

# Fuzzy Multiobjective Bi level Models for Vendor Selection Problem : A Decision Tool for Improving Financial Welfare

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## Abstract

The decision making of vendor selection and the decisions regarding their allocation is one of the main concerns of the purchasing function of a company. Better vendor selection reduces different costs which improve the financial condition of the company. Many conceptual, analytical and mathematical models have been developed for a preferred compromise solution of vendor selection problem (VSP). In this paper, we consider a decentralized vendor selection problem involving two levels of decision maker. We present three different models of vendor selection problem considering multiple objectives at different levels. Here the decision maker at second level is controlled by the decision maker at the first level up to a specific extent defined by a controlling factor. Different scenarios have been discussed for the proposed models under different controlling factors. Numerical validation is also provided in order to illustrate applicability of the models.

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## I. Introduction

VSP IS CONSIDERED to be an important part decision and planning of supply chain management. Selection of potential vendors helps in building long term relationships with them. There exist issues of supply chain management problem where the better selection of vendors influences the decision of any company's purchase department related to the planning of distribution as well as transportation. Hence, VSP has an important role concerning different objectives to be achieved in a supply chain problem. It has also been noted that selecting reliable vendors ultimately increases the efficiency and less number of vendors in a firm. A vendor selection problem

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*Submitted January 2020; Accepted June 2020*

*Article accepted under MoU signed with GLA University (India) in 2019-2020*

#### IV. Conclusion

In this paper, multiobjective models of bi-level nature have been presented for the vendor selection problem. Different models have been constructed on the basis of objective functions present in the different level. Each model consists of two scenarios where each scenario is created on the basis of controlling factor. The controlling factor decides the control over decision variables by the different level decision maker. Fuzzy programming approach has been incorporated to deal with multiple objectives at different level. Optimal values of leader have been used for constructing membership functions considering tolerances. These membership functions have been used for the creation of the final satisfactory compromise solution. The main contribution of the models proposed is that it can handle the complex vendor selection problem when many decision makers exist at different levels. The present approach is very helpful in improving profit margins, reducing costs and thereby improving the financial condition of the company.

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