

A hybrid ranking approach based on fuzzy analytical hierarchy process and data envelopment analysis: Road maintenance and transport organization of Iran

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Abstract. The continuous improvement of performance in organizations requires the continuous and purposeful evaluation of organizations. One of the most vital sectors that significantly affects the economic growth of countries is transportation; in this regard, performance assessment plays an important role in this sector. Therefore, a novel hybrid algorithm based on Fuzzy Analytical Hierarchy Process (FAHP) and Data Envelopment Analysis (DEA) is proposed here to measure the efficiency of product transportation in road fleets of Iranian provinces. FAHP method is used to define the weights of input and output criteria, and the priority of criteria is implemented as a constraint in a DEA model. The efficiency of each province in this domain will be determined by means of the proposed DEA model. The results obtained from the application of the proposed approach to Iran Road Maintenance & Transportation Organization vindicated the effectiveness and efficiency of the proposed approach.

Keywords: Transportation, analytical hierarchy process, data envelopment analysis, fuzzy theory

1. Introduction

Transportation is one of the basic needs of humans. The fast rate of global transformations and changes as well as the continuous progress of communities, the diversity of products and services in the world, the competitiveness of economic activities, division of labor, product production and service delivery based on regions' competitive advantages, etc. have created the increasing significance of transportation for the fast transfer of goods and people. On the other hand, transportation is known as one of the main prerequisites of development, and the economic growth of

developed countries is indebted to the expansion of their transportation and communication systems. The enjoyment of a tactical and strategic assessment system is an important factor in the better development of this industry. Therefore, this study proposes a strategic approach for the performance assessment of the product transportation fleet in road sector in different provinces of Iran.

There are a large number of studies that have used Multi-Criteria Decision Making (MCDM) tools in various fields of evaluation and priority, such as Mina et al. [1], Rao et al. [2], Bafrooei et al. [4], Cao et al. [7], Liu et al. [16], Wu et al. [24], Zhang and Guo [25] and Dong and Cooper [26]. However, when it comes to the field of vehicles fleet, a few studies have been carried out by using these tools. Gumus [8] proposed a hybrid model wherein FAHP

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