

Chapter 6.11

Recent Developments in Supplier Selection and Order Allocation Process

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ABSTRACT

Because the purchasing department can play a key role in cost reduction, supplier selection and order allocation are the most important functions of purchasing management. In view of its complexity, it will be focused especially on the final selection stage that consists of determining the best mixture of suppliers and allocating orders among them so as to satisfy different purchasing requirements. In recent years, many researchers used new integrated models for supplier selection and order allocation. They combine multi-criteria approaches such as AHP/ANP and linear programming (LP), mixed integer programming (MIP), non-linear programming (NLP), mixed integer non-linear programming (MINLP) and goal programming (GP) with different achievement scalarizing functions. In this chapter, after the stages of supplier selection process are explained, these new integrated models are introduced and their constraints, variables, and goals/objectives of these models are explained in detail. Then the solution methods of these integrated models are given. Finally, different integrated models are compared by considering their advantages and disadvantages.

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INTRODUCTION

With globalization and the emergence of the extended enterprise of interdependent organizations, there has been a steady increase in the outsourcing of parts and services. This has led firms to give more importance to the purchasing function and its associated decisions. One of those decisions which impact all firms' areas is the supplier selection. Companies need to work with different suppliers to continue their activities. In manufacturing industries the raw materials and component parts can equal up to 70% of the product cost. Because the purchasing department can play a key role in cost reduction, supplier selection and order allocation are the most important functions of purchasing management. In view of its complexity, we will focus especially on the final selection stage that consists of determining the best mixture of suppliers and allocating orders among them so as to satisfy different purchasing requirements and recent developments (new integrated models) in supplier selection and order allocation process in this chapter.

The contents of the other sections are also summarized in introduction part. In the second part; supplier selection process (different stages and characteristics) are explained. The tangible/intangible criteria used for performance evaluations are discussed and several multi-criteria methods used for pre and/or final selection stage are introduced to evaluate these tangible and intangible criteria, some of which may conflict. The differences among these methods, the advantages and disadvantages of them are also discussed in detail in this part.

In recent years, many researchers used integrated approaches for supplier selection and order allocation. They combine multi-criteria approaches such as AHP/ANP and linear programming (LP), mixed integer programming (MIP), non-linear programming (NLP), mixed integer non-linear programming (MINLP) and goal programming (GP) with different achievement scalarizing func-

tions. In the third part, these integrated models are introduced. The constraints, variables, and goals/objectives of these models are explained in detail.

Many real-life supplier selection and order allocation problems as well as the proposed models in the literature involve more than one objective. In the fourth part, the authors will focus on the solution procedures of multi-criteria and multi-objective supplier selection and order allocation models. Multi-objective optimization models such as ϵ -constraint, Tchebycheff Metric-based Scalarizing Methods, interactive methods (Reservation Level Driven Tchebycheff Procedure-RLTP), GP with different achievement scalarizing functions (Archimedian, Preemptive, Minmax), Conic Scalarization Method (CSM) are introduced to readers in this part.

In the last part, a comparative study is performed for the recent integrated models in the literature so; the readers can understand the advantages and disadvantages of these integrated models.

SUPPLIER SELECTION PROCESS

As reported by De Boer et al. (2001), several decision-making steps make up the supplier selection process. At first, a preparation step is achieved by formulating the problem and the different decision criteria. After that, prequalification of potential suppliers and final choices are successively elaborated. De Boer et al. (2001, 2003) present an interesting overview of the literature on supplier selection models. It specifies the published works treating every stage of the selection process for every purchasing situation. In this section, every stage of the selection process (problem definition, decision criteria formulation, pre and final selection of potential suppliers) is demonstrated.

Problem Definition

Due to shortened product life cycles, the search for new suppliers is a continuous priority for

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