

Chapter 4

Hybrid Multi–Criteria Models: Joint Health and Safety Unit Selection on Hybrid Multi–Criteria Decision Making

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ABSTRACT

JHSUs should have occupational safety specialists, workplace physicians, and other health personnel to establish and provide services. To provide occupational safety services in the most effective operating environment, it is necessary to select the most appropriate JHSU. This chapter provides a hybrid model to assist the JHSU selection process. Using fuzzy logic linguistic variables makes an important contribution to decision making in uncertain environment. The hybrid model using Fuzzy AHP (Analytical Hierarchy Process) and Fuzzy TOPSIS (Technique for Similarity Sorting Preference for Ideal Solution) approaches were used in JHSU selection. The most important criterion was found to be the references of JHSU. Candidate JHSUs were evaluated on the basis of criteria with fuzzy TOPSIS. Five alternative JHSU were evaluated. Alternative 2 was found to be the most appropriate choice. A numerical example is presented to demonstrate the effectiveness of the proposed hybrid model.

INTRODUCTION

The need for OHS services is increasing daily. There are some deficiencies in performing these services. In order to eliminate the deficiencies, there is a need for the institutions where businesses can receive OHS services. The fact that the state alone is not sufficient in providing these services has paved the way for the provision of services through professional organizations from outsourcing. In particular, “The Sloguh Plan has been put into practice in order to provide OHS services for businesses in the UK. In the plan, group model implementation for OHS services has an important place (Rantanen ve Fedotov, 1995). This model, which is applied in the UK, is the first example of units providing external OHS

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services. A similar unit of this model in Turkey, Joint Health Safety Unit (JHSU) it was implemented (Orhan and Özkan, 2017). JHSU creates to healthy and safe workplaces in order a working environment.

Today, for businesses, increasing competition conditions and customer-oriented quality services to increase and market share between companies to become more and more important is becoming. That's why; It is of great importance that companies restructure their relationships and trusts in coordination with the persons or organizations they have received external services in order to further increase their operational performance. It is seen that the harmony, trust and mutual cooperation developed with the service providers will have positive effects on issues such as lowering the cost of the product, increasing the quality, ensuring customer satisfaction, and being open to management developments and innovation. Therefore, the problem of how to provide the service, which is one of the most basic requirements for the businesses, is one of the important activities.

As a result of the literature surveys, the selection of JHSU using fuzzy AHP and fuzzy TOPSIS approaches was not found. Therefore, this study is a unique study. Experts cannot express certain evaluations clearly when using exact values during decision-making. However, using fuzzy logic linguistic variables makes a great success in decision making in uncertain environment. Fuzzy logic was used to determine the importance of criteria and to evaluate alternatives on the basis of criteria so that experts could express their views as linguistic variables. In the application, the importance of the criteria examined in the selection of JHSU with Fuzzy AHP was determined. With fuzzy TOPSIS, alternative JHSUs were assessed on the basis of criteria.

There are dozens of different JHSU that provide OHS services. In selection of JHSU, the criteria that will be the basis for measurement and evaluation and the weight of these criteria should be determined. Because the importance weight of each criterion varies in measuring and evaluating JHSU selection for that job. Therefore, these methods, which are not based on specific criteria and weights, lead to objectivity in the measurement and evaluation process and therefore to make wrong decisions. These decisions are mostly complex and made in an uncertain environment. Many contradictory quantitative and qualitative criteria should be considered simultaneously. Fuzzy multi-criteria decision-making methods (MCDM) have been developed in order to solve these problems.

In this study, fuzzy TOPSIS method was used to evaluate alternative JHSUs. Fuzzy logic approach is proposed to make decision in uncertain environment. In recent years, fuzzy TOPSIS has been applied in different areas such as plant location selection, machine equipment selection and personnel selection (Efe, 2016). Fuzzy TOPSIS method is used to obtain the result of the positive and negative distance from the ideal solution is calculated.

Hybrid fuzzy AHP-fuzzy TOPSIS methods have been proposed for JHSU selection. The hierarchical structure of the problem is determined. Firstly, the fuzzy AHP approach was examined when determining criterion weights. As stated in the "Methodology" section, the opinions of the decision-makers have been translated into a single opinion and presented. "References" were the most important criteria in the selection of JHSU and "Compliance with OHS plan" was the least important criteria. According to this result, it is determined that the education level of OHS experts who will provide service in outsourcing OHS services is more important. In particular, it is necessary to select a expert who is suitable for the hazard type of the enterprise. According to the results obtained from this study, the most suitable JHSU was alternative 2. The worst selection was alternative 3 Although the proposed method helps decision-makers in an uncertain environment, it can be applied in many different areas. Different integrated MCDM methods can be used in future studies In addition, the proposed method can be applied in different decision making methods such as personnel selection, material selection, supplier selection, plant

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