ADJUSTING GENERAL ELECTRIC MULTIFACTOR PORTFOLIO MODEL FOR FUZZY ANALYSIS OF SBUs COMPETITIVE POSITION

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Abstract

The aim of this paper is to introduce an alternative approach to the quantification of the General Electric/McKinsey portfolio model based on the utilization of fuzzy sets theory. In that sense, specific characteristics of fuzzy triangular numbers and fuzzy logic are applied to the standardized GE matrix in order to adequately handle the uncertainty and imprecision associated with various factors that determine SBUs competitive position. Namely, General Electric (GE) matrix indicates the competitive position of SBUs based on industry attractiveness and business strength. Each of these two dimensions represents a composite of different factors (i.e. industry attractiveness is a subjective assessment based on external factors that are uncontrollable by the organization while business strength is a subjective assessment based on the internal factors that are largely controllable by the organization) (Udo-Imeh, et al. 2012). However, there is no standard list of critical factors to be used by all SBUs and dealing with multi-attributes may also lead to high ambiguity in measuring the business strength and industry attractiveness (Mikkola, 2001). Furthermore, since portfolio analysis recommends a strategy for each business unit based on its position in the overall portfolio of businesses according to known and accepted rules, this could result in formulating different strategy propositions for business units.

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placed on the opposite sides of delimiters in matrices regardless of the situation that they may be located very close to one another. Likewise, the exact position of business or product in the matrix is not taken into account because using this approach implies determining the same strategy options for each business placed in the same quadrant of the matrix (Pap, et al. 2000).

The main problem with the use of standardized GE matrix and other traditional portfolio matrices is in their inability to precisely determine the numerical value for the certain criteria. For example, vague nature of human judgment and preferences cannot be effectively estimated with an exact numerical value (Lin, Hsieh, 2004). To solve this problem, we could use linguistic assessments instead of numerical indicators. In that way, the ratings and weights of the criteria in the problem are presented through linguistic variables which are then replaced by suitable fuzzy triangular numbers used for arithmetic operations.

As opposed to the conventional set theory where the object is either member of a set or it is not a member, in fuzzy logic, there is no crisp boundary between the sets. It stems that fuzzy logic rests on the assumption that all things belong to a set at a certain degree which enables us to formalize various linguistic attributes through fuzzy numbers (Malagoli, et al. 2007).

In this paper, we propose that fuzzification of the criteria used for determining market attractiveness and business strength include the estimation of the interval which contains the values of the criteria. In the process of fuzzification, every criterion is presented as a fuzzy triangular number with membership function. We also assess the importance weight of criteria to obtain the limits of importance interval for the criteria. In order to determine the position of SBU in the matrix-specific formulae are used. Instead of the circle which represents SBU in traditional GE matrix, in the fuzzy model, the position of SBU is presented as a rectangle which appertains to each of the nine matrix cells in different percentages. In other words, by projecting the intersection of the fuzzy triangular numbers on to the GE matrix, a rectangle is obtained. To identify the relative priority of strategic zones, the percentage of the rectangle in each zone is calculated. The zone containing the maximum percentage of the rectangle determines the strategies to be adopted. The percentage of the rectangle in each zone and the size of the rectangle depending on the value of importance level. The higher the importance level we wish to achieve, the smaller is the area of the rectangle and its position is readjusted, which increases the accuracy of the estimation.

**Keywords**: Portfolio analysis, GE/McKinsey matrix, Strategic Business Unit (SBU), Fuzzy triangular numbers, Fuzzy logic

**WORKS CITED**

