A Decision-Aid in Supplier Selection for Entrepreneurs, Using Nested-Design, MODM and FAHP

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ABSTRACT

Decision making is an important task for entrepreneurs, and proper performance of purchasing has a direct effect on decreasing costs, increasing profitability, and survival of an entrepreneur. Also, entrepreneurs must follow formal rational decision processes as much as possible with fewer costs. To do so, they can use Design of Experiment techniques in combination with decision-aids. In this paper, the authors develop a fuzzy linear multiobjective model for supplier selection. With this model, the decision maker will be able to identify effective criteria with the Nested-Design technique and their relative importance on supplier selection with FAHP. In this regard, fuzzy linear multiobjective programming will be assigned a share of suppliers for supply and demands in the supply chain. The authors expect that using this combination of techniques will have an impressive effect on reducing supplier selection costs.

Keywords: DOE, Entrepreneurship, FAHP, MODM, Nested-Design, Supplier Selection

INTRODUCTION

Decision making is an important task for everyone and actually entrepreneurs. Studying responses from 15 entrepreneurs, Smith et al. (1988) reveals two important facts about entrepreneurs. These findings can be described as follows:

1) Compared with professional managers from larger firms, entrepreneurs from smaller firms are less comprehensive in their decision behavior. Smith et al. (1988) defines comprehensiveness as the degree to which an individual follows a formal rational decision processes.

2) The less comprehensiveness in decision behavior, the less organizational performance. This fact is true for both entrepreneurs and professional managers.
These findings show that despite, decision making is an important task and can affect the performance of firms directly; entrepreneurs do it quickly, using a few information. On one hand, innovation is the main characteristics, distinguishing entrepreneurs from small business owners (Carland et al., 1984). This means, more uncertainty due to innovative characteristic of entrepreneurs, resulting in more risks. On the other hand, risk is an attendant factor with entrepreneurship, like any other ownership (Schumpeter, 1934; Brockhaus, 1984). This risk can be a threat for entrepreneurs. Thus, as an entrepreneur, one must control risks by providing more information resulting in decreasing uncertainty. In such manner, entrepreneurs can improve comprehensiveness of decisions, making their firms’ performance better. One of the most important barriers to do so is the cost of information. In fact, information gathering is a time consuming and costly process. Thus, an intermediate manner should be chosen. In such manner, equilibrium between amount of collected information cost and risk will be established. Such an equilibrium point is where the total cost in minimized. This point can be seen in Figure 1.

Finding such optimum point is a heuristic process. To do so, one can use tools which need minimum cost in collecting information. Such tools, related to topic of this article (supplier selection) are Design of Experiments (DOE) techniques.

McMullen and Shepherd define uncertainty as what ‘separates entrepreneurial action from mere action’ (McMullen & Shepherd, 2006; Alvarez & Barney, 2005; Sarasvathy, 2001). It is also noted that “entrepreneurship theorists have embraced the position that uncertainty is detrimental to entrepreneurial action because properties such as hesitancy, indecisiveness, and procrastination are thought to lead to missed opportunities” (McMullen & Shepherd, 2006; Casson, 1982). Moreover, many empirical studies represent strong relationship between uncertainty and important entrepreneurial outcomes (Gans et al., 2008; Wu & Knott, 2006). Summing up, uncertainty is a pervasive reality in different entrepreneurial decision making dimensions. Thus, supplier selection as an important task is not an exception. Suppliers have impressive effects on Cost, Quality, Delivery time and etc. Therefore, supplier selection is one of the most important activities in purchasing management.

Ghodsypour et al. (2004) proposed the Supplier selection is a Multiple Criteria Decision Making (MCDM) subject with some conflicting criteria. So, one of the purchasing management’s duties is comparing of suppliers in aspect of different criteria. DOE techniques are used in decision making process as a tool for detecting the effective criteria. The importance rate of the criteria varies in different purchasing situations. Therefore we need a method for considering the importance of criteria in supplier selection (Dulmin & Mininno, 2003).

In practice, i.e., Supplier selection, some of input data aren’t crisp. In these cases value of criteria, constraints, priorities of criteria and etc. are expressed with ambiguity, for example:
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