction. The following factors are taken under consideration during production localization.
Legal issues, labour factor (Competence, attitude & availability), supply chain factors,
capacity and proximity to markets/customer.

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<tr>
<th>Factors</th>
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<tr>
<td>2 Costs</td>
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<td>High</td>
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<td>3 Labour</td>
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<td>4 Supply chain</td>
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<td>5 Capacity</td>
<td>4</td>
<td>Intermediate</td>
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<tr>
<td>6 Proximity to markets/customers</td>
<td>3</td>
<td>Intermediate</td>
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</table>

Table 8: Factors affecting production location

The graphical represents (Figure 19) the factors affecting the production localization. The
impacts are classified under three ranges namely Low, Intermediate and High with the scales
ranging from 1 to 6. The range 1-2 comprises the low impact, 3-4 shows the intermediate

Figure 19: Impact of production localization factors
range, and 5-6 illustrates the high impact. It’s clear from the figure that ABB categories Legal issues, Supply chain, Costs and labour under the high priority, Capacity, Proximity to Markets/Customers under the intermediate level.

Costs and Proximity to the market and customers is an important factor that affects their localization decision process. They endeavor that their new facility is close to their customers to enhance the growth of the business. Another factor is the capacity. Normally, the decision to localize is also influenced by the capacity or demand on their product. When the demand for the product is high and they cannot meet the capacity with their current facility, they decide to localize.

Supply chain factors are one of the most important issues that affect their localization process. This comprises of the supply base, specific suppliers and other logistics factors. Since cost reduction is the main aim they place more emphasis on their logistics cost since it has a high influence on their total production cost.

Legal Issues and Labour factors are the other factors that are considered before the decision to localize is finally taken.

DECISION MAKING PROCESS

Decision making concerning production localization is carried out by the top management. ABB has a standard model, methods, guidelines and checklist for making their localization decisions.

In making their decisions the importance of the geographical neartness of consumers is prioritized on the volume of the produced goods in the preferred manufacturing location. If it is the large volume of products then the importance is very high and on lower part volumes the importance is insignificant in nature.

ABB uses both old product and new product design when it comes to their product characteristics when establishing a new facility. Normally they use the old product design when they localize due to capacity increase. For example, the demand on a product from China was high and they couldn’t meet the capacity with their existing plant in Sweden, so they had to localize in that region using the same old product design.

SOURCING PROCESS AND PARAMETERS

ABB uses both existing and new supplies when they localize a new production. They have a sourcing strategy that is being employed in making their decisions and their commodity manager is responsible for the selection process. Below are the steps they follow in selecting a supply base in a new localization
1. Evaluating the existing supply base
2. Evaluate the supplier requirements
3. Find out if the supply base meets their requirements
4. If there is any miss match in case of quality, lead times, order to delivery performance (OTD) performance, price levels etc. (whatever factors are considered most important for that specific commodity) then they search for a new supply base.

Supply base rationalization is used in order to maintain the right number and quality. Collaboration between LBU (Local Business Unit) Supply Managers and consolidation of volumes is also used to maintain low number of suppliers with closer cooperation.

In selecting specific suppliers the commodity manager makes an investigation on the commodity and forms a strategy and also provides the list of preferred suppliers for different regions. This is made available to all supply managers within the company. Then the final decision is made by local supply managers.

ABB uses Rightsourcing, the combination of both Outsourcing and Insourcing in making their sourcing decisions. Mostly the non core activities are outsourced and the core activities are insourced in order to protect their core competence, intellectual property and IT. They outsource about 60% and Insourced 40% of their component. The main reasons why they outsource are mainly due to cost, to decrease lead time and to access the suppliers that are experts within certain areas (for example cable assemblies) and have other engineering capabilities.

The parameters that influence their sourcing decisions are cost, complexity, quality, core competence and capacity. These parameters are considered when making the sourcing decisions in the company.

**HOW THE SUPPLY BASE AND SOURCING PARAMETERS AFFECT PRODUCTION LOCALIZATION DECISION.**

The supply base and sourcing parameters have a major effect on the decision to localize new production within ABB. They need to have a lot of local suppliers in the region before they localize. This is because, the main aim of localizing production is to reduce their logistics cost as part of the cost reduction and reduce their lead time. Therefore, before they localize they really emphasize a good supply base. When this is not achieved they do not localize in the selected region. This goes to confirm the effect the supply base and sourcing have on their production localization decisions.

This has gone a long way to impact positively on the company. Some of the benefits of emphasizing on their supply base are helps ABB to have a reliable production, minimizes risk on quality issues and assures good investment.
4.4 CASE COMPANY B

Case company B is a mechanical manufacturing company which has global footprint. The company also is a leading services provider through its Logistics Services, Financial Services, Remanufacturing Services, and Progress Rail Services.

Company B’s global reach and presence is unmatched in the industry. They serve customers in more than 180 countries around the globe with more than 300 products. More than half of their sales are outside the United States. Company’s manufacturing, marketing, logistics, service, R&D and related facilities along with our dealer locations total more than 500 locations worldwide, ensuring that they remain geographically close to our global customer base.

FACTORS AFFECTING PRODUCTION LOCALIZATION DECISION

The main factors affecting the company’s production localization are costs, proximity to markets/customers, supply chain factors, labour, capacity and legal issues.

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<td>5   Legal Issues</td>
<td>Intermediate</td>
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<tr>
<td>6   Capacity</td>
<td>Low</td>
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Table 9: Factors affecting production location

The main driving factor for their production localization is maximizing profit through cost reduction. Whenever they want to localize a new production an intensive cost evaluation is then to know the profitability. The next factor is the closeness to the market due to the market demand. They endeavor to get close to their customers to enhance good customer relationship and to meet their demand.
Figure 20: Impact of production localization factors

The graphical represents the factors affecting the production localization. The impacts are classified under three ranges namely Low, Intermediate and High with the scales ranging from 1 to 6. The range 1-2 comprises the low impact, 3-4 shows the intermediate range, and 5-6 illustrates the high impact. It’s clear from the figure that Case company B categories Costs, proximity to markets/customers, Supply chain factors under the high priority, Labour, legal issues under the intermediate level and capacity under low level.

Supply chain factors consisting of the supply base, suppliers, transportation cost and other logistics are main factors that are also considered. Logistics cost plays a significant impact in their total cost, hence minimizing cost supply chain factors are really considered.

Resource availability, capability and transportation are other factors that are considered in the production localization process. These factors are thoroughly investigated before the final decision is taken. Legal issues are one of the factors under consideration. They endeavor to make sure that they meet all the regulations in the region. For example some countries demand that majority of their procurement must be done locally hence they really consider the legislation before they localize. The region must be politically sound to enhance their smooth operations.

DECISION MAKING PROCESS

Decision making is made on a top to down management level. In making the decision to localize the TCO (Total cost of ownership) and the technical feasibility of the product influence their decisions. Both new and old product design are used in localizing their production depending on the market demand.
SOURCING PROCESS AND PARAMETERS

Case Company B uses both existing and new suppliers in their operations when they localize a new facility depending on the complexity of the product. The Six Sigma Strategic Sourcing (6SSS) Process is the sourcing strategy that they use in their sourcing. A source plan is published every year based on the performance of the current supply base and future requirements.

Rightsourcing technique is used during their sourcing thus the combination of both outsourcing and Insourcing. Normally the non core activities are outsourced and the core activities insourced in order to protect its core competence and also protect their intellectual property. Sourcing is based on the technical feasibility of the products.

Case company B selects the suppliers depending upon the complexity of products. If they deal with low complexity parts then the suppliers undergo a simple supplier evaluation process. Contradictorily, if they have complex products then they insists on their 6-SSS. This standard tool defines the six sigma methodologies and comprises the standard supplier selection process. The supplier is evaluated under the QCLDM (Quality, Cost, Logistics, Development and Management) score card and if the suppliers meet the required QCLDM score, then they are selected in order to meet the Right quality, Right products at Right time (3R's). Company B has a good relation in dealing with their suppliers, as they classify them in to core and non-core suppliers. The core suppliers are further classified in to three types as follows:

(i) **Core-evaluating suppliers**- This type of supplier are aligned with the company’s collaboration and helps in developing the business cases.
(ii) **Core-Strategy suppliers**- They have a long term relationship with Company B and are also involved in the company’s development activities. The core-strategy suppliers are selected on the basis of QCLDM scores.
(iii) **Core- collaborative suppliers**- These suppliers plays a major role on the company’s new innovative products. They have an internal collaboration with the company and they are involved in the company’s R & D to develop their patented products.

Generally, the company selects their core suppliers on QCLDM score basis. The non-core suppliers are used for nontechnical components where the quality and the relationships don’t play a significant role.

In Company B the sourcing decisions are executed by the Product Managers (top-level). Initially, the product manager presents the product specification and a cross functional discussion including the purchasing management takes place in selecting the supply base. The purchasing department along with the production engineer, purchasing engineer, and quality engineer conducts a study on sourcing activities, whether to produce in-house or outsource depending upon the core and non-core activities. The core activities are insourced
while the non-core activities are outsourced. The global purchasing department evaluates and selects the supply base for the outsourcing process.

HOW THE SUPPLY BASE AND SOURCING PARAMETERS AFFECT PRODUCTION LOCALIZATION DECISION

From the interview conducted, the supply base and sourcing parameters of case company B are of high importance and really affect their localization decisions. All necessary analysis and calculations concerning sourcing and supply base are taken into consideration when making decision to localize the production. This is done mainly to make sure that they minimize the cost on poor quality, for on time delivery of products thus shorten their lead time, decrease their total cost of operations and satisfy their customers. In some cases if company B don’t find the supply base at the regions where they have higher market value and customer demands then the neighboring country’s supply base is considered. Therefore without a good supply base in and around the region it is difficult to localize their production.
5 ANALYSIS AND DISCUSSIONS

From the interview carried out with the four firms, we conclude the following main factors are taken under consideration by manufacturing firms during their production localization:

1. Costs
2. Proximity to markets/customers
3. Supply chain
4. Legal issues
5. Labour
6. Capacity

From the literature (Levine, 1991) and (Sodal, 1996) sited these factors as some of the factors that are considered during production localization by manufacturing firms. The factors are costs, access to market, and access to supplies/resources, labour, environmental, transportation, utility services and community and government.

The factors affecting the production localization in the case companies and their rate of importance are tabulated in a table. For making the analysis part easier, the cumulative scores for each factor depending upon the participant’s response is calculated and shown in table 10.

<table>
<thead>
<tr>
<th>S. No</th>
<th>Factors</th>
<th>Respondents</th>
<th>Cumulative Scores</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Haldex AB</td>
<td>Case Company A</td>
<td>ABB</td>
</tr>
<tr>
<td>1</td>
<td>Costs</td>
<td>6</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>Proximity to markets/customers</td>
<td>5</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Supply chain</td>
<td>2</td>
<td>5</td>
<td>5</td>
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<tr>
<td>4</td>
<td>Legal Issues</td>
<td>4</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>Labour</td>
<td>1</td>
<td>5</td>
<td>5</td>
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<tr>
<td>6</td>
<td>Capacity</td>
<td>1</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 10: Major factors affecting production localization
Figure 21: Impact of production location factors (Cumulative scores)

The graphical represents the factors affecting the production localization. The impacts are classified under three ranges namely Low, Intermediate and high with the scales ranging from 1 to 24 based on the cumulative scores of the four companies. The range 1-8 comprises the low impact, 9-17 shows the intermediate range, and 18-24 illustrates the high impact. It’s clear from the figure that four industries subjected to the study categories Costs and proximity to markets/customers under the high priority. Supply chain, labour, legal issues and capacity under the intermediate category.

Costs and proximity to market/customers is the highest priority under consideration during production localization by manufacturing firms. As said by (Levine 1991), the most common factor that influences the decision makers is the opportunity to lower production costs and to increase market shares. Manufacturing firms seek to increase their profit margins by reducing the cost of operations hence an intensive cost analysis is done before firms decide to localize in any region. This is also influenced by the proximity to market and the demand from their customers. People demand different things in different regions, which also affect the market structure and location of the firms (sodal, 1996). The globalization has a great impact on the manufacturing firm’s localization decisions. Most of the companies want to get close to their customers in other to meet their demand and have a good relationship with them and also increase their market.
Another factor is the supply chain, which consists of the supply base, sourcing and other logistics factors. This factor is considered by manufacturing firms but the impact varies from one firm to the other. It can be concluded from the interviews carried out that, most manufacturing firms consider it when localizing their production. Some place a high priority while others low priority. A more vivid impact of these factors is discussed in section 5.3.

Manufacturing firms also consider legal issues as one of the factors that affect their localization decision because legislation differs from one country to the other. From the case companies they need to meet the laws and regulations from the government before they can localize hence one of the factors they consider. This conforms to what the literature says that laws, regulations and support from the government are of great importance in location decisions (Sodal, 1996).

Capacity is also another factor that is considered. Manufacturing firms consider the capacity they need before they localize their production. Normally when the demand for their product is too high that they cannot meet with their current facility then they localize in a region closer to the market hence capacity a factor considered.

Labour cost is one factor that also increases the total cost of most manufacturing firms. They endeavor to localize in regions where the labour cost is cheap. Moreover they also look out for regions where they can find most skilled labour for their production. This is highlighted in the literature by (Sodal, 1996) saying that firms may also move to a place where the most skilled workers are situated since the workers are a very important part of the hi-tech production.

5.1 DECISION MAKING PROCESS

From the empirical studies conducted production localization decision making in manufacturing firms is a top to down management approach. There is also a standard model and checklist used in making decisions. Even though some case companies interviewed do not adhere to it due to flexibility, it is very important they use it as a guide line to minimize risk.

The empirical studies reveal that the production localization decision making process is highly complex in nature with a long-term process. Section 3.1 describes the localization decision theory, where it’s highly recommends the manufacturing firms to insist upon the Behavioral decision-making process (See Figure 4) to end up with the right decision on locating their firms. A firm’s locational choice is a part of a complex long-term investment decision and the location preferences are reflected by the decision maker and the information that is available (Hayter, 1997). In figure 4 the complex range of factors affecting the location decision process is illustrated in a model suggested by Pred (1967) in (Hayter, 1997) known as “The Behavioral Matrix”. The relationship between the factors influencing the ability of
information and the factors influencing the ability to use the information is discussed. It is expected that the firms with high value of information and abilities will result in optimum location and those with low value of information will place near the profitability margin or beyond it and the firms beyond the margin profitability will fail. The ability of information and ability to use the information to localize production depends on how the decision maker performs it with his behavioral actions, and it can vary with different personalities. Therefore, production localization is characterized by behavioral decision-making.

During decision making process to localize in new region, manufacturing firms use both new and old product design during their localization. Old product design is used mainly when they are not able to meet the demand with their current production facility then they localize in that region with the same product design. Depending on the need of their customers and the current market they also introduce new products to compete in the market.

5.2 SOURCING PROCESS AND PARAMETERS

During Production localization the case companies interviewed use both local and global procurement in selecting suppliers for their new facilities. They also use both existing and new suppliers during localization depending on the market and the product. The studied manufacturing firms had a sourcing strategy they all followed in selecting suppliers in order to maintain the right quality, right product and deliver in the right time. The suppliers need to have the knowledge, experience and the possibility to meet their volume and demand.

All the companies followed the rightsourcing approach, the combination of both Outsourcing and Insourcing. According to the literature Rightsourcing helps manufacturing firms to optimize their production structure (Hagg, et al, 2004). In carrying out Rightsourcing manufacturing firms classify their core and non-core activities in order to know what to outsource and insource. They outsource their non-core activities and insource core activities as proposed in figure 14 by (McIvor 2000). Core activities may never be outsourced in other to protect core competence, protect intellectual property and Information technology. The manufacturing firms have a higher percentage on outsourcing than insourcing. Outsourcing are mainly done in order to reduce cost, improve quality, shorter lead times, improve their risk management and acquire the skill and technology that they do not have.

As discussed in section 3.6.1, and based on (Lonsdale & Cox 1997) and (Greaver 1999) stated reasons for outsourcing which conforms to what manufacturing firms practice. It was found out that the companies during their outsourcing process follow the generalized five stages outsourcing process (Amy Z. zenk, 2003) which is investigation and tendering, evaluation, supplier selection and development, implementation and performance measurement and continuous improvement.

Before they carry out their sourcing there are some important parameters considered before they decide the kind of sourcing to be carried out. We found out that these parameters really
affect production localization decisions. When they do not meet the demand of their sourcing parameters they have to do a reanalysis in their decisions to localize their production. These parameters are cost, core competence, capacity, quality and supply base. Anette Brannemo (2005) listed the same parameters in Figure 12 as parameters affecting sourcing decisions.

5.3 HOW THE SUPPLY BASE AND SOURCING PARAMETERS AFFECT THE PRODUCTION LOCALIZATION DECISION

In the literature study carried out, we did not find journals and information on how the supply base and sourcing parameters really affects the production localization decision hence our curiosity to really find out how the supply base and sourcing parameters affect the localization decision in manufacturing firms.

According to Schmenner (1982), the factors that affect production localization could be classified into “must” and “wants”. “Must” involves the factors important for production localization and “Wants” could be taken under consideration. The “Must” are the factors that are mainly considered by manufacturing firms and forms the core of their production localization decisions whiles the “wants” may be considered. From the empirical study, we found out the four companies interviewed, three consider the supply base and sourcing parameters as “Must”. The other considered it as “Wants” and was not an important factor taken under consideration. They sometimes localize the production before they consider the supply base and sourcing parameters hence they take in risk.

The other three companies placed high importance on their supply base and sourcing parameters in that if they are considering ten factors in their production localization, supply base and sourcing will constitute 10% of the weighted average. Companies will not localize a production if they cannot find good and adequate supply base and supplies in and around the region they want to localize. Every companies aim is to increase its profit margin through cost minimization. Logistics cost constitute highly on a company’s total cost, hence without placing high importance on the supply base and sourcing, one will end up increasing the logistics cost and hence increases total cost. Moreover without good supply base, lead time will also increase. Some benefits of placing a high importance on the supply base and sourcing parameters are that it helps to have a reliable production, minimizes risk on quality issues and assures of good investment.

The empirical findings indicated the company that did not place a high importance on the supply base and sourcing during their production localization was due to the fact that they mostly found good and adequate suppliers where ever they have localized their production so far. They tended to localize their production before really considering the supply base. This might be a risky venture considering the current changes in the market trend. Some few years
ago many never perceived the market trend moving to China and Brazil but currently they are leading in the market.

Taking a scenario where the market trend changes to very low cost countries, where the supply base is poor and inadequate and manufacturing firms do not consider it as an important factor in making localization decisions, they stand a high risk in their investment. When the localization is carried out only to release that they lack good supplier base in and around the region, then they will have to bring supply from their current facility. This increases the Logistics cost and intend increases total cost of operations. The aim of cost reduction to maximize profit will not be achieved. Moreover without good supply base the quality of the products will be risked. Manufacturing firms should place a high importance and have a good analysis on their supply base and sourcing during their production localization in order to minimize their risk and have a good business investment.
6 CONCLUSIONS

The objective of this thesis is identification and analysis of the factors that affect the Production localization decision process in manufacturing firms with the consideration of the supply base and the sourcing parameters.

During this thesis project, the factors affecting the production localization and the impact from the supply base and sourcing parameters are identified. The objective of this thesis has been fulfilled through a literature study as well through four case studies. Three research questions were presented in the introduction (see chapter 1) and they have been investigated in the case studies. The research questions and the summarized conclusions are presented below:

RQ1. What are the factors to be considered for Production Localization and how do they affect the decision making process?

From the literature studies and the empirical findings, many factors are considered during production localization by manufacturing firms. The most important factors that are considered are costs, proximity to markets/ customers, supply chain factors, legal issues, capacity and labour.

The most universal factor that influences the decision makers is the prospect to reduce their production costs and increase market shares. All factors affect the firms in one way or another. Advantages are weighed against disadvantages and the decision to localize the production is carried out according to the firm’s musts and wants. For a few manufacturing firms, moving the production is the only option and the different factors may not be considered as they should do. Companies that have extensive time to make a decision can weigh up different localization preference from the list of the affecting factors and get information concerning the locations. The production localization factors have diverse degree of influence in each firm, but all are profoundly affected by the locational factors, factor price and factor mobility.

RQ2. What are the practices used in manufacturing firms when making sourcing decisions?

The literature study indicates that there exist a large number of theoretical models for outsourcing decisions and the models for in-house manufacturing decisions is negligible.

Both the theoretical and empirical studies reveal that the many companies follow their own sourcing models in accordance to their core and non-core activities. In making the sourcing decisions firm usually outsource their non-core activities and also keep the core activities.
Many companies use the Rightsourcing process to actively apply the combination of in-and outsourcing on a strategic approach to be competitive now and in future. Manufacturing firms outsource most of their non-core activities mainly to reduce cost, improve quality, shorter lead times, improve their risk management and acquire the skill and technology that they do not have.

**RQ3. How do the sourcing parameters and supply base affect the localization decision?**

The supply base and sourcing parameters have a great impact on the production localization decision. According to the empirical studies carried out. Logistic cost as mentioned have a high impact on total cost hence manufacturing firms consider their supply base seriously in order to reduce their logistics cost. Manufacturing firms make sure they have adequate and good suppliers before they localize. This helps to minimize risk quality issues, have a reliable production and assures of good investment. Some manufacturing firms will not even localize production in a region if they cannot have adequate and quality suppliers in and around the region. This illustrates the effect of it on localization decisions.

There are different sourcing parameters illustrated through the theoretical and the empirical studies. This can be summarized as cost calculation, core competence, risk analysis, capacity, quality, qualitative & quantitative analysis, supply base and production strategy. These parameters are taken under consideration before localization decisions is made.

From our theoretical and empirical findings we would like to suggest one way that could be followed by manufacturing firms in making their production localization decision process due to the complexity of its nature, Manufacturing firms could follow the five step decision making approach by (Hack, 1999 and Schemenner, 1982) in figure 5. Which suggest they consider their Production capacity, analyze possibility to expand, establish facility specification and Identification of their key factors during decision making process in localizing new production facility. In addition, the Behavioral decision- making process in Figure 4(Hayter, 1997) to end up with the right decision on locating their firms since decision making process in very complex.

Furthermore we found out that supply base and sourcing is a very important factor in production localization and firms must consider it as “Must” and not a “Want” in order to achieve optimal production.
7 REFERENCES


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8 APPENDIX

INTERVIEW QUESTIONS

This Interview seeks to determine the factors that one has to consider in making decisions for production localization in consideration with the supply base. The parameters that has to be considered in making sourcing decisions and suitable sourcing models in achieving optimal supply base for manufacturing companies. We also seek to find out how the supply base and sourcing affect the decision making process in production localization. The objective of this research is therefore:” Identification and analysis of the factors that affects the Production localization decision process in manufacturing firms with the consideration of the supply base and the sourcing parameters”.

Interviewers:
1. Jayaprakash Lakshmikanthan (jlj10006@student.mdh.se), +46 700160935
2. Godfred Tabiri (gti10002@student.mdh.se), +46 765814072
Masters in Product and Process Development-Production & Logistics
Malardalen Högskola, Eskilstuna - Sweden.
Thesis Tutor: Monica Bellgran
Professor, Production Development at Malardalen University

Name:
Company:
Position:
Email:
Phone/cell phone:

1. How long has the company been operating?

2. What is your primary business in terms of?
   a) Products
   b) Markets
   c) R&D

3. What is your current Manufacturing footprint?

4. What is the main objective for your facility location?
   a) To minimize cost
   b) Demand oriented
   c) Environmental concerning
   d) Maximum Services
e) Others .............

5. Do you have production plant abroad apart from current country? If so please list the countries

6. Have you moved any production globally? If so, what were the reasons?

7. Have you moved any production from Sweden to another existing site within your footprint? Have you built any new facility for new production abroad?

8. What factors did you consider in localizing production in Sweden?

9. What are the factors you consider in localizing Production abroad?

10. How did these factors affect your decision making process?

11. What are the most important issues that you have been facing from non-domestic manufacturing and supply facilities regarding the following?
   a) Customer service
   b) Flexibility/agility
   c) Operational and supply chain
   d) Product quality
   e) People and talent
   f) Regional (Political and local issues)

12. Did you endeavor to invest on the place near an important city, which is able to? Provide enough services (financial education, cultural, business institutions)?
   a) Yes, It is important to life of employee
   b) Yes, It is important for our company
   c) No

13. Was geographical (transport) nearness of consumers important for localization decision?
   a) Very Important
   b) Very Little Importance
   c) Insignificant

14. How do you consider the localization decision process of your company to be? What do you think about the complexity degree?

15. How do the following factors affect your localization decisions?
   a) Supply Chain Management
   b) Commercial Management
   c) Production System
   d) Human Resource
16. Do you have any practices, methods, guidelines, checklists in making the production location decision process?

17. How does your company deal with the Product Characteristics, when making the location process?
   a) New Product Design for the new facility plant
   b) Old product Design (Existing Product) for the new facility plant
   Please justify your answer………………………

18. What is your choice in Production Localization?
   a) Local Procurement
   b) Global Procurement
   c) Both a & b
   Please Justify your answer…………………

19. How does these supply chain factor affects the decision process?
   a) Material cost
   b) Logistics cost
   c) Availability & Proximity to suppliers
   d) Transportation Availability & Reliability
   Please explain your choice …………………

20. What are the choices of suppliers during localization abroad?
   a) Existing suppliers
   b) New Suppliers
   c) Combination of both

21. Have you outsourced any production from Sweden to a supplier the last 5 years? Why?

22. How do you select your supply base and specific suppliers? Do you have a sourcing strategy for this?

23. How does your supply base affect the localization decision process?

24. Was the nearness of suppliers important for the localization decision?
   a) Yes, very important
   b) Very Little importance
   c) No

25. What are the main problems in supply- base localization?
   a) Insourcing
   b) Outsourcing
   c) Right Sourcing {Combination of (a) & (b)}
      [Insourcing…….%
      Outsourcing……..%]

27. How do you make your company’s sourcing decisions?

28. What are the parameters affecting your sourcing decisions?

29. How do the sourcing parameters affect the location decision process?

30. Is there any differences or similarities in making sourcing decisions locally and aboard? If yes, how?

31. Describe how you selected suppliers for your latest new production localization.

32. What is the effect of lack of good supply base in your production localization? Does that have an influence in selecting another country for Production?

33. Which countries have the highest risk of losing production due to lack of good supplies?