

# Chapter 8

## Multi-Criteria Decision Making: A Cast Light Upon the Usage in Military Decision Process

**Tolga Temucin**  
*Turkish Naval Forces, Turkey*

### ABSTRACT

*Multi-criteria decision making (MCDM) is a discipline that explicitly considers assessing alternatives in a decision problem with respect to multiple criteria. Those methods are frequently used to solve real-life decision problems that incorporate multiple, conflicting, and incommensurate criteria. Considering the chaotic, complex, and ambiguous nature and the dynamics of the military operations, most decision problems observed in military organizations also follow a similar structure involving multiple criteria. This chapter gives an overview of the basic decision-making problem types and decision processes observed in military organizations and provides information on the MCDM methodologies adopted to solve those problems.*

### INTRODUCTION

Like all other decision processes, the decision process in military operations and; their integral part military problems, mainly concerns with selection of the best alternative under present situation. However, the complex structure of military problems makes the determination of the best alternative nearly impossible in most cases due to the limited capability and emotional characteristic of human. In this context; Multi-criteria Decision Making (MCDM) methods fits to the chaotic, complex and ambiguous nature of military problems.

If we go deeper, we will easily notice that this complicated but inalienable decision-making process starts with the life in our world, and at the beginning, humans used it in very simple decisions for basic requirements like where to sleep and what to eat. In initial periods of humanity, namely The Stone and Iron Ages there was limited input that had to be considered during decision-making activities. However, the complexity of decision processes has changed in the course of time. Technological improvements in science, improved theories in mathematics and other changes speed up the progress of military systems

DOI: 10.4018/978-1-5225-5513-1.ch008

as well as human and exposed new problem fields. Beginning from this moment decision processes wouldn't be easy as they were before due to the increased number of inputs, conflicting criteria, importance weights, etc. Thus, the evolution of MCDM methods has started.

MCDM methods propose different methodologies to help decision maker(s). The main concept of these methods is maximizing the benefit criteria while minimizing the cost criteria to determine the best option (alternative). Some of these methods determine the best option while some others order the options from best to worst. Although solution process of most MCDM methods does not seem complicated, they become complexes when the number of alternatives and conflicting criterions increase; which, unfortunately, is a common situation that decision-makers face in most military decision problems. Consequently, this deficiency led to the existence of computer-based decision support systems to simplify the procedures.

The aim of this chapter is to provide a basic knowledge of the decision process, MCDM methods and light a way for the usage of MCDM in military decision problems. Information about some common MCDM techniques, e.g. ELECTRE, TOPSIS, PROMETHEE will also be illustrated to support the idea of global applicability of MCDM for possible users in the field of military.

## **DECISION MAKING AND MULTI-CRITERIA DECISION MAKING**

Human is a living creature that makes a decision to determine the best choice by compiling lots of input presented in a raw status to meet different kinds of requirements.

It is appropriate to define "decision process" which humans execute in every second of life as below:

- Decision making is an act of choice of an individual or a group of individuals. It is the exercising of one's free will to choose a single alternative or a hierarchy of alternatives among available options (Gunasekera, 2010),
- Decision making is about asking clear questions and obtaining clear and definite answers, for example, "where should we go?", "what options have we got?", "what should we do?" and "what should our strategy be?" and so on (Drummond, 2001),
- Decision-making process which is related to the selection or the preference of a choice when there are more than one is the sum of physical and mental efforts (Tosun, 1992),
- A decision implies the end of deliberation and the beginning of an action (Buchanan & O'Connell, 2006), and
- Decision making is a procedure to find the best alternative among a set of feasible alternatives (Cebi & Kahraman, 2010; Karatas, 2017b).

To make a decision means jumping from one state of mind to another. In this exercise, the mind follows a certain process. The objective of this process is to find the best alternative. Sometimes the number of alternatives increases a lot. Besides, the decision-maker has to take into consideration the conflicting criteria having different importance weights and assess alternatives with respect to each of these criteria. There is also a growing tendency that, in many real-world decision problems, the planners and decision makers are likely to pursue multiple and possibly conflicting objectives (Karatas, 2017a; Karatas & Yakici, 2018).

28 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

[www.igi-global.com/chapter/multi-criteria-decision-making/209805](http://www.igi-global.com/chapter/multi-criteria-decision-making/209805)

## Related Content

---

### Deploying a “Good Jobs” Strategy in Service Sectors for Enhancing Competitive Advantage

Pankaj M. Madhani (2021). *International Journal of Business Strategy and Automation* (pp. 29-53).

[www.irma-international.org/article/deploying-a-good-jobs-strategy-in-service-sectors-for-enhancing-competitive-advantage/269495](http://www.irma-international.org/article/deploying-a-good-jobs-strategy-in-service-sectors-for-enhancing-competitive-advantage/269495)

### The Impact of Data Strategy and Emerging Technologies on Business Performance

Subbarao Pothineni (2023). *International Journal of Business Strategy and Automation* (pp. 1-19).

[www.irma-international.org/article/the-impact-of-data-strategy-and-emerging-technologies-on-business-performance/334022](http://www.irma-international.org/article/the-impact-of-data-strategy-and-emerging-technologies-on-business-performance/334022)

### Assessing the Impact of Cigarette Taxation on the Supply Chain Stakeholders' Revenue Shares in Greece

Athanassios Vozikis, Yannis A. Pollalis and Archontoula Armoutaki (2021). *Interdisciplinary Perspectives on Operations Management and Service Evaluation* (pp. 313-328).

[www.irma-international.org/chapter/assessing-the-impact-of-cigarette-taxation-on-the-supply-chain-stakeholders-revenue-shares-in-greece/264107](http://www.irma-international.org/chapter/assessing-the-impact-of-cigarette-taxation-on-the-supply-chain-stakeholders-revenue-shares-in-greece/264107)

### Optimization of Maintenance Management Indicators in a Chilled Water Plant: Case Study in the Education Sector

Carlos Alberto Jiménez Arango, Leidy Marcela Dueñas Ramirez and Carlos Andres Castaño Restrepo (2022). *Cases on Optimizing the Asset Management Process* (pp. 302-323).

[www.irma-international.org/chapter/optimization-of-maintenance-management-indicators-in-a-chilled-water-plant/289750](http://www.irma-international.org/chapter/optimization-of-maintenance-management-indicators-in-a-chilled-water-plant/289750)

### Assessing the Impact of the COVID-19 Crisis on the Socio-Economic Situation in Africa

Ebrima K. Ceesay (2021). *International Journal of Business Strategy and Automation* (pp. 41-53).

[www.irma-international.org/article/assessing-the-impact-of-the-covid-19-crisis-on-the-socio-economic-situation-in-africa/276456](http://www.irma-international.org/article/assessing-the-impact-of-the-covid-19-crisis-on-the-socio-economic-situation-in-africa/276456)