Chapter 73

A Fuzzy Approach for Ranking of Student's Expectation From a Technical Institute

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ABSTRACT

Due to high competition and less employability in the technical education sector, quality in technical education has turned out to be most extreme imperative criteria to deliver better educational services. For this reason, it is required to screen the expectation of the customer of the education sector for fulfilling their needs. With aim of this, this article first illustrates the identification of the customer of the education sector, then their expectations from an institute and finally a detailed ranking of each expectation which has been done. For the ranking of student's expectations, various authors have used a number of multi-criteria decision-making methods, but the vagueness of the result was not being handled in their research. Therefore, in this study, a fuzzy approach has been used to rank the various expectations of customers. The result of the study indicates that among all student expectations, the job-oriented expectation is the most important expectation and further, an ergonomics-based expectation and a sports-based expectation are the least important expectations of the students.

INTRODUCTION

The engineering course in India is one of the favored decisions for students who have scored high at the 10+2 level. The competition for the best institutions is extreme need of students. This is clear from student's crowds in coaching classes to get the added edge at the competitive entrance tests. This increasing demand for engineering has resulted in a mushrooming of a large number of engineering colleges in the nation. As per the record of AICTE (All India Council of Technical Education) there are a total of 3325

approved engineering college in India, out of which 2855 are unaided private, 286 are government, 63 are government aided, 64 are university managed government, 23 are university managed private, 12 are central university, 5 are private aided, 13 are private deemed university and 4 are deemed government institute (AICTE .NIC .in). Though number of engineering colleges are increasing tremendously quality of engineering education is decreasing exponentially. That results various vacant seat in many engineering colleges. Therefore, to attract number of meritorious students engineering education should be designed as per the needs of customer of education sector (Kingdom and Sciences, 2015). For this reason, this paper has illustrated the need of customer of education sector along with their ranking. For the ranking of customer needs number of method are available in literature but those methods do not handle the vagueness of responses which are present in human judgement. Therefore, to handle this vagueness a fuzzy methodology has been applied in the ranking of student's expectation from a technical institute.

Fuzzy set theory was first proposed by Zadeh in 1965 which is totally different from the crisp set theory and exact estimation of ordinary mathematics. In fuzzy set theory Zadeh has suggested that vagueness of human judgement and real-world problem can be solved by considering a set of number and their participation level for each component of that number. Zadeh utilized this concept and participation level of every component of the fuzzy set to express the measurement of importance, which can settle the uncertainty and fuzziness of the real-world problem. Fuzzy set theory includes fuzzification then logic control and finally defuzzification of a fuzzy number. Fuzzification is the process of changing a real scalar value into a fuzzy value which involves different types of method to convert a real scalar value in to fuzzy value (Kharagpur, 2010). In this study a Gaussian membership function has been used to convert real value in to a fuzzy value. A formula to represent Gaussian membership function is given below as Equation (1):

$$mf = \mathrm{e}^{-\frac{(x-m)^2}{2\sigma^2}} \tag{1}$$

where:

mf = Membership function value for a particular value of 'x'
x = Rating given by a respondent for a particular expectation
m = Mean value of all the ratings for a particular student expectation
σ = Standard deviation of all the ratings for a particular student expectation

After fuzzification of a crisp set next operation used to get whole effect of a fuzzy number is defuzzification of a fuzzy number. Defuzzification is the process of converting a quantifiable crisp number from a given fuzzy set and corresponding membership function. It is the process that maps a fuzzy set to a crisp set (Kharagpur, 2010). There are several rules that transform a fuzzy number into a crisp result. One most commonly used method is center of area method. In center of area method center of area of the fuzzy number represent the defuzzified value (whole effect) of a fuzzy number. The equation to calculate centroid of a fuzzy number is given in Equation (2):

$$x_c = \frac{\int A\,dx}{A} \tag{2}$$

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