This chapter presents the background and basis for thesis discussion. It will introduce the research question; discuss objectives, scope and importance of the study, and finally, present an outline for thesis structure.

1.1 RESEARCH BACKGROUND

With the globalization of economic markets and the development of information technology, a well-designed and implemented supply chain management (SCM) system is now regarded as an important tool to increase competitive advantage, Choi et al. (2007); Li et al. (2007). In upstream echelons of supply chain, vendor selection or vendor evaluation continues to be a key element in the industrial purchasing process, and appears to be one of the major activities of the professionals in the industry, Patton (1996); Michaels et al. (1995).

A supply chain is coordination between a manufacturer and vendors which is typically a difficult and important link in the channel of distribution involved in the manufacturing of a product from the procurement of raw materials to the distribution of the final products to the customer. Purchasing commands a significant position in most organizations since purchased parts, components, and supplies typically represent 40 to 60 percent of the sales of its end products.

In today’s highly competitive environment, the proper evaluation and selection of vendors is very crucial for the progress and development of every manufacturing industry. With the emphasis on quality improvement concepts and wide use of enterprise systems, the managers try to go beyond the conventional boundaries of money and material and try to explore the vast new universe of possibilities.
In most of the business processes, it has become essential for the firms to go for few and trusted vendors who can provide high quality goods at least cost with minimum lead time. Therefore vendor selection has turned to be an important constituent of the organization decision making and is one of the most critical activities of purchasing management which has gained great importance in the study chain management. It has proved to provide a competitive edge over the competitors, while maintaining the strategic and operational bindings and also functions as factors used in globalization, increased value added in supply, and accelerated technological change.

The concept of just-in-time (JIT) manufacturing has put additional pressure on the vendors emphasizing on delivery performance, quality and strategic integration between the two firms. Vendor selection involves various criteria including delivery performance, cost, quality, flexibility, service, etc. and often involves the selection of one while sacrificing the other. Consider a situation in which one vendor is providing goods in cheap rates but is not able to deliver on time. On the other hand, another vendor is providing the best quality goods but delivery performance and cost are not acceptable.

Vendor selection and evaluation is the process of finding the appropriate vendors who are able to provide the buyer with the right quality products and/or services at the right price, in the right quantities and at the right time, Mandal and Deshmukh (1994); Sarkis and Talluri (2002). Selecting the right vendor is always a difficult task for the purchasing manager, Liu et al. (2005). Purchasing involves buying the raw materials, supplies, and components for the organization. The activities associated with it include selecting and qualifying vendors, rating vendor performance, negotiating contracts, comparing price, quality and service, sourcing goods and service, timing purchases, selling terms of sale, evaluating the value received, predicting price, service, and sometimes demand changes, specifying the form in which goods are to be received, etc.. Based on the information, as purchasing is quite vital for the manufacturer, seeking the right vendor is
utterly significant for the company. Vendors have varied strengths and weaknesses which require careful assessment by the purchasers before ranking can be given to them, Liu et al. (2005). During the 1990’s many manufacturers seek to collaborate with their vendors in order to upgrade their management performance and competitiveness, Chen-Tung et al. (2006). Thus the vendor selection process has received considerable attention in the business management literature due to the key role of vendor’s performance on cost, quality, delivery and service in achieving the objectives.

The overall objective of vendor selection process is to reduce purchase risk, maximize overall value to the purchaser, and build the closeness and long-term relationships between buyers and vendors, Monczka and Trecha (1988) which is effective in helping the company to achieve, ‘just-in-time’ (JIT) production, Li et al. (1997). The vendor selection process would be simple if only one criterion is used in the decision making process, however, in many situations, purchasers have to consider a number of criteria in decision making. In such cases, it becomes necessary to determine how far each criterion influences the decision making process, whether all are to be equally weighted or whether the influence varies according to the type of criteria, Yahya and Kingsman (1999). Therefore, vendor selection belongs to the class of multi-criteria decision making (MCDM) problem in which the firms need to identify the top priorities of selecting the best vendor based on its working style and the industry type. MCDM problem is affected by conflicting criteria; hence a trade off among these several criteria must be analyzed. MCDM techniques support the decision-makers (DMs) in evaluating a set of alternatives. Depending upon the purchasing situations, criteria have varying importance and there is a need to weigh criteria, Dulmin and Mininno (2003).

Different multi-criteria decision making (MCDM) approaches have been proposed by the researchers in past, to solve the vendor evaluation and selection problem. In the present work, we present a review of various MCDM methodologies reported in the literature for solving the vendor
evaluation and selection process. Matrix and Distance Based Approximation methodologies were found widespread application in decision-making problems, involving multiple criteria in systems of many levels. The methodologies have the ability to structure complex, multi-person and multi-criteria problems hierarchically and are very useful in involving several decision-makers with different conflicting objectives to arrive at a consensus decision. These methodologies are described in this research to develop decision model to identify the important criteria for vendor selection and selecting the best suitable vendor in an automobile manufacturing company. Sensitivity analysis is carried out to identify the most and least critical criteria and the influence of any criterion on the overall performance rating of a vendor. Knowledge based computer software has been developed for the implementation of these methodologies in evaluation and selection of vendors in any industry. The software is highly user friendly and does not require any extensive knowledge in the field of computers/information technology for its use.

1.2 RESEARCH PROBLEM

The increasing globalization of the automobile industry, the rapid pace of technological change, the increasing establishment of long-term strategic partnerships with a few key vendor and recent trends in moving production facilities to low-cost countries has resulted in a newfound emphasis on the changing structure of the automobile industry. The automobile industry is, more or less, considered to be an assembly industry. Meaning that, it brings together a variety of components, many of which are manufactured by independent firms in other industries and is a primary example of a producer-driven production chain. The research is focused to identify suitable vendor selection criteria, which add value to the selection process and present capabilities, in terms of vendors, technology and infrastructure and to develop a unique and suitable model based on multi-criteria decision making to facilitate the evaluation and selection of best suitable vendors.
1.3 OBJECTIVES OF THE STUDY

1. To study the general concept of vendor (supplier) selection and its relevance to current developments in the business environment.

2. To study the available literature in form of research papers, books, articles and case studies etc. for the development of vendor selection methodology. It is proposed to cover strategic purchasing, supply management, vendor / supplier selection and quality management systems.

3. To carry out the system and structural analysis of the vendor selection using Graph theoretical approach.

4. Development of the vendor selection methodology that will include identification of selection attributes, design of an evaluation questionnaire, respondent interview, analysis of the questionnaire results and finally, synthesis of the methodology.

5. Development a framework to implement the vendor section methodology through Knowledge based software.

6. To carry out a case study in an advanced technology based automotive industry for illustration of the developed methodology.

7. To review the results comparing with already developed vendor selection methodologies / models for validation and significance of the developed methodology, making recommendations and to explore the possibilities for the future research work on the application of the developed methodology in other kinds of advanced technology based industries.

1.4 SCOPE OF STUDY

The scope of the present study is to compare the vendor selection process across and within the industry by using both quantitative and qualitative selection criteria. The research is focused towards evaluation, selection and ranking of various vendors based on these conflicting criteria
using computer based multi-criteria decision making methodologies for automobile industries in India. Structural modelling and analysis for visual understanding, identification and comparison of the vendor selection systems for better presentation to top management authorities is another consideration in this study. Knowledge based computer software is to be developed for the proposed methodologies in order to assist the users for implementation in similar problems. The study will be limited to automobile industries in India and evaluation selection and ranking will be done for one particular industry. Hence, the findings from this study are not so strong enough to be generalized for all other manufacturing industries. Therefore greater care needs to be taken when references are made on the results.

1.5 IMPORTANCE OF RESEARCH

In today’s competitive market, Vendor selection is a critical and demanding process for the industry, which provides with the accurate product/raw material and/or services at the right price, right time and in the required quantities. Consequently, vendor selection become very important for maintaining planned association. Selection of best vendor among a large number of potential vendors with more selection criteria / sub-criteria is a difficult choice and requires an effective model of selection for decision makers. Presently, the decision making process is handled qualitatively as they do not use any specific vendor selection model. In this scenario, the present study is important as the developed knowledge based software based on matrix and DBA methodologies can handle the decision making process considering both quantitative and qualitative selection criteria.

1.6 OUTLINE OF THESIS

The thesis is arranged in nine chapters; salient features of each chapter are discussed in Fig. - 1.1.
CHAPTER 1: Introduction
A presentation of our research background, problem definition, research questions, objectives and importance of the study will be presented in this chapter.

CHAPTER 2: Literature Review
A review of the available literature in form of books, research papers and articles related to vendor selection criteria, decision methods and management etc. will be reported in this chapter.

CHAPTER 3: Research Methodology
This chapter will provide the basis for our research, discuss our research strategy and methods for data collection, and seek to justify the quality of the research. It will also provide an introduction to the proposed methodologies for empirical findings.

CHAPTER 4: Structural Modelling and Analysis
This chapter will aim to develop a methodology based on graph theory for structural modelling and analysis of the vendor selection systems in order to carry out structural identification and comparison among them.

CHAPTER 5: Automobile Scenario in India
The automobiles scenario in general and in India in particular that includes the background, history of development, growth rate in automobiles, key statistics and future prospects of automobile industries in India will be discussed in this chapter. The supply chain of automobile industries is also presented.

CHAPTER 6: Empirical Study and Analysis
The empirical study will deliver an in-depth exploration of vendor selection criteria, methods, modelling and how they are being applied in Indian automobile industries, in an effort to best answer the research questions.

CHAPTER 7: Sensitivity Analysis
The sensitivity analysis will be carried out in this chapter for all potential vendors for each selection criteria to identify the most and least critical criterion and to estimate their influences on performance of the vendors.

CHAPTER 8: Knowledge Based Software
This chapter will present a user friendly knowledge based software tool for optimal evaluation, selection and ranking of vendors based on proposed methodologies.

CHAPTER 9: Conclusions and Recommendations
This chapter will aim to summarize major research findings and present suggestions for future research studies.

References and various relevant appendixes will be given at the end.

Fig. 1.1 Thesis outline