Chapter 12
Fuzzy Multi-Criteria Decision Making Methods for E-Commerce Issues

Mohamed Naili
Univeristy of Bejaia, Algeria & University of Bordj Bou Arreridj, Algeria

Abdelhak Boubetra
University of Bordj Bou Arreridj, Algeria

Abdelkamel Tari
University of Bejaia, Algeria

ABSTRACT

Nowadays, internet technologies make of people's life easier by providing a huge number of websites and web-based support systems to help users in their daily surfing and transactions through online services such as buying, selling, booking…. This luxury of having multiple options and offers has generated the need for more sophisticated systems to deal with multiple criteria decision making problems especially in case of fuzzy evaluation. In this chapter, the authors give an overview of the E-commerce field where they focus on one of its crucial recent problems, it is the ranking problem. After discussing some issues of this field, some of well known mathematical and bio-inspired methods, which have been developed to solve the problems related to fuzzy multi-criteria decision making will be presented and explained. In order to show some recent applications of the discussed methods, the authors present some case studies already published in the literature.

1. INTRODUCTION

Over the last two decades, the internet is getting more and more importance in our daily life, whoever we are: scholars, students, business man/woman, etc. Such situation, has created an environment full of options and choices to be taken. So how could anyone make the right decision and choose for example the right document, product, web service, website…? Most of these situations are handled using multi-

DOI: 10.4018/978-1-5225-2599-8.ch012

criteria decision making (MCDM) methods, where each alternative has a set of evaluations with respect to a set of criteria. Often, allocating weights to the decision criteria and scores to the alternatives are performed by experts to ensure the accuracy of these assessments; but sometimes it is so difficult to give a clear value (quantitative/qualitative), which leads them to give their evaluations with some uncertainty. So, *How could take a decision in case of uncertainty? Which is the best website or service if there are multiple choices? How could assess and classify an e-commerce website, service or a supplier in case of uncertainty?*

In order to answer these questions, this chapter is organized as follows: in the second section an overview of the e-business and web intelligence fields is given where some of their major issues will be discussed. Section three focuses on the problem of decision making in the e-business field. In the fourth section, the authors turn to some new and well known methods which will be explained with a discussion of their applications in some case studies. At the end of this chapter, some future research directions will be discussed and a conclusion will be made.

2. DECISION MAKING IN E-COMMERCE

Before discussing the decision making problem in the e-business field, it is preferable to talk first about the research field to which the e-business belongs, it is the Web Intelligence.

2.1. Web Intelligence

Without doubt, the 21st century is the era of technology, especially the internet. Nowadays, a very important portion of the world's population use internet to learn, publish, buy, sell, order… product and services. Such fact gives these users a very wide set of choices. On the other side, this situation could turn into a very serious problem when the decision is crucial and based on inaccurate data. In order to help users in dealing with such situations, a new "intelligent" methods and tools have to be implemented. In response to these needs, a new trend of scientific research, has been developed to deal with "intelligence" in the web, it is called the *Web intelligence*. The web intelligence consortium has defined this research field as follows (Consortium, 2014): " Web Intelligence (*WI*) has been recognized as a new direction for scientific research and development to explore the fundamental roles as well as practical impacts of Artificial Intelligence (AI) (e.g., knowledge representation, planning, knowledge discovery and data mining, intelligent agents, and social network intelligence) and advanced Information Technology (IT) (e.g., wireless networks, ubiquitous devices, social networks, wisdom Web, and data/knowledge grids) on *the next generation of Web-empowered products, systems, services, and activities*. It is one of the most important as well as promising IT research fields in the era of Web and agent intelligence." Also (Zhong et al., 2006) has described *WI* as the emerging of two very important research fields, *Artificial Intelligence* (*AI*) and the *Information Technology* (*IT*) to create a new domain of research to develop new highly intelligent method and systems, which could imitate the human capabilities for the *World Wide Web* (*WWW*).

In the light of the previous definitions, the following conclusion could be derived: Researches in *WI* are based mainly on *AI, social intelligence*, *bio-inspired intelligence (especially human)* and the *IT* technologies to develop new methods and tools to help the internet users in their tasks. As known, there are plenty of applications of the *WI*, for instance: *E-Commerce*, *E-Finance*, *E-Government, E-Learning,*