Chapter 24
Modeling Gender Based Customer Preferences of Information Search Channels

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ABSTRACT

The disparity in consumer and organization preferences of information channels is a major concern. Further, making decisions in the presence of a wide range of conflicting criteria through the use of a multiple criteria decision-making (MCDM) approach has gained increased prominence in recent years and research in this area has become an important consideration for business operations that involve dealing with complex decision problems. This paper describes how an integrated approach can be applied to a decision-making problem that combines a fuzzy analytical hierarchy process (AHP) and TOPSIS for identifying preferences consumers of information search channels according to demographic factors such as gender.

1. INTRODUCTION

Multi-criteria decision making (MCDM) has transformed into one of the fastest growing areas of operational research throughout the span of the last two decades. MCDM is primarily concerned with ranking various concrete alternatives based on multiple conflicting criteria. Research into MCDM additionally inspects the hypotheses and techniques that can be utilized to handle the complex issues that are commonly experienced in administration, business, building, science and different ranges of human action. In recent years, several different MCDM methods have been proposed as representing ideal methodologies that can be employed to select the best option from a variety of alternatives. MCDM methods have emerged in response to a wide range of different problems and the existence of various criteria. Furthermore, more and more practitioners are recognizing the need for decision-making models to take

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advantage of the various technological advancements that are available in terms of scientific computing, mathematical optimization and computer technology (Wiecek et al, 2008).

In the late 1970s, Saaty created the analytic hierarchy process (AHP) as a potential means of approaching MCDM (Saaty, 1980). Over the course of the last 25 years, the application of this process as a means of ranking, selecting, evaluating and benchmarking decision alternatives has been studied in depth (Golden et al, 1989; Wasil & Golden, 2003). When a decision maker employs an AHP approach, he or she starts the decision making process by developing a hierarchy of criteria, sub-criteria and alternatives. Once this hierarchy has been constructed, the relative importance of each element is assessed. This is achieved by generating a pairwise comparison matrix, through which each decision element can be directly compared with each other. The decision maker uses the eigenvector method (EVM) for each pairwise comparison matrix to produce a priority vector that provides an estimation of the relative weights of each option at each level of the hierarchy. These weights can then be amassed using the principle of hierarchic composition, resulting in a final weight for each alternative. Further, these weight can applied to methods such as TOPSIS for ranking different alternatives.

The reminder of this paper is organized as follows. Section 2 provides an overview of the methodology and how a combination of fuzzy AHP and TOPSIS decision making approaches can be applied within a real-world context. Section 3 provides a mathematical formulation of the proposed model together with a schematic diagram. To examine the proposed model in depth, an illustration based on an Internet information search channel selection problem is provided in Section 4. Finally, Section 5 provides a summary and conclusion.

2. THE FUZZY AHP-TOPSIS METHODOLOGY

Although AHP and TOPSIS decision methods first emerged over 20 years ago and have been in regular use for some time, their hybrid application with TOPSIS is rarely employed for decision making purposes in information search channel selection. In the following subsections this study discusses some of the key theories relating to AHP, group decision making, fuzzy AHP TOPSIS.

2.1. AHP

AHP as a decision making Saaty (1982, 1988, 1995) approach can be described as a multi-attribute theory variant, as during the process of decision making using this approach, the criteria are accumulated in a single utility function that incorporates the decision-maker's key requirements (De Brucker et al, 2004). There are three main steps involved in the AHP method: (1) construction of a hierarchy, (2) priority setting and (3) logical consistency (Macharis et al, 2004). First, a hierarchy is established that breaks the complex system into a series of different elements that can then be compared and ranked against one another. This hierarchy has three main levels: overall objective/focus at the top, (sub-) objectives (criteria) in the middle and alternatives at the bottom (Dağdeviren, 2008; Macharis et al., 2004). Once the hierarchy has been developed, the priorities of element are ascertained through the use of pairwise comparisons that serve to examine each of the elements detailed at the bottom of the hierarchy against the criteria. These comparisons are based on a standardized comparison scale of five different levels (see Table 1) (Saaty, 2008) and the outputs are summarized in a pairwise comparison matrix where