Introductory Chapter: An Overview to the Analytic Principles with Business Practice in Decision Making

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Additional information is available at the end of the chapter

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1. Decision making

Decision-Making is a book based on contributions by different authors. The book synthesizes the analytic principles with business practice of decision-making [1]. The book provides an interface between the main disciplines of engineering/technology and the organizational, administrative, and planning abilities of decision-making. It is complementary to other sub-disciplines such as economics, finance, marketing, decision and risk analysis, etc.

Decision-making can be understood as a method to select an option into a set. The method can be exact or not, quantitative/qualitative, and so on, and therefore, the option can be optimal or not [2]. These operations are done for anyone every day in anywhere. The decisions can be classified according to the period as politic (very long period), strategic (long period), and operational (short period).

The scientific advances, together with the competitiveness in the market, have led that this concept will be very important nowadays, generating a large number of research publications, new software, specific profiles in the human resources, etc., in every industry field.

Nowadays the industry is employing the new technologies and information system in decision-making. Business analytics employs data to build quantitative models to manage decisions due to the unknown future. The methods are based on statistical analysis, management science, operational research, etc. [3, 4].

It requires advanced methods for advanced analytics [5–8]. Triantaphyllou showed a paradox on what decision-making method should be used to choose the best decision-making method [9]. A state-of-the-art survey of multiple attribute decision-making is discussed in Refs. [6, 10].

New methods are being presented [11–13], where the artificial intelligence is being one of the most important [14–16]. This book presents also several methods for different case studies.

Charnes et al. [17] presented a research work on measuring the efficiency of decision-making units. Linear and nonlinear programming methods were presented. This study also considered the engineering and economic connections to decision-making.

The chapters introduce and demonstrate a decision-making theory to practice case studies. It demonstrates key results for each sector with diverse real-world case studies. The theory is accompanied by relevant analysis techniques, with a progressional approach building from a simple theory to complex and dynamic decisions with multiple data points, including big data, lot of data, etc. Computational techniques, dynamic analysis, probabilistic methods, and mathematical optimization techniques are expertly blended to support analysis of multi-criteria decision-making problems with defined constraints and requirements.

The book is focused on graduate students and professionals in business administration, industrial organization, operations management, applied microeconomics, and the decisions sciences, either studying decision-making analysis or who are required to solve large, specific, and complex multi-criteria decision-making problems as a part of their jobs. The work will also be of interest to industrial engineers and engineering designers working with optimization problems, but this is not the main audience and finally researches from the academia.

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