Evaluation of Academic Research Projects Using the AHP and TOPSIS Methods

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Abstract : Due to the increasing number of universities and academics, the fund of the universities for research activities and grants/supports given by government institutions have increased number and quality of academic research projects. Although every academic research project has a specific purpose and importance, limited resources (money, time, manpower etc.) require choosing the best ones from all (Amiri, 2010). It is a pretty hard process to compare and determine which project is better such that the projects serve different purposes. In addition, the evaluation process has become complicated since there are more than one evaluator and multiple criteria for the evaluation (Dodangeh, Mojahed and Yusuff, 2009). Mehrez and Sinuany-Stern (1983) determined project selection problem as a Multi Criteria Decision Making (MCDM) problem. If a decision problem involves multiple criteria and objectives, it is called as a Multi Attribute Decision Making problem (Ömürbek & Kınay, 2013). There are many MCDM methods in the literature for the solution of such problems. These methods are AHP (Analytic Hierarchy Process), ANP (Analytic Network Process), TOPSIS (Technique for Order Preference by Similarity to Ideal Solution), PROMETHEE (Preference Ranking Organization Method for Enrichment Evaluation), UTADIS (Utilities Additives Discriminantes), ELECTRE (Elimination et Choix Traduisant la Realite), MAUT (Multiattribute Utility Theory), GRA (Grey Relational Analysis) etc. Teach method has some advantages compared with others (Ömürbek, Blacksmith & Akalın, 2013). Hence, to decide which MCDM method will be used for solution of the problem, factors like the nature of the problem, types of choices, measurement scales, type of uncertainty, dependency among the attributes, expectations of decision maker, and quantity and quality of the data should be considered (Tavana & Hatami-Marbini, 2011). By this study, it is aimed to develop a systematic decision process for the grant support applications that are expected to be evaluated according to their scientific adequacy by multiple evaluators under certain criteria. In this context, project evaluation process applied by The Scientific and Technological Research Council of Turkey (TÜBİTAK) the leading institutions in our country, was investigated. Firstly in the study, criteria that will be used on the project evaluation were decided. The main criteria were selected among TÜBİTAK evaluation criteria. These criteria were originality of project, methodology, project management/team and research opportunities and extensive impact of project. Moreover, for each main criteria, 2-4 sub criteria were defined, hence it was decided to evaluate projects over 13 sub-criterion in total. Due to superiority of determination criteria weights AHP method and provided opportunity ranking great number of alternatives TOPSIS method, they are used together. AHP method, developed by Saaty (1977), is based on selection by pairwise comparisons. Because of its simple structure and being easy to understand, AHP is the very popular method in the literature for determining criteria weights in MCDM problems. Besides, the TOPSIS method developed by Hwang and Yoon (1981) as a MCDM technique is an alternative to ELECTRE method and it is used in many areas. In the method, distance from each decision point to ideal and to negative ideal solution point was calculated by using Euclidian Distance Approach. In the study, main criteria and sub-criteria were compared on their own merits by using questionnaires that were developed based on an importance scale by four relative groups of people (i.e. TUBITAK specialists, TUBITAK managers, academics and individuals from business world) After these pairwise comparisons, weight of the each main criteria and sub-criteria were calculated by using AHP method. Then these calculated criteria' weights used as an input in TOPSİS method, a sample consisting 200 projects were ranked on their own merits. This new system supported to opportunity to get views of the people that take part of project process including preparation, evaluation and implementation on the evaluation of academic research projects. Moreover, instead of using four main criteria in equal weight to evaluate projects, by using weighted 13 sub-criteria and decision point's distance from the ideal solution, systematic decision making process was developed. By this evaluation process, new approach was created to determine importance of academic research projects.

Keywords : Academic projects, Ahp method, Research projects evaluation, Topsis method.