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A Multi-Criteria Decision Analysis Approach for Critical Success Factors Identification in Civilian European Union Common Security and Defence Policy´s Missions

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Master in Business Administration

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PhD Candidate Alexandra Milici,
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BUSINESS
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Department of Marketing, Operations and General Management

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ABSTRACT

This research focuses on the strategic role of performance measurement systems (PMS) in the decision-making processes of organisations and provides valuable insights into using the Multiple Criteria Decision Analysis (MCDA) approaches for PMS in Common Security and Defence Policy (CSDP) Missions and the potential of Cognitive Mapping techniques and the Choquet Integral to facilitate evaluation processes. The researcher used a panel of experts with specialised knowledge of the subject under analysis to identify evaluation criteria and interactions. An external expert validated the proposed evaluation system during a final session. The proposed framework´s advantages and limitations are also examined in this study, which incorporates a constructivist stance, facilitating the integration of objective and subjective elements into the decision-making process. The study found that using the MCDA approach can effectively evaluate the performance of CSDP Missions and provide valuable insights for decision-making processes.

Keywords: Critical Success Factors, Performance, Cognitive Mapping, MCDA, and Choquet Integral.

JEL Classification Codes:

M0 General

M1 Business Administration

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EXECUTIVE SUMMARY

Management literature has widely stressed the strategic role of Performance Management Systems (PMSs) that provide managers with valuable tools to understand how well their organisation performs and assist them in decision-making (Glykas & Valiris, 1999). Some authors have suggested that organisations evolve in turbulent environments and misunderstandings (Drucker,1994; Kelly, 1999). Thus, savoir-fair executives should first consider what to strengthen and build. In other words, managers should not start by saving costs but by optimising performance (Drucker, 1994). The Common Security and Defence Policy (CSDP) Missions inherently exist in countries with considerable volatility and instability (i.e., socio-political context) exacerbated by security issues. CSDP Missions strive to fulfil their mandates while promoting Europe´s global influence and supporting fragile and conflicting countries in four developmental areas: civil administration, civil protection, the rule of law, and police. Organisations should be aware and vigilant to detect weaknesses (Ansoff, 1975) and discontinuities regarding emerging threats or opportunities and to initiate further probing based on such detections (Glykas, 2004). The literature review highlights the need for Operations Research studies on Business Administration in CSDP Missions. Therefore, developing a PMS using Multiple-Criteria Decision Analysis (MCDA) in a CSDP Mission reinforces this study´s importance. It also widely stresses the strategic role of PMSs that provide managers with valuable tools to understand how well their organisation performs and assist them in decision-making. As suggested in several studies, PMSs allow the designing of paths and improvements with performance data and facilitate strategic alignment, a prerequisite for effective performance management (Verweire & Van den Berghe, 2003). Starting from the organisation´s 1) Mission, 2) Vision, 3) Strategic Objectives, and 4) Perspectives outlining and optimising its critical success factors (CSF) and key performance indicators (KPI), the organisation can fine-tune the business planning and support continuity to gain success and achieve objectives. The literature review defines CSF as things the organisation must do well to achieve its strategic objectives and define KPI as metrics that show the organisation´s progress. When searching for CSF, the success of the business organisation management must be clearly defined (Buh et al., 2015). Some authors have defined success in Business Management as 1) if it continuously meets the pre-determined goals, both within a single project scope and over a more extended period (Trkman, 2010), 2) if the proposed goals achieve a satisfactory level, and 3) success factors are more important in critical areas where “things must go right” (Alibabaei et al., 2009). Previous research found that the most critical planning processes, with the most significant impact on project success, are the definition of activities to be performed in the project, schedule development”, organisational planning, staff acquisition, communications planning, and developing a project plan (Zwikael & Globerson, 2006).

Literature suggests that decision-making processes with thinking focused on alternatives (per se) are retrograde because, in the first instance, it identifies alternatives before articulating values. The values are fundamental in the decision in any situation, and the alternatives are important only because they allow us to achieve the values. Keeney´s (1996) Value-Focused Thinking approach can help organisations in three significant ways: 1) to recognise and identify decision opportunities, 2) to create better alternatives for the organisation´s decision problems, and 3) to develop solid and lasting guidelines. Over time extensive literature has developed and grown on structuring problems for MCDA, being increasingly used to support participatory and collaborative processes facilitating more effective support for the different phases of the decision-making process (Marttunen et al., 2017). Combining problem-structuring approaches with MCDA promotes a deeper view of the decision situation by enabling engaged and structured discussions to 1) motivate problem owners to view situations from different perspectives and 2) facilitate the synthesis of information (Marttunen et al., 2017). From the literature review, it seems clear that CSDP Missions can improve their performance through the understanding and alignment of all stakeholders, bringing structure and voice to all, and thus supporting to generate evidence by identifying CSF outside of traditional methods, allowing for new contributions. MCDA, grounded in Value-Focused Thinking, is increasingly popular in supporting participatory and collaborative processes to facilitate effective decision-making. The MCDA methodology comprises three phases: 1) Structuring the Problem, 2) Evaluating Alternatives, and 3) Making Recommendations. This dissertation explores the application of problem-structuring approaches with MCDA in CSDP Missions. The SODA approach created a group Cognitive Map (CM), promoting a deeper view and fostering engaged and structured discussions and information synthesis. Regarding Decision Support Methodology (DSM), since preferential mutual dependence exists between the identified criteria/clusters, the study employed Non-Additive Measures (NAM), specifically Choquet Integral (CI), to manage criteria interactions. A panel of experts evaluated different Missions using a CI matrix, resulting in a ranking of alternatives. Multiple evaluation sessions involving several CSDP Mission experts contributed to the graphical representation of the rankings. A final validation session by an unbiased expert ensured practical applicability and reliable results. The structured process enabled ranking alternatives and informing decision-making in CSDP Missions. MCDA facilitates multi-stakeholder processes, leverages expert knowledge, and evaluates trade-offs, contributing to better decision-making and PMS in CSDP Missions. MCDA can help CSDP Missions to recognise and identify decision opportunities, create better alternatives for the decision maker, and develop solid and lasting guidelines.

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Glossary

ABBREVIATIONS, INITIALS, AND ACRONYMS

BSC - Balanced Scorecard

CI - Choquet Integral

CFSP - Common Foreign and Security Policy

CM - Cognitive Map

CPCC - Civilian Planning and Conduct Capability

CR - Criteria

CSDP - Common Security and Defence Policy

CSF - Critical Success Factor

DM - Decision-Maker

DSM - Decision Support Methodology

EEAS - European External Action Service

EU - European Union

FPI - Foreign Policy Instrument

FVP - Fundamental Viewpoint

HQ - Headquarter

KPI - Key Performance Indicator

MCDA - Multiple Criteria Decision Analysis

MENA - Middle East and North Africa

NAM - Non-Additive Measure

PMS - Performance Management System

PSM - Problem Structuring Method

PsV - Points of View

OR - Operations Research

SCA - Strategic Choice Approach

SMART - Specific, Measurable, Achievable, Realistic, and Time-bound

SODA - Strategic Options Development and Analysis

SSM - Soft Systems Methodology

VP - Viewpoint

CHAPTER 1

INTRODUCTION

This chapter introduces the dissertation. It presents a brief initial framework of the study, followed by the presentation of the general and supporting objectives and the adoption of the methodological orientation of the research. Finally, it presents the structure of the dissertation and the main expected results.

1.1 Initial Study Framework

The evaluation of performance in organisations is a critical aspect of management. It involves the assessment of the organisation´s achievement of its goals and objectives, which is essential to ensure continued success and profitability. Traditional approaches to performance evaluation often rely on quantitative measures, such as financial performance indicators. However, such methods are limited because they need to consider the subjective aspects of organisational performance, such as customer satisfaction, employee engagement, and social responsibility. Hence, new approaches are required to address the limitations of traditional performance evaluation methods. This study focuses on enhancing this field and overcoming methodological limitations using 1) the Value-Focused Thinking based view, 2) the Strategic Options Development and Analysis (SODA) framework, and 3) the Multiple Decision Criteria Analysis (MCDA) framework.

The SODA and MCDA are two methods proposed as alternative approaches to performance evaluation. In this thesis, SODA is a structured approach that provides a framework for generating and evaluating strategic options in complex and uncertain environments, supported by Cognitive Mapping. MCDA, supported by Choquet Integral (CI), on the other hand, is a method that allows decision-makers (DMs) to consider alternatives based on multiple criteria, including both quantitative and qualitative factors.

1.2. Main Objectives

The primary goal of this dissertation is to develop a performance evaluation model for a Common Security and Defence Policy (CSDP) Mission. In this context, the present study aims to investigate the effectiveness of the SODA and MCDA frameworks in performance evaluation in CSDP Missions, seeking to 1) evaluate the applicability of these methods to performance evaluation, 2) access their potential

advantages over traditional approaches, 3) identify any potential challenges associated with implementing these methods and suggest ways to address them. Overall, the thesis aims to contribute to developing more comprehensive and effective performance evaluation methods for CSDP Missions.

To our knowledge, this methodology has never been applied before in the context of CSDP Missions.

1.3. Methodology

This dissertation aims to develop an evaluation performance model for CSDP Missions using methodologies based on constructivist logic. The complexity and scope of this theme require a comprehensive analysis of the problem. The literature review on European External Action Service (EEAS) and CSDP will be conducted, followed by presenting the intended methodologies for the empirical component. Working sessions with a panel of experts are necessary to gather essential information for implementing the evaluation model. The SODA approach will be adopted using cognitive mapping to structure the problem under analysis. Subsequently, the CI method can provide a way to aggregate different sources of information and handle interactions among criteria in constructing an evaluation performance model. By allowing for important non-additive measures (NAM) and considering the interdependence among criteria, the CI can offer a more comprehensive and realistic representation of decision-making processes in evaluating performance.

The integrated use of cognitive mapping techniques and the CI method will facilitate the construction of a more informed, coherent, transparent, and applicable evaluation model for CSDP Missions. The model will be put into practice and validated by an independent entity. This approach helps fill some of the general limitations of previous studies and the gap identified in the literature.

1.4. Structure

This dissertation, organised in five chapters, includes the introduction, the body of the text, the conclusion, the bibliographical references and the respective appendixes.

Chapter One of this dissertation begins with the present introduction giving a broader approach to the varied discussion topics.

Chapter Two provides a literature review and conceptual analysis of EEAS and CSDP and their implications. This chapter delves into the existing research and analyses the contributions and limitations of various studies in this area. Through this critical literature evaluation, the chapter aims to clearly understand the current knowledge on the subject matter.

Chapter Three methodologically frames the work to be developed, analysing concepts related to cognitive mapping techniques and the CI approach. It outlines the theoretical and methodological frameworks for the study. Specifically, it delves into the paradigms and epistemological beliefs that underlie the MCDA approach. The chapter provides a detailed explanation of the theoretical foundations of MCDA, including its historical development and key concepts. Additionally, the chapter explores the epistemological beliefs that inform the use of MCDA in decision-making contexts. By examining the theoretical and methodological underpinnings of the MCDA approach, the chapter aims to provide a clear understanding of the conceptual framework used in the dissertation's analysis.

Chapter Four details the study's empirical component and the designed performance evaluation system, which involves applying a chosen methodology (i.e., Cognitive Mapping and CI) based on a combination of frameworks (namely MCDA, SODA and CI). The chapter comprehensively explains the process, outlining the various steps in implementing the MCDA and CI frameworks and detailing using Cognitive Mapping to generate input data. Additionally, the chapter presents the findings of the validation session conducted to assess the effectiveness of the developed model. Finally, the chapter concludes by offering recommendations for the model achieved based on the results of the empirical analysis.

Chapter Five concludes the dissertation and opens perspectives for future research.

1.5. Main Expected Results

The primary goal of this dissertation is to develop a performance evaluation system for CSDP Mission. The study expects to identify and organise the factors to consider in evaluating these missions. Cognitive mapping techniques will be employed, followed by calculating the CI, thus enabling DMs to discuss their values and perspectives regarding the subject under analysis.

The fact that this study follows a constructivist and interactive logic and, as such, allows incorporation of the know-how of specialists in the field also means that one of the expected results is to make this line of research more robust, highlighting its potential applicability in the evaluation of CSDP Missions. The model aims to simplify and clarify the evaluation process of CSDP Missions, providing support for managers.

Furthermore, we anticipate publishing the findings of this study in a scientific journal that employs a peer-review process.

CHAPTER 2

LITERATURE REVISION

The roots of strategic management are in military strategy, and businesses first applied it in the mid-twentieth century. In the 1950s and 1960s, management scholars like Peter Drucker, Igor Ansoff, and Alfred Chandler began developing theories and frameworks for strategic management in the business context to identify critical factors contributing to an organisation´s success. Strategic management encompasses several vital activities, including strategic planning, implementation, evaluation, and control. It involves collaboration among various stakeholders to ensure an organisation´s practical strategies align with its vision and mission. Adopting strategic planning processes is vital to contemporary business management and crucial to their decision-making and ensuring an organisation´s long-term success.

Performance Management Systems (PMS) started in the early 20th century when companies began using scientific management principles to improve efficiency and productivity. PMS are crucial for organisations to enhance the performance of individuals and the organisation. The EEAS and the CSDP are under scrutiny for their effectiveness in achieving their objectives.

This chapter will focus on 1) understanding the basic concepts of EEAS, 2) explaining the importance of CSDP, and 3) understanding the limitations of previous studies while also highlighting the potential benefits of using MCDA methods to improve the effectiveness of CSDP.

2.1. European External Action Service: Basic Concepts

EEAS is the diplomatic service of the European Union (EU). Established by the Lisbon Treaty, it works closely with 1) the foreign and defence ministries of the member states of the EU, 2) institutions such as the European Commission, 3) the European Council, 4) the European Parliament, and 5) it also has strong relations with the United Nations and other international and multilateral Organisations.

The EEAS is responsible for ensuring consistency and coordination of the EU's external action and preparing and implementing policies. In doing so, it aims to make the EU foreign policy more coherent and effective, thus increasing Europe´s global influence. Since 2011, the EEAS has implemented the EU´s Common Foreign and Security Policy to promote peace, prosperity, security, and the interests of Europeans across the globe.

The EEAS (Appendix A) has a Global Agenda and Multilateral Relations department and six geographical departments headed by a Managing Director, dividing the world into 1) Africa, 2) Asia

and Pacific, 3) the Americas, 4) the Middle East and North Africa (MENA), 5) Europe and 6) Eastern Europe and Central Asia (EEAS, 2022). EU member states have established permanent political, military, and civilian structures to fulfil their crisis management responsibilities and act as global security actors. In 2009, the Lisbon Treaty endorsed the extension of the *"Petersberg Tasks"* (a list of security, defence, and peace-making tasks, which was initially set out at the time of the signature of the Treaty on European Union in 1992) and hence created the CSDP and respective Missions (Rehrl et al., 2010).

2.2. Importance of Common Security and Defence Policy Civilian Missions

Being an integral part of the EU´s comprehensive approach towards crisis management, drawing on civilian and military assets, the CSDP has gained increasing attention as the EU faces new threats and challenges from its neighbourhood. The CSDP enables the EU to lead peace-keeping operations, prevent conflict, strengthen international security and project its ambition as a global security actor.

On 19 November 2018, EU member states agreed to a Civilian CSDP Compact that aims to improve the capabilities, effectiveness, flexibility, and responsiveness of EU civilian missions and better integrate them with other EU instruments to address the changing security environment. The aim was to strengthen the EU's capacity to deploy civilian crisis management missions.

The objectives of CSDP Missions stem from the conclusions of the Feira European Council in 2000, which had identified four critical areas for development: civilian administration, civil protection, the rule of law, and police (Feira priorities).

There are three prominent EU Institutions relating to CSDP: 1) the European Parliament (representing the EU´s citizens), 2) the Council of the EU representing the governments of the individual Member States (the Foreign Affairs Council meets at the Ministerial level; the Member States share the Presidency of the Council on a rotating basis) and 3) the European Commission that represents the interests of the Union as a whole.

The European Parliament allocates a Common Foreign and Security (CFSP) budget to finance civilian CSDP missions and operations. The Foreign Policy Instrument (FPI) administers the budget of the European Commission, falling under the responsibility of the High Representative for Foreign Policy in her capacity as the Vice President of the Commission. Military CSDP operations financing uses a different mechanism called ATHENA (funded by Member States' contributions, calculated based on the size of national economies).

CSDP operations are prepared by the EEAS and FPI and decided by EU Foreign Ministers at the Foreign Affairs Council. All CSDP missions deploy at the invitation of the host country´s government.

For civilian CSDP missions, the Civilian Planning and Conduct Capability (CPCC) serves as the operational headquarters of the EEAS Managing Directorate. This permanent structure is responsible for autonomously conducting civilian CSDP operations. Under the political control and strategic direction of the Political and Security Committee and the overall authority of the High Representative of the Union for Foreign Affairs and Security Policy (HR/VP), the CPCC ensures the effective planning and conduct of civilian CSDP crisis management operations, as well as the proper implementations of all mission-related tasks (CPCC, 2022). A Managing Director leads CPCC for all the 13 EU civilian CSDP missions currently deployed on three continents: Europe, Africa, and Asia *(Figure 2.1)*.

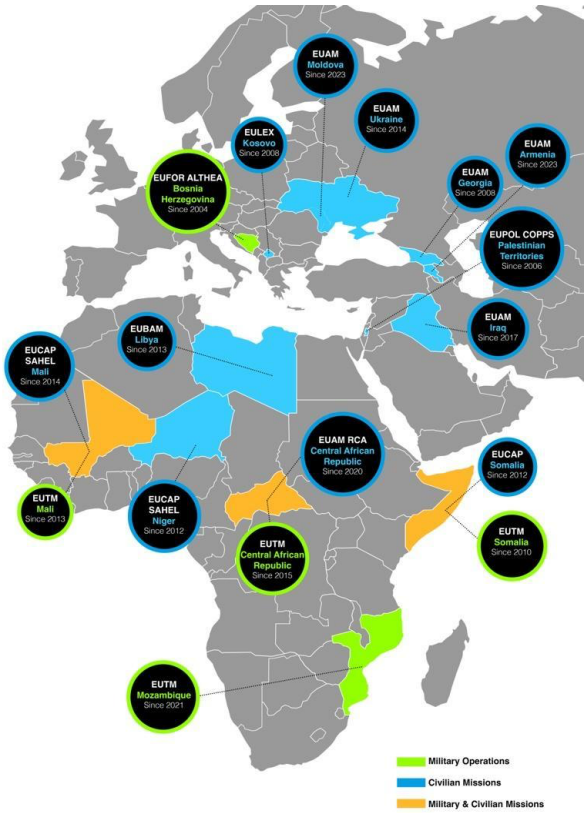


Figure 2.1: EU Security and Defence Engagement Around the World

Source: Adapted from European Security and Defence College (ESDC, 2022)

One of the EU Advisory Mission in Support of Security Sector Reform (henceforth called Mission M1) is a civilian CSDP Mission in the MENA region. Mission M1 has six Departments: 1) Operations, 2) Mission Support (includes the units of Record Management, Procurement, Finance, General Supportive Services and Communication and Information Systems), 3) Security & Duty of Care (incorporates the Security division and Medical Section), 4) Head of Mission Office (contains Executive Officer and Verifications Officers), 5) Chief of Staff Office (including Mission Analytical Capability, Legal Adviser, Brussels Support Element, Press & Public Information Office and Plan, Report and Evaluation section) and 6) Human Resources. Mintzberg´s framework can classify its organisational structure as a

Professional Bureaucracy (Lunenburg, 2012) with a staff of about 80 professionals from various European countries with an average age of 49 (a Mode of 53, being a minimum age of 30 and a maximum of 69 years old). The Mission diversity and intergeneration dynamics are composed mainly of two large generations (Williams et al., 2010): *Generation X* (native from 1965 to 1976) and *Generation Y or Millennials* (born between 1977 and 1994).

2.3. Previous Studies: Contributions and Limitations

There were a number of studies conducted on MCDA approaches in different fields during the literature review; research in EU CSDP Missions remains limited in a number of domains and, more specifically, in Business administration, no such study has yet been applied to the same application area as this thesis *(Table 2.1)*. This limitation is also in itself an opportunity for further research.

Author & Year	Title	Contributions	Limitations acknowledged by the authors
Maurer & Reichel (2004)	The European external action service: Elements of a three-phase plan	• The implementation of a coherent plan allowing the construction and instrumentalisation of the Service can ensure a "Single European Voice" for EU external affairs.	• EU external relations suffer from 1) fragmentation of the rules of jurisdiction and 2) duplication of institutions and instruments; • The danger that EEAS "double hat" to be rendered useless between arguing power interests.
Mattelaer (2010)	The CSDP mission planning process of the European Union: innovations and shortfalls	• Analyses and evaluates CSDP planning process.	• Difficulties prevail at the strategic and operational levels of mission planning (i.e., commanding operations and inter-pillar coordination); • The mental gap between the political expectations and operational level requires attention.
Hofmann (2011)	Why institutional overlap matters: CSDP in the European security architecture	• Study the institutional architecture into which CSDP emerged.	• Institutional overlaps exist (occupying the same policy domain).
Simón (2012)	CSDP, strategy and crisis management: out of area or out of business?	• In order to meet the demands in a changing geopolitical environment, CSDP must break away from its distinctively approach to security.	• CSDP´s narrow mandate centred on "soft" crisis management
Bátora (2013)	The Mitrailleuse Effect: The EEAS as an interstitial organisation and the dynamics of innovation in diplomacy	• EEAS provides opportunities for studying institutional innovation in organisational domains.	• Conflicting organisational principles, practices, and expectations from stakeholders within and outside EEAS.
Juncos & Pomorska (2013)	In face of adversity: explaining the attitudes of EEAS officials vis-à-vis the new service	• The study indicates that a strong identification with the EU and the desire to make EU foreign policy work might explain officials strong support for the EEAS.	• Negative views among EEAS officials concerning the implementation of reforms; • Time-consuming negotiations.
Jørgensen et al. (2022)	The EEAS navigating foreign policy paradigms	• Examines the main foreign policy paradigms that EEAS needs to navigate in 1) world order, 2) multilateralism, 3) security, 3) neighbours and 4) climate change.	• Competing foreign policy paradigms in EU landscape.

Table 2.1: Previous Studies in Literature Review

SYNOPSIS OF CHAPTER 2

Strategic management, rooted in military strategy, entered the business world in the mid-twentieth century. Scholars such as Peter Drucker, Igor Ansoff, and Alfred Chandler developed theories and frameworks for strategic management in the business context, emphasising its crucial role in organisational success. Strategic management involves planning, implementation, evaluation, and control, requiring stakeholder collaboration to align practical strategies with an organisation´s vision and mission. Performance Management Systems (PMS) emerged in the early 20th century, focusing on improving efficiency and productivity through scientific management principles. PMS plays a vital role in enhancing individual and organisational performance. The effectiveness of the European External Action Service (EEAS) and the Common Security and Defence Policy (CSDP) is under scrutiny regarding their objectives. This chapter focuses on understanding the EEAS, its importance, and the significance of the CSDP. It also highlights the limitations of previous studies regarding Business Administration I CSDP Missions. Decision-making is complex, and literature suggests that Multi-Criteria Decision Analysis (MCDA) methods can create new contributions outside traditional methods, thus bringing structure and voice to all stakeholders when identifying fundamental viewpoints and enhancing the effectiveness of the CSDP. The EEAS serves as the diplomatic service of the European Union (EU), working closely with member states, institutions like the European Commission, European Council, European Parliament, and international organisations. Its role is to ensure consistency and coordination of the EU´s external action by formulating and implementing policies to increase Europe´s global influence and promote peace, prosperity, and security for Europeans worldwide. The CSDP, an integral part of the EU´s comprehensive approach to crisis management, allows the EU to lead peacekeeping operations, prevent conflicts, and projects its ambition as a global security actor. CSDP missions are prepared by the EEAS and Foreign Policy Instruments (FPI), decided by EU Foreign Ministers, and deploy at the invitation of the host country´s government. The Civilian Planning and Conduct Capability (CPCC) is the operational headquarters for civilian CSDP missions, responsible for planning and conducting crisis management operations. This dissertation aims to develop a PMS for CSDP Missions. The study focused mainly on Mission M1, which operates in the Middle East and Northern Africa (MENA) region. The Mission´s M1 organisational structure is classified as a Professional Bureaucracy comprising professionals from various European countries. Overall, this chapter provides an overview of strategic management, the EEAS, the CSDP, the limitations of previous studies and the need for further research, and the potential benefits of using Multiple Criteria Decision Analysis for Commons Security Defence Policy Missions: 1) to recognise and identify decision opportunities, 2) to provide better alternatives for the decision-makers, and 3) to develop solid and lasting guidelines.

CHAPTER 3

METHODOLOGY AND SOURCES

The previous chapter addresses the limitations of existing studies on EEAS and CSDP, thus presenting an opportunity for new approaches. This third chapter will present the framework and the methodological bases that support the model to develop in this dissertation, addressing three key points: 1) the use of multicriteria analysis to facilitate decision-making, 2) the SODA approach using Cognitive Mapping, and 3) the CI technique within the context of multicriteria assessment.

3.1. Multicriteria Decision Support

It is human nature to make decisions all the time. Multicriteria decision support assists decision-makers (DMs) in choosing the best option among several alternatives, considering multiple criteria. This approach is vital in complex and dynamic environments, requiring mathematical modelling, data analysis, and stakeholder engagement to ensure informed and transparent decision-making. Multicriteria decision support finds applications in various domains, such as finance, engineering, healthcare, and environmental management.

There is a lot of complexity and challenges involved in decision-making. This is why during the past decade, Operations Research (OR) has emerged as a field that supports scientific management by facilitating the analysis of complex real-world problems (Zopounidis & Pardalos, 2010). Multiple criteria decision aid has progressed since the 1960s, with the development of two robust branches, Multiple Criteria Decision Making (MCDM) and Multiple Criteria Decision Analysis (MCDA). These two branches differ but share a common vision about facilitating decisions. *Table 3.1* highlights the main differences between the MCDM and MCDA approaches.

MCDA is a field of study that provides a structured approach to support decision-making in complex, multi-objective problems. MCDA methods help DMs to evaluate and compare alternatives based on multiple criteria, which may be conflicting or have different weights. The goal of MCDA is to provide a transparent and consistent framework for decision-making that considers stakeholders' preferences and values while encouraging constructivism and favouring the inseparability of subjectivity and objectivity in the decision-making process. This subheading provides an overview of

the evolution of knowledge in the field, along with its key concepts and paradigms. This study aims to explore the potential benefits of using MCDA in PMS within the context of CSDP Missions.

MCDM	MCDA
Considers multiple criteria, but strongly linked to optimisation.	Recognises the presence and the need to integrate elements of both objective and subjective nature.
Acceptance of something pre-existing that allows the best solution to be reached.	The main objective is to create something that, by definition, does not pre-exist completely.
Aims to analyse a particular axiom leading to the truth by prescribed norms.	Aims to understand a particular axiom, in the sense of knowing its meaning and its role in making recommendations.
There is no concern in making the decision agent understand the problem, only to make the preferences explicit.	It helps understand the behaviour of the decision agent, aiming at arguments capable of strengthening or weakening their convictions.

Source: Ferreira (2011, p. 76, adapted)

Table 3.1: MCDM/A Approaches Main Differences

3.1.1. MCDA Approach

As a constructivist approach, MCDA has grown exponentially in popularity over the past few years, changing how we make general decisions and OR science (Zavadskas et al., 2014). Some authors deem the MCDA approach as a branch of OR that deals with highly complex problems and emphasises the need to simultaneously consider subjective and objective aspects in the search for a solution (Ferreira et al., 2011). Similarly, other authors defend to be impossible to deny the importance of subjective factors and contemplate the subjectivity (introduced by the actors) by recognising that objectivity has limits and bestows as its primary objective the construction of something that, by definition, does not pre-exist, helping decision-making models and transform their preferences according to their values (Ferreira, 2011; Roy & Vanderpooten, 1996).

MCDA is an umbrella term encompassing a wide range of methods designed to simultaneously and explicitly consider multiple and conflicting criteria before making a decision (Baltussen & Niessen, 2006; Marttunen et al., 2017; Tröster & Hiete, 2019). This approach was developed to aid in evaluating alternatives with conflicting objectives, aiming to assist individuals or groups in making significant decisions (i.e., prioritise, rank or choose alternatives) based on multiple criteria (Belton & Stewart, 2002). Mendoza and Martins (2006) assert that MCDA methods facilitate dialogue and improve the quality of the decision-making process to manage complex decision-making situations involving multiple and frequently conflicting objectives valued differently by various stakeholders and DMs.

According to Bennet & Howard (1996) and Sacco (1996), the decision-making process is a rational choice based on the consequences of actions. Ferreira (2011, p. 70) defends that the decision-making

process, the interpretation of alternatives, is conducted in terms of 1) expected consequences, 2) each action depending on anticipating the future effects of current actions, and 3) the DM preferences carried out in the evaluation of consequences (Ferreira et al., 2011).

According to Bana e Costa (1993b), the structuring phase in the *Decision-Support Process* emphasises the importance of understanding two interrelated *subsystems* 1) the *system of stakeholders* and 2) the *system of actions*.

Since the decision support process consists of people directly or indirectly participating in the decision – *stakeholders* – one must consider that these, with different perceptions and roles, are subject to their value systems. These stakeholders act according to their value systems and are influenced by 1) other stakeholders' value systems with whom they interact and 2) the environment where they operate (Dias, 2012; Ferreira, 2011). *Table 3.2* presents the classification and characterisation of the stakeholders that interfere in the decision process.

Position in relation to the decision-making process	**Stakeholder type**	**Relation to the Decision**
They are characterised by not having an active voice in the decision-support process, although they may influence it indirectly. E.g., residents of a specific street, students at a university or employees of a company.	***"Acted Player"***	They all suffer the consequences of the decision in a passive way.
Stakeholders who effectively have a place at the negotiating table.	**Intervener**	All the individuals or groups that, by their direct intervention and according to their value system, condition the decision.
They are those who address the decision-making process. They are also interveners.	**Decision-maker**	Have the power and responsibility to ratify the decision, assuming the consequences of it.
This external expert intervenes in the process. They guide the activity with clarity, transparency, and intellectual honesty.	**Facilitator (*L´homme d´étude*)**	Its role is essential in the decision-making process as it helps to improve communication and the search for a compromise solution between the stakeholders.
It occasionally appears as an intermediary in the direct relationship between the decision-maker and the facilitator.	***"Demandeur"***	This stakeholder exists, for example, when the decision-maker is a state minister. Given their difficult access, a direct advisor to the minister may act as an intermediary in the decision-support process.

Source: Ferreira (2011, p.83, adapted)

Table 3.2: Classification and Characterisation of Stakeholders in the Decision-Making Process

Roy (1985) and Vincke (1992) classified actions resulting from decision-making processes as 1) Realistic when belonging to a project whose execution is believed plausible, 2) Unrealistic if corresponding to objectives not compatible with the problem at hand even if they can still serve to

develop new alternatives, 3) Global when their implementation implies the rejection of other actions introduced by the model, and 4) Fragmented when it is relevant to combine several types of actions to facilitate the decision process.

Roy (1985) and Ferreira (2011, p. 87) subdivided realistic and unrealistic actions into 1) Real if they already exist and are ready to be implemented and 2) Fictitious if they do not hold an actual existence, corresponding to idealised projects, incomplete or built by imagination. In turn, these Fictitious actions can be ideals or non-ideals. Ideal actions concern all activities which, if put into execution, would rigorously correspond to the description and expected consequences. On the other hand, non-ideal actions involve all actions that, if put into execution, would not rigorously correspond to the report and expected results.

Belton & Stewart (2002) defined criterion as a "means or standard of judging". In addition, the judgements of decision agents may be influenced by the characteristics of the actions and/or by the stakeholder's perspectives.

MCDA approaches consider the DMs preferences by integrating their choices into the decision model, ranking the alternatives based on multiple criteria and value judgment (Almeida et al., 2015). Thus, it introduces advantages in the construction and operationalisation of several criteria or dimensions, according to several points of view of the stakeholders involved in the decision-making process (Bana e Costa, 1993a; Bana e Costa & Beinat, 2005). The approach´s main objective is to conceive models of DM objectives and their value trade-offs, thus allowing consistent and transparent comparison between the alternatives under consideration. The MCDA techniques are valuable tools for structuring and evaluating complex decision situations and can allow for more informed and potentially sounder decisions (Belton & Stewart, 2002). Those techniques can build on expert participants' knowledge and expertise in a designated field and deliver assessments based on their values and experiences (Keeney, 1992; Keeney et al., 1993).

At the core of MCDA is the *Decision Support Methodology* (DSM) that can be classified into five leading families (a summary is provided in Appendix B): 1) elementary methods (Hwang & Yoon, 1981), 2) value measurement models (Belton & Stewart, 2002), 3) goal and reference models (Belton & Stewart, 2002), 4) outranking models (Belton & Stewart, 2002), and 5) dominance-based approach (Greco et al., 2001; Moshkovich & Mechitov, 2013; Pawlak & Sowinski, 1994). The thesis will incorporate a UTA (UTilité Additive)-like, non-additive ordinal regression method within the CI framework regression described by Angliella et al. (2004).

3.1.2. Paradigms and Epistemological Beliefs

New methods to support decision-making in the last decades allowed a significant evolution in resolving complex problems (Ferreira, 2011). The emergence of these new methods led to conclude that the most orthodox and traditional techniques (Roy, 1985) applied until then were only some of the instruments available for the purpose (Ferreira et al., 2011). Therefore, the difficulty in obtaining optimal solutions – a characteristic of the hard paradigm – was progressively complemented by developing new soft approaches (Dias, 2012). Thus, the traditional methods used until then, which considered only one criterion in the decision-making process, were complemented by a new perspective that highlights the limits of objectivity, not forgetting the subjectivity of the stakeholders and the inability sometimes to reach an optimal solution (Correia, 2014; Ferreira, 2011).

To better understand the need for a *paradigm shift*, Bana e Costa (1986) refer that it might be enough for each individual to ask themselves when was the last time they made a decision based on a single criterion. In this sense, a new approach called "*Soft*" emerged (Ferreira, 2011), not only as an alternative to more traditional procedures but rather as a complementary approach since it can recognise the effectiveness of the more traditional methods in solving some problems (Ferreira et al., 2011). The acceptance of this new paradigm created the necessary conditions for developing several soft approaches, mainly using multiple criteria in decision-making (Ferreira, 2011).

The *Soft approach* differs from the more traditional approach (also named the *Hard approach*). Its *characteristics* have implications for the decision-making processes (Ferreira, 2011, p. 100): 1) *Non-Optimisation* (replaces the incessant search for an optimal solution with the search for compromise solutions in different dimensions), 2) *Reduced need for data* (achieved due to the use of quantitative and qualitative data underlying the possibility of resorting to subjective judgments), 3) *Simplicity and Transparency* (enables a greater understanding of the problem and possible conflict situations), 4) *Human factor inclusion* (people are active subjects in the decision-support process), 5) *Bottom-up planning* (creates the necessary conditions for planning to be done from the particular to the general), and 6) *Acceptance of uncertainties* (seeks to leave options open to ensure greater flexibility for future events). *Table 3.3* compares the main characteristics of the *Soft* vs *Hard* paradigms.

Hard Paradigm	**Soft Paradigm**
Optimisation	Non-Optimisation
Large amount of data	Reduced need for data
Previous consensus	Simplicity and transparency
Passive attitude of people	Active attitude of people
Single decision-maker	*Bottom-up* Planning
Abolition of uncertainties	Acceptance of uncertainty

Source: Ferreira (2011, p.71, adapted)

Table 3.3: Characteristics of Confrontation between the *Soft* and *Hard* Paradigms

Keeney (1996) established *value-focused thinking* as a means to create valuable tools that would help structure and evaluate complex decision situations, basing the analysis on the experience, expertise and values of the researchers in specific fields (Ferreira et al., 2019; Keeney, 1996). Specialised literature support that the MCDA approach is based on *three fundamental value-focused thinking convictions* (Bana e Costa, 1993a; Bana e Costa et al., 1997; Belton & Stewart, 2002; Ferreira, 2011). Namely: 1) *Interpenetration of objective and subjective elements and their inseparability*, 2) *Learning through participation*, and 3) *Constructivism*.

The first conviction, *interpenetration*, also referred to as "Specialised know-how and sensemaking" (Gonçalves et al., 2018), mentions that since there is an interpretation between objective and subjective variables, it is possible to assume that the assessment process is difficult to be separated into parts because it is a holistic process (Ferreira, 2011). It is essential to realise that subjectivity is an intrinsic factor in decision-making (Bana e Costa, 1993a).

The second conviction, *learning through participation*, emphasises the importance of dialogue and discussion among various stakeholders to develop a decision-support model, which involves a learning process for each stakeholder to exchange and understand points of view. Through dialogue and discussion, stakeholders can deepen their knowledge of the issue and formulate conclusions while simultaneously learning individually (Ferreira, 2011; Santos et al., 2002). This learning process is vital in decision support (Dias, 2012). It should occur gradually and be based on a common language of communication, ultimately leading to the achievement of a consensus model that supports decision-making (Ferreira, 2011).

Regarding the third conviction, *constructivism*, Ferreira (2011, p. 116) states that it presupposes the non-use of pre-established models for the structured creation of models concerning elaborating and projecting preferences or value judgments. In practical terms, the author defends that the foundation of this way consists in considering concepts, models, procedures and results as valuable tools for the development and evolution of beliefs. Thus, a predetermined vision is not assumed; instead, an evolutionary and constructivist vision from which it can reach consensual solutions. In this sense, this conviction objective is not to discover an existing truth external to the stakeholders involved in the process but to build a "set of means" allowing the opening of new doors for the stakeholders to progress according to their objectives and value systems (Ferreira, 2011, p. 114).

The MCDA approach reasons that the direct participation of all stakeholders in dialogues and discussions results in a group-engaged learning process. The individual expert´s contributions to the problem under analysis enhance the decision-making process. Via the interactions, it is possible to identify objective and subjective criteria that, being treated equally during the analysis and incorporated into the decision problem´s structure, will aid in delivering a more informed and holistic understanding of the assessment process (Ensslin et al., 2000).

It is now necessary to understand how multicriteria analysis, to aid decision-making in creating a model for Performance evaluation, can help CSDP Missions.

3.1.3. Possible Contributions to Performance Analysis in Common Security Defence Policy Missions

Ewenstein et al (2016) argue that most corporate PMSs do not work because they are rooted in models dating more than a century to Frederick Taylor (models for specialising and continuously optimising discrete work tasks). Over time PMS evolved but did not change fundamentally. A measure like the number of items produced in a single day can evolve for more sophisticated measures, like a balanced scorecard (BSC) of key performance indicators (KPIs) linking to overarching corporation goals. In other words, according to Ewenstein et al. (2016), what started as a simple mechanical principle acquired layers of complexity as corporations tried to adapt industrial-era performance systems to ever-larger organisations and more complex work.

The concept of PMS aims at helping the organisation maximise its productivity by enabling workers to perform to their potential (Mueller-Hanson & Pulakos, 2015). Hence, Mueller-Hanson & Pulakos (2015) argue that PMS should accomplish three critical goals: 1) enable employees to align efforts contributing to the organisation´s goals, 2) monitor behaviour and results and adjust in real-time as needed to maximise performance, and 3) remove barriers to employee performance.

Most PMS processes have three main components (Mueller-Hanson & Pulakos, 2015): 1) setting performance goals (a powerful way to channel energy and focus and improve performance), 2) monitoring progress, and 3) evaluating results.

Setting goals should be challenging and meaningful to the individual (Locke & Latham, 1990). For formal PMS processes, Mueller-Hanson & Pulakos (2015) recommend: 1) employees and managers collaboration to set brief, essential and achievable performance goals related to the organisation´s priorities, 2) establishing relevant goal timeframe to the job (i.e., quarterly goals), 3) striving for meaningful goals where measures of success can be more subjective (instead of focusing only in quantitative metrics - SMART criteria: Specific, Measurable, Achievable, Realistic, and Time-bound), 4) ensuring that goals are sufficiently challenging, and 5) ensuring linkages between goals (and rewards) make sense for the work.

According to Mueller-Hanson & Pulakos (2015), developing a high-performance organisation requires 1) open and transparent communications, 2) support for performance improvement, and 3) ongoing real-time feedback.

Mueller-Hanson & Pulakos (2015) defend 1) stripping PMS of as many standards and demanding administrative requirements as possible and 2) replacing them with a more flexible approach

reinforcing critical behaviours and aligning individual work to organisational objectives. PMS reform should begin with the organisation´s goals and what managers and employees require to achieve these (Mueller-Hanson & Pulakos, 2015). When traditional PMS practice is cumbersome in its current form and does not fully support the organisation´s goals, allowing for new and more informal approaches to PMS can build more added value activity (Mueller-Hanson & Pulakos, 2015).

PMS transformation is a significant organisational change effort (Cohen, 2005; Kotter, 2007). As with any change effort, success requires developing a business case, engaging stakeholders, gaining buy-in and support, communicating effectively, enabling and empowering the workforce to embed the change and managing expectations (Pulakos et al., 2019).

Pulakos et al. (2019), regarding PMS and based on research and practice to date, concluded that 1) format PMS processes are costly, disengage employees and have no impact on performance, 2) format systems can be streamlined but should not be eliminated without robust informal processes, 3) informal day-to-day PMS behaviours enable performance but take time and effort to embed, 4) future research should investigate new PMS models that leverage neuroscience, are strength-based, and focus on team performance.

In a nutshell, a better process means better results, and with that, PMS can: 1) increase productivity, 2) achieve smoother project execution, 3) favour employee growth (quantifiable goals within the workflows allow staff to strive for completion markers), 4) set clear expectations, 5) identify CSF and KPIs (the more likely employee will buy into the challenge), and 6) give context to staff workload while providing transparency behind decisions.

From OR science, the constructivist branch approach MCDA can help DM´s deal with complex real-world problems (Zavadskas et al., 2014; Zopounidis & Pardalos, 2010), allowing them to consider not only objective aspects but also subjective aspects in the search for a solution (Ferreira, 2011). This MCDA approach considers the DMs and the involved stakeholder´s points of view (Bana e Costa, 1993a; Bana e Costa & Beinat, 2005), preferences and choices in the decision model, allowing for ranking alternatives based on multiple criteria and value judgment (Almeida et al., 2015).

In a nutshell, MCDA can bring “as new added-value” to PMS in CDSP Missions the fact that: 1) can facilitate multi-stakeholder processes, transparency, and discussion about the subjective elements in policy analysis, 2) can build on expert participant's knowledge and expertise (Keeney, 1992; Keeney et al., 1993), 3) introduces advantages in the construction and operationalisation of several criteria or dimensions (Bana e Costa, 1993a; Bana e Costa & Beinat, 2005), 4) covers a wide range of ecosystems services, 5) trade-offs can be evaluated (allows consistent and transparent comparison between the alternatives under consultation), 6) uncertainty can be addressed by sensitivity analysis, and ultimately 7) can allow for more informed and potentially sounder decisions (Belton & Stewart, 2002).

3.2. Cognitive Mapping

Cognitive mapping is a powerful tool for visualising complex systems and decisions, which enables individuals and groups to explore and communicate their understanding of a given situation. By creating a mental map, or a Cognitive Map (CM), people can better navigate and interact with their environment by utilising their perceptions, experiences, and knowledge. In particular, CMs are helpful when dealing with high uncertainty, ambiguity, or diverse perspectives. They help stakeholders to identify relationships and interactions among various system components, share their knowledge, assumptions, and mental models, and pinpoint areas of consensus or disagreement. In this subheading will delve deeper into the concepts and importance of cognitive mapping.

3.2.1. Cognitive Mapping and Decision Problem Structuring

Developed and used since the mid-1970s, *Problem Structuring Methods* (PSMs) are a participatory and interactive process (Rosenhead, 1996), used to address a specific problem and make a one-off decision or to be part of an organisational routine to support decision-making formally (Franco, 2013). They are "a collection of participatory modelling approaches" (Shaw et al., 2006) aiming to help DMs who manifest different perspectives reach timely decisions (Cronin et al., 2014).

PSM represent different views and allows stakeholders to clarify the situation to converge on a mutual problem and subsequently reach constructive improvements (Mingers & Rosenhead, 2001, 2004; Rosenhead, 1996; Smith & Shaw, 2019; White, 2006). In other words, PSM aims to structure and face complex and uncertain problematic situations (Lami & Tavella, 2019) characterised by the existence of 1) multiple stakeholders, 2) multiple perspectives, 3) conflicting interests, and 4) high levels of uncertainty (Mingers & Rosenhead, 2001; Rosenhead, 2006). PSM manages complexity by adopting a holistic approach, thereby rejecting reductionism (Smith & Shaw, 2019).

Tangible and intangible outputs emerge from using PSM. Tangible results include graphical illustrations in the form of models (i.e., CMs), pictures (i.e., images representing the problem) and/or lists of options with solutions and action plans. Intangible outcomes include a better-shared understanding of the problem, stakeholder learning and agreement on actions to follow, and commitment to the problem definition and decisions made (Franco & Montibeller, 2010).

Rosenhead & Mingers (2001) and Belton & Stewart (2010) identified five PSM approaches, namely: Soft Systems methodology (SSM), Strategic Choice Approach (SCA), Robustness Analysis, Drama Theory, and Strategic Options Development and Analysis (SODA).

Checkland´s SSM studies human activity systems (Checkland & Scholes, 1999). Action-oriented process of inquiry into a problematic situation using different methods to structure the discussion and enhance learning (Marttunen et al., 2017). Participants construct ideal conceptual models, comparing them with perceptions of the existing system, thus generating discussion about what changes are culturally achievable and systemically desirable (Checkland & Poulter, 2020; Rosenhead & Mingers, 2001). Commonly used methods are CATWOE (Costumers, Actors, Transformation, Worldview, Environment), Rich Pictures, 3 E´s (Efficacy, Efficiency, Effectiveness), PQR (What?, How?, Why?) and the Root definitions (Marttunen et al., 2017).

The SCA intends to reduce uncertainty in strategic situations by building several models representing the interconnectedness of decisions (Friend, 2010). Facilitators assist in modelling the interconnectedness of decision areas where interactive comparison of alternative decision schemes helps them to bring critical uncertainties to the surface (Rosenhead & Mingers, 2001). The DMs group identifies priority areas for partial commitment and structures investigations and contingency plans. SCA is deemed helpful in defining options in complex decision situations (i.e., when there are multiple decision areas to consider and/or sequential contemplations) (Marttunen et al., 2017).

Robustness analysis enables participants to compare the flexibility maintained by alternative initial commitments (Rosenhead & Mingers, 2001). *Drama Theory* is an interactive method for analysing cooperation and conflict among multiple actors by drawing into metagames and hypergames (Rosenhead & Mingers, 2001). In combination with MCDA, these last two methods are scarce in literature reviews (Marttunen et al., 2017).

The SODA approach, also known as JOUNEY Making (Jointly Understanding, Reflecting, and Negotiation strategy) (Ackermann & Eden, 2010), is a prominent soft method utilised for structuring complex problems (Belton & Stewart, 2002; Diniz & Lins, 2012; Mingers & Rosenhead, 2004). This approach facilitates a group workshop setting to create a shared graphical representation of a problematic situation, typically as a Causal or Group Map, by merging several individuals' CMs. It uses this to explore potential strategies concerning a complex system of goals (Marttunen et al., 2017). The CM is a structuring tool that captures an individual's views of a problem and serves as a foundation for the SODA approach's strategic analysis of causal relationships (Eden & Ackermann, 2001, 2004, 2018; Ferreira, 2011). Trough SODA, stakeholders can engage in an interactive conversation to agree on a course of action to address a given situation by constructing a CM and subsequently analysing options and their ramifications for a complex system of goals or objectives (Ackermann & Eden, 2010; Lami & Tavella, 2019). *Table 3.4* overviews researchers' standard techniques for expressing ideas and facilitating map-making.

According to Ferreira (2011), the SODA methodology can be characterised by 1) the ability to deal with qualitative variables, 2) allowing for the structuring of complicated situations, 3) serving as a

support for group work, and 4) being useful in the development and implementation of strategic directions.

Eden & Banville (2003) state that the SODA approach assists the facilitator in structuring complex problems, and the facilitator's role is to mediate any conflicts that may occur (Ferreira, 2011). According to Ferreira (2011), the facilitator should have two different skills for structuring these problems: 1) acting as a mediator, acting effectively in discussions for decision-making, and 2) assisting in the construction of the model that will belong to the whole group, but taking into account the individual considerations of each participant. During a decision support process, the facilitator should consider the subjectivity inherent to the process, as each individual has values and objectives that often conflict.

Technique	Characteristic
Brainstorming ("rambling" process)	It consists of letting the decision-makers talk freely about the problem. If there is time and freedom, it is possible to obtain a large amount of information so that aspects unrelated to the initial objective may become essential later in the process.
Interviews	These are classic techniques for gathering information. In group work situations, it is common to use individual interviews before moving on to a discussion forum. However, rigid interviews with a pre-defined sequence of questions are not recommended.
List of objectives and values of decision-makers	If the problem generates discomfort in the decision agent, knowing his/her values can become helpful, as it allows relating the current situation to what he/she considers essential for himself/herself or the organisation – Value-Focused Thinking.

Source: Ferreira (2011, p.128, adapted)

Table 3.4: Some Techniques to Express Ideas

Based on this rationale, from the perspective of Filipe (2013, p. 53), the SODA approach allows structuring complex problems by 1) dealing with the subjectivism inherent to the decision-making process and 2) using CMs as a vital means.

Literature defines the term "*cognition*" as the "mental action or process of acquiring knowledge and understanding through thought, experience and the senses" (Ferreira et al., 2017, p. 174). *Human cognition* is a complex system (conscious or unconscious, intuitive or analytical and/or even artificial) composed of processes ranging from cognition, attention and memory to evaluation, computation and decision-making, including even language production (Ferreira et al., 2017). According to Ferreira (2011), the sensory-motor system relates to the amount of information received, while the cognitive system relates to the quality of that information. Due to the interaction between these two systems, the individual can relate images of the real world with images created in their mind, assembling something that will give some sense to their surroundings. The stimulus and how the problem is understood influence the individual's behaviour.

It was to understand this complex process (i.e., *human cognition*) that Tolman (1948) developed a methodological instrument called a CM to describe the internal mental changes of individuals and the representation of the relationships between concepts.

It seems now pertinent to understand the concept of the CM. Thus, numerous definitions have emerged. For Eden & Banville (2003), CMs are an effective technique for ensuring the connection between formulating a strategy and preparing its implementation. Ferreira (2011), Ferreira et al. (2017), and Miguel et al. (2019) argue that a CM is a negotiation tool that assists the facilitator and other stakeholders (with their perceptions and interpretations) in the decision-support process.

According to Eden & Ackermann (2004), this methodological instrument derives from interviews and thus intends to represent the interviewee's subjective world and is characterised as a graphic representation that reflects the values, objectives, ideas and experiences of DMs about a complex problem (Ackermann & Eden, 2010). However, the cognitive map-building process employed in the SODA approach utilises techniques such as brainstorming and listing the DMs objectives and values (Ferreira, 2011). For Eden (2004), a CM is an aggregation of ideas, organised and structured hierarchically, linked together by arrows representing causal relationships. To this author, it is a process of mapping the representation of thinking about a problem. Ferreira (2011, p. 129) and Ferreira et al. (2016b) corroborate Eden's view defending that CMs are epistemological structures from which individuals organise thoughts, experiences or values.

Despite their subjective nature, CMs are tools for structuring complex problems, promoting dialogue and discussion and enabling real-time ideas visualisation, thus, facilitating their reorganisation and the cooperation between those involved in the decision-making process (Filipe, 2013).

According to Eden & Ackermann (2001), CMs can follow two main orientations, namely 1) the Top-Down approach and 2) the Bottom-Up approach. However, regardless of the orientation followed, constructing CMs is a cyclical and interactive process (Ferreira, 2011). Therefore, according to several authors (Ferreira et al., 2017; Ferreira, Jalali, et al., 2016; Ribeiro et al., 2017) CMs have two main functions, namely: 1) descriptive function (i.e., maps provide visual representations that help individuals better understand the problem at hand and, thus, facilitate its resolution), and 2) reflective function (i.e., maps are a tool used to develop new ideas). Thus, these methodological instruments prove to be effective because they ensure the link between the formulation of a strategy and the preparation of its implementation (Eden & Ackermann, 2004). Therefore, CMs are tools with enormous potential in structuring and clarifying complex problems (Belton & Stewart, 2002; Eden, 2004; Eden & Ackermann, 2001), mainly due to their interactivity, versatility, and simplicity (Eden & Ackermann, 2004; Ferreira et al., 2012).

In short, *cognitive mapping* is a mental structuring process that leads to creating a CM (Wong, 2010). From Diniz & Lins's (2012, p. 142) perspective, a CM captures inferences about a given matter or problem via people´s perceptions. CMs allow for a model of cause-and-effect relationships between the variables in complex problems and play a significant role in supporting decision-making, largely thanks to their recursive and flexible nature, firmly linked to the conviction of constructivism (Ferreira, 2011). *Table 3.5* illustrates the characteristics and objectives of types of CM (Ferreira, 2011; Fiol & Huff, 1992).

Types of Maps	Characteristics and Objectives
Identity Maps	They aim to establish a way of identifying the key elements of the problem, making it possible to know which stakeholders, events and processes should be considered when developing a decision-support model.
Categorisation Maps	They seek to obtain information about the problem by developing a categorisation process. In other words, they aim to lead the stakeholders to classify events and situations based on their differences and similarities.
Causal and argumentation Maps	They aim to generate an understanding of the links that exist between one event in time and any other event occurring at a different time. In addition to identifying paths between two events, these maps provide the necessary evidence about the claims and/or assumptions stakeholders make in the construction process.

Source: Ferreira (2011, p.133, adapted)

Table 3.5: Classification of Cognitive Maps

The subsequent segment examines the advantages and limitations of Cognitive Mapping.

Several authors highlight the ability of CMs to deal with the complexity inherent to decision-making (Belton & Stewart, 2002; Eden, 2004; Eden & Ackermann, 2001). According to Ferreira (2011) and Ferreira et al. (2016), cognitive mapping´s main advantages stem from three particularities, namely 1) it drives knowledge synergies through discussion and reflective analysis, therefore, allowing an analysis of the problem with a greater volume of information, which would hardly be feasible without the use this tool, 2) it allows reducing the rate of omitted criteria in decision-making, and 3) it promotes learning through discussion and information sharing among DM´s about the causal relationships between evaluation criteria (Ferreira et al., 2012; Mogonea & Mogonea, 2014).

As pointed out by some authors, Ferreira (2011) and Faria et al. (2018), it is crucial to bear in mind cognitive mapping main limitations, namely 1) the possible lack of sincerity of the DM in the process (i.e., the DM, at certain times, may not want to give their opinion on specific issues), 2) the poor quality of the facilitator (i.e., the facilitator may not make a factual linguistic reconstruction of what was said by DMs), and 3) the subjective nature of CMs (built from mental representations of DMs). Reinforcing

these limitations, Mohammadi & Rezaei (2020) argue that the subjective or biased value judgements of DMs can affect the outcome.

To ensure that the whole process required to construct a CM runs smoothly, the facilitator should take some precautions: 1) take into account that the main appeal of a CM is the creation of a system of relationships allowing to obtain from the decision-maker a high level of representation of the issue under analysis, 2) guide the DM towards a natural logic combining form and content, and 3) avoid definitions, because they are regressive and can lead stakeholders to an infinite number of meanings, which is not the intention in a schematisation process (Cossette & Audet, 2003; Ferreira, 2011).

3.2.2. Viewpoint Structuring

Previously exposed in point 3.1., the structuring phase emphasises the importance of understanding two interrelated subsystems: the system of stakeholders and the system of actions (Bana e Costa, 1993b). Given that both categories complement each other in building the preference model, Bana e Costa (1993a) argues that it is impossible to state that one is more important than the other, for both are relevant. From this complementarity, both elements merged into one and materialised through structuring the so-called Viewpoint (VP) (Correia, 2014). In order to be able to assess the various actions, the VPs must be clarified and made operational to find the interconnections and incompatibilities between them (Ferreira, 2011).

Property	Implications for the decision-making process
Consensuality	● Consensus desire of the stakeholders to consider the values represented by a FVP (these values will form an integral part of the evaluation model to be built).
Operability	● The operationalisation of a FVP should be possible by constructing a local preference scale associated with that viewpoint impact levels. Additionally, an impact indicator related to the viewpoint should be built.
Intelligibility	● Gathering the necessary information for the analysis in progress, considering time, effort and other resources. ● The aim is for the FVP to act as a structuring instrument, promoting communication, argumentation and the confrontation of values of the various stakeholders.
Isolability	● Essential for aggregating decision-makers' judgements. If the FVP is isolable, it is possible to evaluate actions according to this FVP, considering the other constants.

Source: Ferreira (2011, adapted)

Table 3.6: Properties of a Fundamental Viewpoint

Bana e Costa et al. (1999) divided the VPs into two types: 1) Fundamental Viewpoints (FVPs), considered as an end in themselves, and 2) Elementary Viewpoints (EVPs), considered as a means to an end. Therefore, a FVP reflects the value considered relevant to DMs and may group several

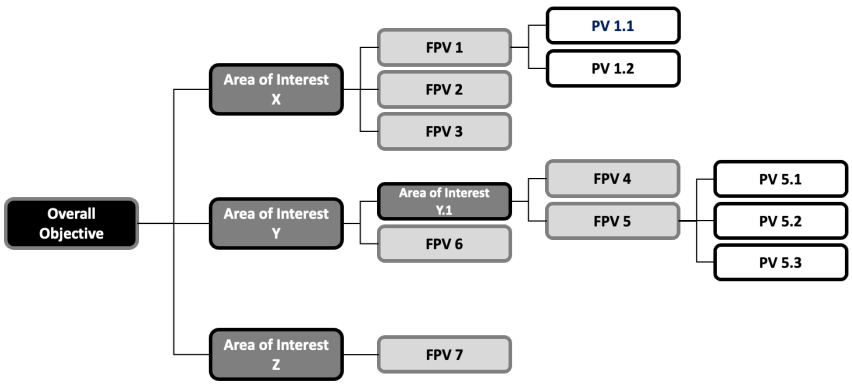
interconnected EVPs. Thus, a FVP must endow characteristics (i.e., consensuality, isolability, intelligibility and operability), which can be analysed in *Table 3.6*.

The creation of a Tree of Points of View (PsV) is essential in the structuring process to hierarchically structure the information following a top-down approach, resorting to a tree metaphor as a mode to clarify the perception of the problem, its interactions and, innately, the concept to be structured (Ferreira, 2011, p. 159). If envisaged FVPs characteristics, they can be grouped by Areas of Interest or Concern (Bana e Costa et al., 1999), originating a Tree of PsV (Ferreira, 2011). In turn, these areas of interest will form the overall objective of the decision process (Ferreira, 2011).

Trees of PsV are useful structuring tools, and Ferreira (2011) defends some of its benefits, namely 1) the possibility of achieving a multicriteria model for evaluating the various actions, 2) the possibility of improving communication with and between stakeholders, 3) the possibility of clarifying beliefs and rationales, 4) the possibility to obtain compromises between the interests and aspirations of each stakeholder involved in the process, and 5) the possibility to operationalise the FVPs.

Under this context, using CMs is beneficial for constructing Trees of PsV, as it identifies the stakeholder's objectives and the characteristics of specific actions that DMs consider relevant to integrate into the multicriteria assessment model.

Once defined the Tree of PsV (*Figure 3.1*), the structuring process entails defining a descriptor (or attributes) according to Roy (1985) and impact levels (i.e., a scale of preferences) for each FVP.



Source: Ferreira (2011, p.160)

Figure 3.1: Example of a Tree of Points of View

In short, given the importance of cognitive mapping techniques in the decision-support process, it becomes pertinent to explore its applicability in promoting initiatives to improve Performance measurement in CDSP Missions. The thesis problem under analysis characteristic is the scarcity of data necessary to create the model and the need to clarify the subjectivity inherent to the decision-making process. Thus, the integrated use of CMs with multicriteria assessment techniques aims at building a

framework adding value to the definition of criteria and as a way of obtaining trade-offs between those criteria.

In the next section, the multicriteria evaluation now emerging is analysed.

3.3. Multicriteria Assessment

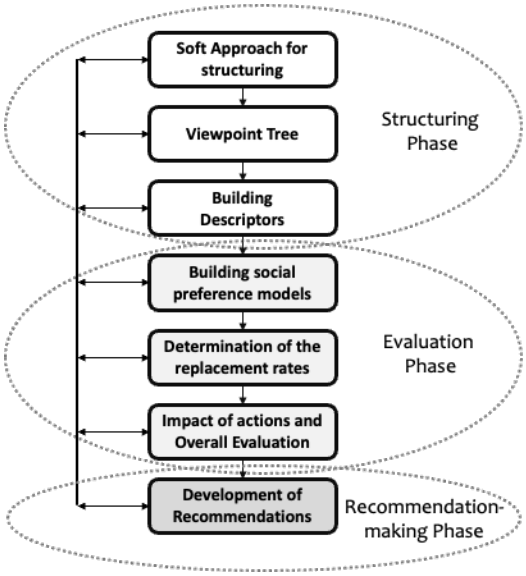
Several authors champion the existence of *three phases in the decision-support process* 1) *structuring*, 2) *evaluation* and 3) *recommendation-making* (Bana e Costa, 1993a; Bana e Costa et al., 1997; Ferreira et al., 2012; Moraes et al., 2010). The cyclical phases in the decision-making process are represented in *Figure 3.2*.

According to Ferreira (2011), the *structuring phase* is the most crucial decision process stage. Here it is determined which elements will be the content of the assessment or evaluation. Neglect at this stage may lead to incorrect decisions and the unfitness of any recommendation made at later stages of the study (Bana e Costa, 1993b). This stage serves as the foundation for the identification of decision opportunities, several authors (Bana e Costa et al., 1997; Moraes et al., 2010) emphasise that the structuring phase should proceed to 1) formulate the problem, 2) identify the DMs and the respective stakeholders and 3) determine the decision criteria and alternatives. In summary, due to the problems' complexity, the structuring phase should remain “open” throughout the study (Bana e Costa, 1993b), allowing for possible adjustments and improvements to the initial study.

The *evaluation phase* refers to the performance evaluation of the actions/alternatives in the various criteria defined. At this stage is defined the relative weight of each criterion. According to Ferreira (2011), within the scope of this phase, three activities must be developed to achieve the overall results of the decision-making process: 1) construction of a preference model that enables the partial evaluation of actions, 2) identification of substitution rates (scale constants, weights or trade-offs), and 3) determination of the impact of each action on each criterion (Ferreira, 2011, p. 110).

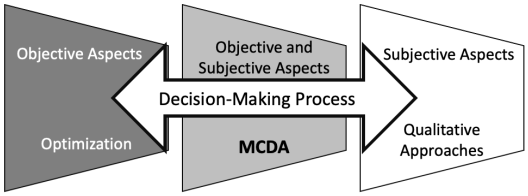
The last stage of the decision-making process corresponds to the *recommendation-making phase*. However, this phase can be done without scientifically defined procedures since it depends on the facilitator and the problem under analysis (Ferreira, 2011, p. 110).

Figure 3.3 illustrates the conceptual framework of the MCDA approach that integrates three critical phases in the decision-support process: 1) *Structuring*, 2) *Evaluation,* and 3) *Recommendations-making* (Bana e Costa, 1993a; Bana e Costa et al., 1997; Ferreira et al., 2012; Moraes et al., 2010). These three phases should not be seen as single entities but rather as interconnected, thus reducing the risk of gaps that could potentially harm the outcomes (Gonçalves et al., 2018; Morente-Molinera et al., 2020).



Source: Adapted from Ferreira (2011, p.103)

Figure 3.2: Cyclical Decision-Making Process



Source: Ferreira et al. (2011, p.117, adapted)

Figure 3.3: The MCDA Approach

3.3.1. Multicriteria Assessment and Non-Additive Measures Methods

The no-additivity in probability started with *Bernolli* in the 17th century and fell into forgetfulness for more than 200 years with the development of additive probability and measure theory (Denneberg, 1994).

Evaluation criteria are the base for decision-making in rational processes. However, some criteria are mostly interdependent and interact with each other. Therefore, it cannot be combined partial evaluations with regular additive measures (Bottero et al., 2018; Ferreira, 2011; Grabisch, 1996; Grabisch et al., 2008). Different methodologies exist to address it, which can be referred to as *Non-Additive Measures* (NAM) and represent a valuable tool to visualise various interactions that meet DMs preferences.

The growth of fuzzy measures, belief functions and others in the last decades revived the vision that set functions representing uncertainty need not be additive (Denneberg, 1994). Introduced in 1974 by Sugeno (Tan & Chen, 2010), the Non-Additive Aggregation Methods (NAM) are also named fuzzy measures (Wang, 2011).

NAM is applicable when deterministic and/or probabilistic models cannot provide a realistic description of the process under the decision (Ralescu & Adams, 1980). Wang (2011) claims that NAM emerged to support vague concepts and subjective judgement.

3.3.2. The Choquet Integral

Among NAMs best-known is the CI, which can be deemed a fitting substitute for a weighted arithmetic mean in aggregating interdependent criteria (Labreuche & Grabisch, 2003; Tan & Chen, 2010; Wang, 2011). CI is a fuzzy integral method demonstrating a model for the multicoalition of criteria focusing on various decision criteria (Grabisch, 1996). The CI developed in 1953 by *Gustave Choquet* is a "non-additive MCDA operator" (Campos & Bolaños, 1992; J. J. M. Ferreira et al., 2018; Sansa et al., 2019; Shieh et al., 2009).

CI, or the Choquet aggregation method (Grabisch, 1996; Sugeno & Kwon, 1995), is an aggregation function defined for a fuzzy measure (Shieh et al., 2009). A fuzzy measure is a set function acting on the domain of all possible combinations of a set of criteria. It has an exponential complexity of 2^n subsets, where *n* is the number of decision criteria (Estêvão et al., 2019; Krishnan et al., 2015; Vu et al., 2014). Thus, CI demanding a 2^n parameter represents all the potential combinations of the *n* criteria (Estêvão et al., 2019; Krishnan et al., 2015), obtaining the values of all 2^n coefficients of the fuzzy measure. For example, even in the case of four criteria for determining the fuzzy measure, it is necessary to obtain $2^4 = 16$ coefficients.

Ferreira et al. (2018, p. 492) defend using CI when the aggregation of partial scores by conventional additive measures is impossible due to criteria coalition. The coalition of criteria representing the interaction and synergy between decision criteria can be complex, especially regarding ambiguous situations between stakeholders or when searching for the alignment of common objectives and visions.

According to Gürbüz (2010) and Tan & Chen (2010), this method aids in modelling interactions between criteria (i.e., fuzzy measure). It determines the weight deriving from the combination of criteria, giving weight to each criterion and subset of criteria (Corrente et al., 2016; Moghtadernejad et al., 2019). Its main success depends on a suitable representation of fuzzy measures able to capture the individual criterion importance or their combination (Demirel et al., 2010).

CI considers the interactions or interdependencies in the aggregation process. These interdependency values are predetermined before the aggregation process can proceed (Kasim & Abdullah, 2014).

Some authors (Shieh et al., 2009; Tan & Chen, 2010) refer that from a technical point of view, a fuzzy measure in X refers to a function $\mu: P(X) \rightarrow [0,1]$ if and only it complies with Conditions (1) and (2):

$$\mu(\emptyset) = 0,\ \mu(X) = 1 \text{ (limit condition)} \quad (1)$$

$$\text{If } A, B \in P(X) \text{ and } A \subseteq B, \text{ then } \mu(A) \leq \mu(B) \text{ (monotonicity condition)} \quad (2)$$

For μ to be considered a non-additive measure, Premises (3) and (4) must be observed (Ralescu & Adams, 1980):

$$\{A_n\} \subseteq P,\ A_1 \subseteq A_2 \subseteq \ldots \subseteq A_n \in P \Rightarrow (\cup_n^{\infty} = {}_1A_n) = \lim_{n\to\infty} \mu(A_n) \quad (3)$$

$$\{A_n\} \subseteq P,\ A_1 \supseteq A_2 \supseteq \ldots \supseteq A_n \in P \Rightarrow (\cup_n^{\infty} = {}_1A_n) = \lim_{n\to\infty} \mu(A_n) \quad (4)$$

Concomitantly, Torra et al. (2016) mention that μ refers to a submodular non-additive measure if μ(A)+ μ(B) ≥ μ(A ∪ B) + μ(A ∩ B) and to a super modular non-additive measure if μ(A)+ μ(B) ≤ μ(A ∪ B) + μ(A ∩ B) – for any A, B ⊆ P, respectively. Therefore, the CI of ƒ in relation to μ in A is referred to as (C) $\int_A f d\mu$ and defined according to Formula (5) (Ouyang & Li, 2004):

$$(C) \int_A f d\mu = \int_0^{\infty} \mu\,(A \cap F_\alpha) d\alpha \quad (5)$$

where:

- ƒ represents a non-negative measurable function of real value defined in X
- $F_\alpha = \{x \mid f(x) \geq \alpha\}$, for any $\alpha > 0$

If (C) $\int_A f d\mu < \infty$, (C) is referred to as integrable (Wang, 2011). In consequence, if (X, P, μ) represent a fuzzy measure space with $\{f_1, f_2, \ldots f_n\} \subseteq F$ and A, B ∈ P, F is the set of all non-negative measurable functions of real value defined in X. The CI has the following Properties (6 to 11) (Wang, 2011):

$$\text{If } \mu(A) = 0, \text{ then } (C) \int_A f d\mu = 0 \quad (6)$$

$$(C) \int_A c d\mu = c.\mu(A) \quad (7)$$

$$\text{If } f_1 \leq f_2, \text{ then } (C) \int_A f_1 d\mu \leq (C) \int_A f_2 d\mu \quad (8)$$

$$\text{If } A \subset B, \text{ then } (C) \int_A f d\mu \leq (C) \int_B f d\mu \quad (9)$$

$$(C) \int_A (f+c) d\mu = (C) \int_A f d\mu + c.\mu(A) \quad (10)$$

$$(C) \int_A c.f d\mu = c.(C) \int_A f d\mu \quad (11)$$

where *c* represents a positive constant.

According to Wang (2011), CI integrates a set of monotone, non-additive, and non-linear integrals. Thus, the most important property of the CI involves the non-additivity of μ, as defined by Formula (12):

$$(C) \int_A (f+g) d\mu \neq (C) \int_A f d\mu + (C) \int_A g d\mu \quad (12)$$

where ƒ and *g* ∈ F. Finally, Murofushi & Sugeno (1991) defend that the underlying monotony of the CI is defined by Formula (13):

$$(C) \int_A f d\mu \leq (C) \int_A g d\mu, \text{ whenever } f \leq g \quad (13)$$

3.3.3. Advantages and Limitations of the Choquet Integral

CI is one of the commonly used methodologies for managing interactions between criteria due to its tractability, understanding of preferences, and even being comprehensive for non-expert DMs (Corrente et al., 2016). The option to use CI if decision criteria are interconnected has as advantages 1) the use for single or multiple decision-making situations, 2) not mathematically demanding, 3) being able to handle uncertainties, and 4) accepting interactions between criteria (Moghtadernejad et al., 2019).

The application of CI allows for obtaining several benefits, namely: 1) it can consider both positive and negative interactions among the criteria (Angliella et al., 2004), 2) DMs can give minimum information and voluntarily express the level of subjective importance (Angliella et al., 2004), 3) quick implementation and stable employing a large size of options (Angliella et al., 2004), 4) diminishing the need for further calculations for raw data (Greco et al., 2011), 5) considering exact values and interval values (Greco et al., 2011), and 6) more complicated additive models can be used to consider the interdependence among criteria (Greco et al., 2011).

Krishnan et al. (2015) recognised as CI limitations: 1) the DMs inability to previously identify the values corresponding to the fuzzy measures, corresponding to the importance of each of the subsets of attributes defined, and 2) the greater the number of evaluations attributes defined (coefficients of the fuzzy measure), the greater the complexity and difficulty in determining their respective importance.

Krishnan et al. (2015) defend that the DMs motivation to use CI depends on the ease of the procedure to identify fuzzy measures: the easier, the more motivated they will be. When balancing advantages and limitations, Demirel et al. (2010) argue that CI is an excellent tool for solving problems when contemplating qualitative and quantitative criteria with interactions between them.

SYNOPSIS OF CHAPTER 3

In recent years, the complexity of decision-making has led to a new *"Soft"* Paradigm. MCDA, based on fundamental *Value-Focused Thinking*, has become increasingly popular for addressing this complexity. This chapter introduces the methodological foundations for using multicriteria analysis in performance evaluation. It highlights the importance of Multicriteria Decision Support (MCDS) in complex environments and its applications in various fields. MCDS consists of Multiple Criteria decision-making (MCDM) and Multiple Criteria Decision Analysis (MCDA), which aim to facilitate decision-making by considering multiple and conflicting criteria. MCDA methods provide a transparent and consistent framework for evaluating alternatives based on stakeholder preferences. The Decision Support Methodology (DSM) is a critical component of MCDA and includes various families of techniques for constructing and operationalising multiple criteria. MCDA incorporates both "hard" and "soft" paradigms, recognising the role of subjectivity, participation, and constructivism in decision-making. In the context of Performance Management Systems (PMS), MCDA offers valuable contributions by addressing the limitations of traditional models and enabling a more comprehensive evaluation of performance. Using MCDA in performance evaluation enhances decision-making in complex environments, such as Common Security and Defence Policy (CSDP) Missions. The literature describes five Problem Structuring Methods (PSM) approaches. The SODA approach gains traction in this study since it uses techniques to express ideas and support groups in a workshop environment to construct a shared graphical representation of a problem situation. This methodology is characterised by its ability to handle qualitative variables and complex structured situations, support group work, and aid in developing and implementing strategic directions. The methodology utilises Cognitive Maps (CMs) as a tool for structuring complex problems and facilitating the decision-making process. CMs are graphic representations that capture the mental changes and relationships between concepts within an individual´s subjective world. They allow for the visualisation of ideas, clarifying beliefs and rationales, and identifying causal relationships. CMS have advantages in promoting knowledge synergies, reducing omitted criteria, and facilitating learning through discussion and information sharing. Finally, the chapter delves into the Value Measurement family, scilicet Non-Additive Measures and concretely Choquet Integral (CI) since it is a commonly used methodology for managing interactions between criteria coalition (since preferential mutual dependence exists). The multicriteria assessment involves three phases: structuring, evaluation, and recommendation-making. These phases are interconnected and essential for decision support. Research supports that MCDA can bring new contributions and added value to decision-making and PMS in CSDP Missions, including facilitating multi-stakeholder processes, building on expert knowledge and expertise, and evaluating trade-offs.

CHAPTER 4

IMPLEMENTATION AND RESULTS ANALYSIS

This dissertation aims to design a model to support PMS evaluation in civilian CSDP Missions. The practical application of the structuring and evaluation methodologies previously reviewed becomes necessary.

4.1. Collective Cognitive Map

The first step in the decision-making process is the structuring phase, which involves properly defining the problem at hand (Bana e Costa et al., 1997; Ferreira, 2011; Moraes et al., 2010). This is a critical step as it lays the foundation for the decision-making process and helps ensure a clear understanding of the problem (Ferreira, 2011). The PSM of choice was JOURNEY Making or SODA to structure the problem. This method was chosen for two reasons: 1) it allows a group of individuals to collaborate and create a shared representation of the problematic situation, known as a causal or Group Map, through the merging of individual Cognitive Maps (CMs) (Marttunen et al., 2017), and 2) it evaluates important causal relationships in a strategic manner (Eden & Ackermann, 2001).

A crucial aspect of the planning process was assembling a panel of experts with relevant knowledge and experience in CSDP Missions. The panel comprised seven DMs from different departments within the mission, selected to represent diverse management perspectives, internal and external relationships, and departmental issues (i.e., Operations vs Support). According to the literature, the ideal size of a SODA workshop panel is between 6 to 10 experts (Eden & Ackermann, 2004, p. 618). In addition to the DMs panel, a facilitator was also present, whose role was to conduct the whole process and record the results achieved.

The DMs panel was convened for two in-person sessions to analyse the decision problem of the study thoroughly. However, forming the panel presented several challenges. Firstly, scheduling difficulties arose from the need to coordinate the panel members‘ schedules for two sessions separated in time. Secondly, arranging for all panel members to be available simultaneously for three hours per session was challenging.

The first in-person session used CM to structure the problem. The researcher was a facilitator to lead the session and recorded the results. This approach helped to improve communication and to reach compromise solutions between stakeholders. The session began with introducing the panel members and the research objective, followed by an explanation of the methodologies to be applied,

lasting four and a half hours. The DMs involvement, commitment, and delivery enabled achieving the intended objectives.

During the first hour of the session, the panel identified the criteria. To this end, and to support the definition of the problem, the DMs were asked the following trigger question: "*Based on your principles, values and professional experience: What criteria influence the performance in a civilian CSDP Mission?*". This question stimulated interaction and discussion among all panel members, motivating answers by applying the "post-its technique", which supports the design of the CM. The techniques used to express ideas and assist with map-making were brainstorming and listing DMs objectives and values (Value Focused Thinking). The "post-its technique" (Eden & Ackermann, 2001) was applied using an online collaborative whiteboard platform (miro.com), thus enabling experts to work effectively together by brainstorming with digital sticky notes (refer to *Appendix C* and *Figure 4.1*). Essentially, the "post-its technique" requires that each member of the DMs panel write which criteria they consider relevant to the decision process on sticky papers (post-its), considering their perspectives (with basis on their principles, values, and professional experiences). To better optimise this first part of the session, the methodology for implementing this technique was presented and clarified at the outset: 1) each post-it should correspond to only one criterion (i.e., 3 to 4 words maximum per criteria), 2) should the criterion have a negative causal relationship connection, this situation shall be evidenced by placing a minus sign (-) in the upper field of the post-it (Ferreira, 2011), 3) the process must be repeated until a significant number of criteria is obtained (i.e., 150 criteria) or until the entire DMs panel is satisfied with the outcome (i.e., more than 150 criteria can be added), 4) in case of criterion repetition or redundancy these can be later removed or reformulated (Ferreira, 2011), and 5) the panel had a maximum of one hour to complete this task.

Figure 4.1: Structuring Phase

In the subsequent meeting time, as Bana e Costa et al. (2002, p. 229) argue, the "post-its" technique helps to identify "clusters of linked aspects". Those criteria identified in the "post-its technique" were subject to triage (sorting) and clustered. At the beginning of the second moment of

the first session, the facilitator requested DMs to sort and group criteria defined in the first moment (i.e., post-its) by clusters (also called "areas of interest") so that groups of criteria that relate to each other were created, originating a division of the map into subjects. In practice, the panel selected a post-it, assigned it an "area of interest" or cluster (i.e., the post-it "facilities" was placed in Cluster 1, which was named "Working & Living Environment"), and then read all the remaining post-its selecting those that should belong to the same cluster. Only after finishing the composition of the first cluster did the DMs panel proceed with sorting the second cluster. The process was done cluster by cluster to reduce any possible bias. This exercise identified in total 128 criteria and defined six clusters based on an intense and focused group discussion: 1) Working & Living Environment, 2) External Relations, 3) Human Resources, 4) Leadership and Management, 5) Mandate & Policies, and 6) Internal Communications & Workflows. In the end, the facilitator asked the DMs to perform an internal analysis of each cluster: assess the causal relationships between the various criteria and rank the criteria within each cluster. In practice, this analysis´s main objective consisted of ranking the evaluation criteria by order of importance in the overall composition of the cluster, placing the most relevant criteria at the top rows of the cluster box. *Figure 4.1* illustrates moments recorded during the first session where the "post-its technique" was applied according to the SODA approach.

The first in-person session concluded once all criteria were sorted and clustered and with the completion of the internal analysis of each cluster. Finally, with all the information collected in the first session and using the Decision Explorer software (banxia.com), a group CM was developed and later provided to the DMs panel to debate, review, and validate (this took place at the beginning of the second in-person session). At the outset of the second in-person meeting (spaced one week), it was given to the DMs panel if they wanted to restructure the form or content of the CM, the possibility of reformulating the groupings, introducing or excluding criteria, or even restarting the whole process. After analysis and discussion, the DMs panel validated the CM. *Figure 4.2* displays the final version of the CM.

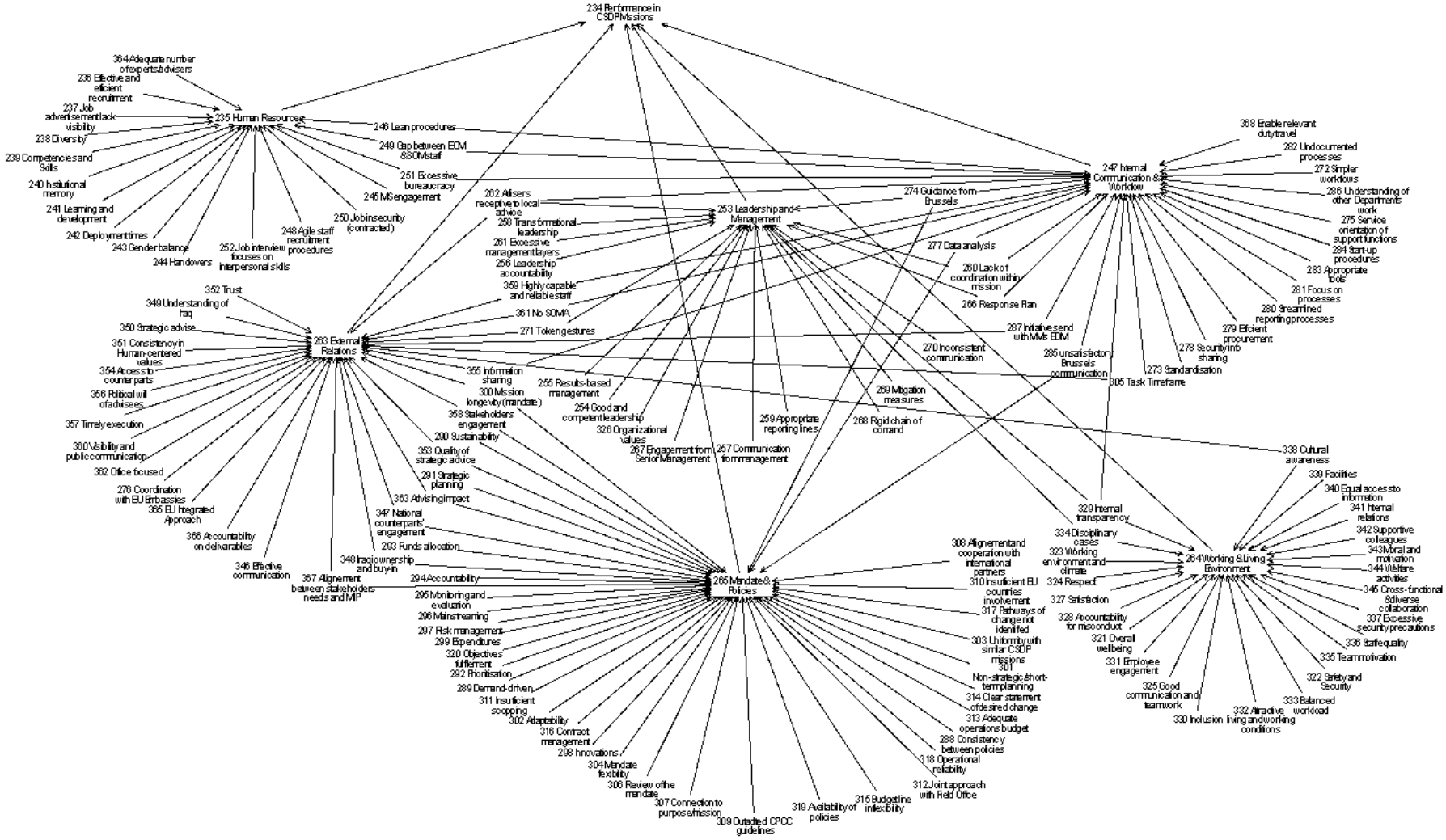


Figure 4.2: Group Cognitive Map

Per some authors (Faria et al., 2018, p. 119), CMs are effective structuring tools for complex decision problems by promoting dialogue, discussion and visualisation of ideas in real-time, thus facilitating reorganisation and cooperation between the DMs panel. During the structuring phase, the DMs knowledge was highlighted through an interactive process, making it a valuable and productive phase (i.e., promoting participation and subjectivity where there is no "right" or "wrong"). The panel recognised the usefulness and potential of the techniques, expressed satisfaction and motivation, and emphasised the SODA approach´s ease, transparency, and clarity. Overall, the CM developed provides consolidated information on the criteria that affect performance in a CSDP Mission. By highlighting several criteria not considered in the current model, it can overcome the limitations of current performance evaluation models in CSDP Missions.

4.2. Criteria Tree

The structuring process was followed by identifying the main areas of interest contemplated in the group cognitive map, thus identifying criteria candidates for FVPs (or critical success factors), to verify their compliance with the properties presented in *Table 3.6* of this dissertation (Properties of a Fundamental Viewpoint). In this sense, some criteria were considered essential to performance in CSDP Missions, thus allowing the determination of the main FVPs. Through the analysis of *Figure 4.2* (Group Cognitive Map), which materialises how the group structured the problem, it is possible to identify which factors are essential for defining the indexes to be developed at the moment of evaluation performance in CSDP Missions. *Figure 4.3* presents the arborescent structure of the analysis performed.

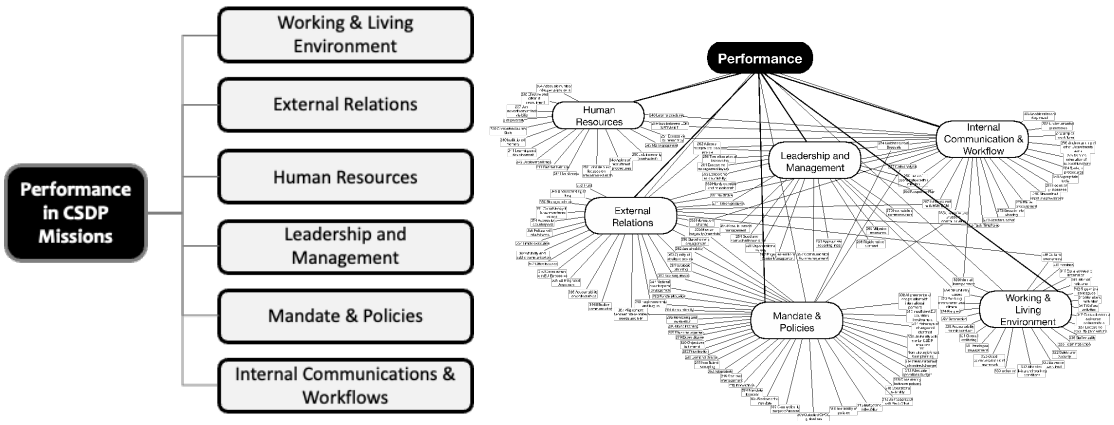


Figure 4.3: Criteria Tree

In practice, the multicriteria model is made up of six FVPs, whose meaning, according to the panel of experts, is as follows: FVP 1 – Working & Living Environment: encompasses criteria related to the living conditions and collegial atmosphere within the mission area of operations; FVP 2 – External Relations: encompasses relationships with partners and counterparts, the panel considered for this purpose that relations with the headquarters (HQ) in Brussels to be internal rather than external relations; FVP 3 – Human Resources: incorporates all criteria that may affect human resources as a fundamental resource by itself (not to be confused with the Missions Human Resources Departments); FVP 4 – Leadership and Management: understands criteria for assessing leadership and management; FVP 5 – Mandate & Policies: encompasses criteria related with Mission implementation plan, mission strategy and policy making; FVP 6 – Internal Communications & Workflows: incorporates as the name indicates all criteria related to communication and internal workflows (note that the relationship with the HQ in Brussels is assessed here).

Once the criteria tree was discussed and validated, the next phase of the process consisted of applying the Choquet Integral (CI).

4.3. Application of Choquet Integral

With the conclusion of the problem structuring phase, the assessment phase began in a second in-person group session. This session, with the same panel members, lasted three hours and took place one week after the first session. Since preferential mutual dependence exists between the clusters, as clearly illustrated in *Figures 4.2, 4.3 and from C.2 to C.8*, the DSM of choice was the CI (refer to *Appendix B*).

The facilitator started by briefly explaining the method that would be used (CI) and its relevance for Performance analysis in CSDP Missions. Then, the facilitator presented a matrix of all possible combinations around the six FVPs, obtained in the first group session to the DMs panel (refer to Appendix C). Gustave Choquet introduced the CI in 1953, which states that the number of possible combinations requires 2^n parameters. This study has 64 possible combinations, which refers to 2^6=64.

The DMs focus on the various combinations presented in the matrix and, as a group, proceed with their assessment, paying particular attention to the fact that the different attribute combinations would be assessed on a nominal scale from zero (0) to 10 points. *Table 4.1* demonstrates the 10-Point scale, a commonly used method for evaluating the CI, a mathematical concept used in MCDA (and MCDM). Each attribute or criterion is assigned a score on a scale from 0 to 10, with 10 being a totally desirable situation, zero (0) corresponding to a totally undesirable situation, and five (5) portraying a common (neutral) situation. The scores are used to weight the criteria, and the CI is then used to

aggregate the scores and provide a composite ranking of decision. This scale is often used because it is simple and intuitive, allowing for a relative comparison of the importance of different criteria.

SCALE	DESCRIPTION
0	Totally Undesirable Situation
1	⇓
2	⇓
3	⇓
4	⇓
5	Common Situation
6	⇓
7	⇓
8	⇓
9	⇓
10	Totally Desirable Situation

Table 4.1: CI 10-Point Scale

Furthermore, the panel was told that the scores attributed to different combinations could change and had no precedence relationships exist (i.e., if a previous combination scored three points, there was nothing to prevent the following combination from scoring a higher or lower value). The DMs used the group CM to score the combinations, which helped understand the FVPs and their correlations. *Figure 4.4* illustrates moments during the second in-person group session.

Figure 4.4: Evaluation Phase (Mission M1)

The scores the DMs gave to the 64 possible combinations can be found in *Appendix D*. As an example, row 12 *(in Table D.3)*, where the combination is Good, Good, Bad, Bad, Bad, Bad, received three (3) points. The DMs were asked to rate a hypothetical scenario of a CSDP Mission, where only

the Working & Living Environment and External Relations criteria are good (positive), at the detriment of the other criteria being bad (negative).

After evaluating the 64 possible combinations and exploring the interactions between criteria, the DMs scored each of the FVPs for Mission M1 using a brief questionnaire on a nominal 10-point scale (refer to *Table 4.1*). Later, three experts from various CSDP Missions (Mission M2, M3, and M4) were invited to separate virtual meetings through Teams (*Figure 4.5*). They assessed their respective missions using the same evaluation method.

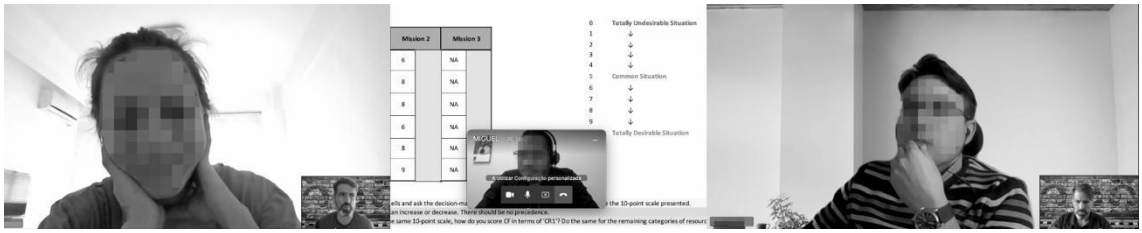


Figure 4.5: Evaluation Phase (Missions M2, M3 and M4)

4.4. Ranking of Alternatives

Using the CI in this thesis produced a ranking of alternatives for CSDP Missions. *Figure 4.6* shows the final ranking, which was then analysed, discussed, and validated by an external expert. As shown in *Figure 4.6*, the alternative with the highest ranking, based on the DMs perceptions and the calculations performed, is Mission M2, with 73 points. Mission M3 follows with 66 points, then Mission M4 with 53 points. Mission M1 received the lowest ranking with 52 points. Nevertheless, it is still considered to have an attractive situation. It is worth mentioning that no mission received an undesirable ranking.

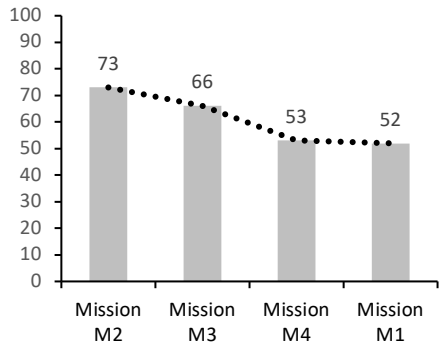


Figure 4.6: Alternatives Ranking

As can be inferred from *Figure 4.7* and *Figure 4.8*, variations in the internal structure and contextual factors have likely contributed to the varying scores received by the criteria.

The mode, representing the most frequently occurring value in a data set, has been determined for criteria CR1, CR2, CR3 and CR4. The mode for each criterion is 6, 5, 5, and 6, respectively. Implicitly, the value 6 is the most commonly occurring value in the data set for Criteria CR1 and CR3. In contrast, the value five (5) is the most commonly occurring value in the data set for Criteria CR2, and the value six (6) is the most commonly occurring value in the data set for Criteria CR4.

An analysis of the data reveals that the median values of criteria CR1 (Working & Living Environment) and Criteria CR3 (Human Resources) are considered more desirable among the four evaluated missions. Thus, suggesting that these criteria´s median values align with attractive conditions. On the other hand, the median value of Criteria CR6 (Internal Communications & Workflows) is deemed unfavourable, implying that this criterion among the four missions has a less desirable median value than the other criteria.

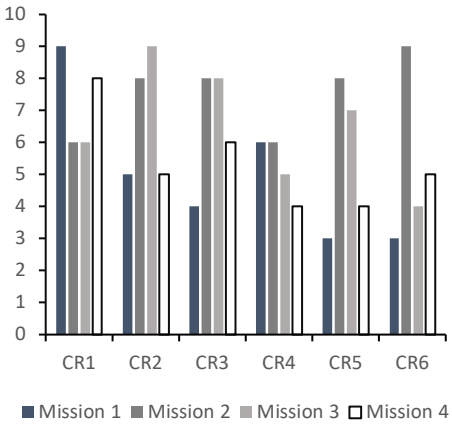


Figure 4.7: Criteria Score by Mission

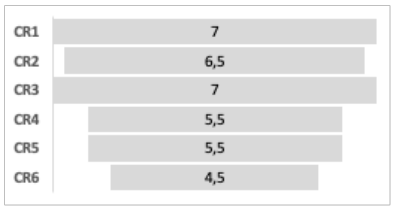


Figure 4.8: Overall Criteria Score Media

The calculation results for each of the four studied alternatives are provided below. The scores were calculated based on the criteria specified in Appendix D using the established weighting. *Figures 4.8 to 4.13* present the CI for each evaluated alternative in a graphical format. The CI and the 10-Point scale were used to aggregate the scores and reach conclusions.

Regarding *Mission M1*, half of the criteria received a score of five (5) or higher, precisely criteria CR1 (Working & Living Environment), CR4 (Leadership and Management) and CR2 (External relations). However, the DMs panel deemed that this Mission performed below average for criteria CR3 (Human Resources), CR5 (Mandate & Policies) and CR6 (Internal Communications & Workflows), leading to scores of four (4) and three (3). The resulting score for Mission 1 is 52, as illustrated in *Figures 4.6 and 4.9*. While the overall situation for Mission M1 is attractive, steps should be considered to address and improve the criteria deemed less favourable (criteria CR5 and CR6).

1) RANKING of Partial Performances MISSION M1		2) CUMULATIVE Calculations	3) CI Calculation Variation	CI
CR1	9	2	3	6
CR4	6	3	1	3
CR2	5	6	1	6
CR3	4	7	1	7
CR5	3	8	0	0
CR6	3	10	3	30
				52

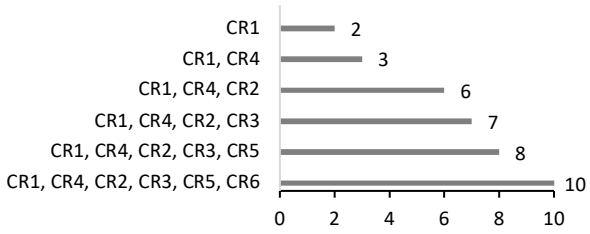


Figure 4.9: *Mission M1* Partial Performance and Graphical Representation of the CI Calculation

In *Mission M2*, all the criteria were evaluated as attractive, with CR6, CR2, CR3 and CR5 having high scores between 8 and 9. Based on this evaluation, Mission M2 is considered the most attractive of the alternatives under study. The resulting score for Mission M2 is 73, as illustrated in *Figures 4.6 and 4.10*.

1) RANKING of Partial Performances MISSION M2		2) CUMULATIVE Calculations	3) CI Calculation Variation	CI
CR6	9	1	1	1
CR2	8	3	0	0
CR3	8	5	0	0
CR5	8	6	2	12
CR4	6	8	0	0
CR1	6	10	6	60
				73

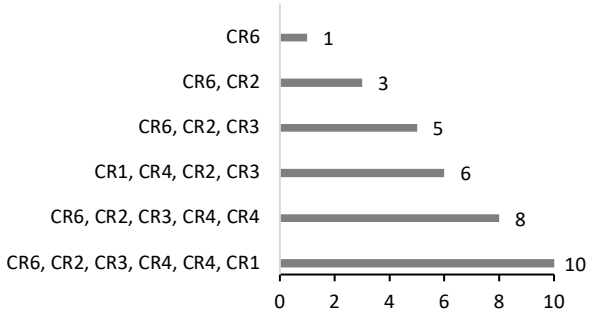


Figure 4.10: *Mission M2* Partial Performance and Graphical Representation of the CI Calculation

Concerning *Mission M3*, only one criterion is in an undesirable situation, criterion CR6 (assessed with four points). One criterion is in a neutral or common situation, criterion CR4. The remaining three criteria were considered attractive, with relevance in criteria CR2 and CR3, with 9 and 8 points, respectively. The resulting score for Mission M3 is 66, as illustrated in *Figures 4.6 and 4.11*.

1) RANKING of Partial Performances MISSION M3		2) CUMULATIVE Calculations	3) CI Calculation Variation	CI
CR2	9	2	1	2
CR3	8	3	1	3
CR5	7	6	1	6
CR1	6	7	1	7
CR4	5	8	1	8
CR6	4	10	4	40
				66

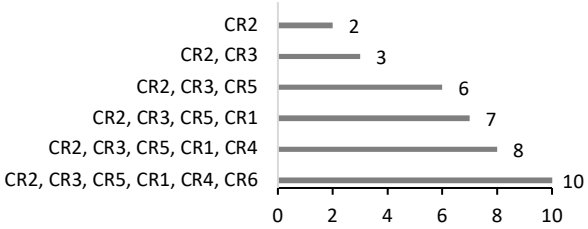


Figure 4.11: *Mission M3* Partial Performance and Graphical Representation of the CI Calculation

In analysing *Mission M4*, it was observed that two criteria were in an undesirable state and were assessed with 4 points each. These were criteria CR4 and CR6. On the other hand, criteria CR3 and CR5 were in a neutral or common situation. Finally, the remaining two criteria were considered attractive, with criterion CR2 standing out as particularly desirable due to its high score of 8 points. The resulting score for Mission M4 is 53, as illustrated in *Figures 4.6 and 4.12*.

1) RANKING of Partial Performances MISSION M4		2) CUMULATIVE Calculations	3) CI Calculation Variation	CI
CR2	8	2	2	4
CR3	6	3	1	3
CR5	5	5	0	0
CR1	5	6	1	6
CR4	4	7	0	0
CR6	4	10	4	40
				53

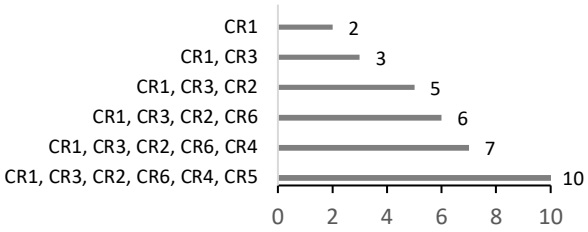


Figure 4.12: *Mission M4* Partial Performance and Graphical Representation of the CI Calculation

After the alternatives were ranked, the assessment phase was completed. The next step involved holding a validation session and making recommendations.

4.5. Validations and Recommendations

After the evaluation phase and analysis of the results by the panel of DMs, a final validation session was held to examine the significance and practicality of the evaluation system. A validation expert from a different Mission (Mission M5) was recruited for this session, which took place via videoconference and lasted about one hour. The expert Dr Paolo Foradori is an associate professor at the University of Trento (Italy) and a seconded political adviser for a CSDP Mission.

The session was organised with the following goals: 1) Provide a brief overview of the used methodologies and their advantages for evaluating CSDP Missions, 2) Obtain feedback on the use of CMs and CI in enhancing the understating of the problem and the importance of analysing different criteria combinations in determining an attractive high-performing Mission, 3) Discuss the results achieved, 4) Evaluate the practicality of the model and potential improvements. It started with a summary of the methodology followed by a review of the group CM and the matrix of criteria interactions. *Figure 4.13* captures a moment of the session with the validation expert.

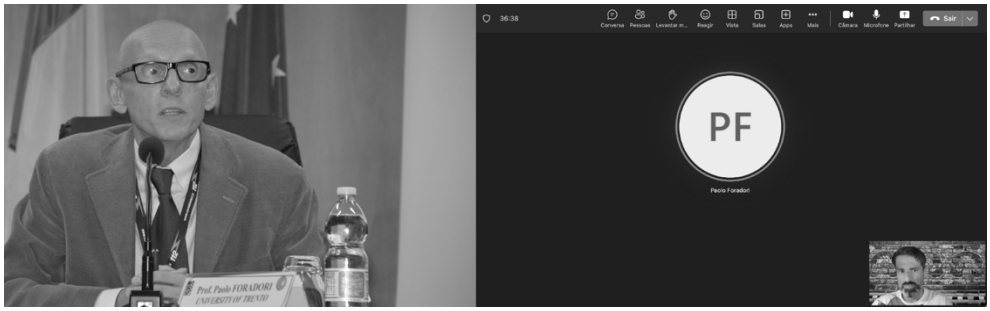


Figure 4.13: ***Evaluation Phase (Overall Evaluation with an Expert from Mission M5)***

Overall, the expert considered it an “ambitious and thorough project that gives a comprehensive and precise view of a CSDP Mission” since the expert deems that “evaluating performance in CSDP Missions deployed in difficult scenarios is inherently a complex subject”. Since any “policy needs to be done according to the state-of-play, having a deeper knowledge and understanding of realities” can be advantageous.

Regarding the CM and the identified criteria, the expert believes the content to be “really comprehensive” since “hardly any criteria is missing” and was positively impressed by how CM allows for “a very effective and visual assessment of all”, being a “pleasant presentation and visualisation of dynamics and complexity”.

Concerning the obtained results with CI, the expert judges it to portray values in line with reality, thus agreeing with the obtained values and considering this framework a “major asset”.

Lastly, envisaging the practicality of this study in a real case, the expert cogitated that: 1) although it “looks complex, it seems easily applicable and doable for CSDP Missions”, 2) it “simplifies a complex reality without losing the complexity” by providing a “real picture of the missions”, 3) it identifies strengths and problems thus allowing to act upon them in a positive and constructivist approach (i.e., lessons-learned, corrective measures), 4) CPCC should endorse it, and further work could be developed applying it to all CSDP Missions, therefore standardising the evaluation criteria across all missions, 5) it would be interesting to use the model to evaluate the missions implementing plans (in this case the DMs panel must include partners and counterparts, which was not the circumstance in this study since all DMs were internal to the mission).

SYNOPSIS OF CHAPTER 4

This dissertation focuses on designing a model to support the evaluation of Performance Management Systems (PMS) in civilian Common Security and Defence Policy (CSDP) Missions. The research aims to address the limitations of existing performance evaluation models by incorporating a structured and comprehensive approach. The study employs the Strategic Options Development and Analysis (SODA) method, using a collective Cognitive Map (CM) to structure the problem and evaluate causal relationships. A panel of decision-makers (DMs) experts in the CSDP civilian Missions and one facilitator (the researcher) were assembled in Mission M1 to collaborate and create a shared representation of the problem. The first in-person session involved Cognitive Mapping and the "post-its technique" to identify and cluster essential criteria from the DMs perspective. The expert´s input created a group CM with clear definitions and causal relationships between the clusters. Since preferential mutual dependence exists between clusters, the evaluation phase began in a second in-person session by applying the Choquet Integral (CI). The panel was presented with a matrix of the CI containing 64 possible combinations between the six criteria defined in the first group session. After evaluating all possible combinations and determining the synergies between criteria (using a 10-point scale), the panel was asked to evaluate Mission M1. In three subsequent sessions, three other CSDP Missions experts (from Missions M2, M3 and M4) were invited to evaluate their respective Missions. These final exercises enabled defining a ranking of alternatives through the CI and the respective graphic representation, thus obtaining partial performances and estimating the global performances for each alternative under study. Mission M2 had the highest score, and the one with the lowest was Mission M1 (73 and 52 points, respectively), although still considered to have an attractive situation. A final validation session, with a neutral and unbiased expert from a different CSDP Mission (Mission M5), was held to assess the practical applicability of the model and validate the results achieved. The study highlights the significance of criteria such as Working & Living Environment, External Relations, Human Resources, Leadership and Management, Mandate & Policies, and Internal Communications & Workflows in evaluating performance in CSDP Missions. The research findings provide valuable insights for improving performance evaluation models in these Missions. The structured approach, combining the CM and CI, provides valuable insights into evaluating criteria, correlations, and ranking of alternatives. The developed model offers a structured and comprehensive approach to PMS evaluation. The research demonstrates the effectiveness of these methodologies in promoting collaboration, dialogue, and visualisation of ideas among DMs. The findings enhance performance evaluation processes and identify critical factors influencing performance in civilian CSDP Missions. In conclusion, this dissertation successfully designs a model that supports PMS evaluation for CSDP.

CHAPTER 5

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

This dissertation's final chapter presents the main conclusions of the study. The chapter starts by showing the top results and limitations of the study, followed by a summary of the practical implications of the system developed for the management area. Finally, the chapter ends with some recommendations for future research.

5.1. Results and Limitations of Application

This study successfully achieved its primary objective by developing an innovative CSDP Mission evaluation model using the MCDA approach. Combining cognitive mapping and CI techniques, it was possible to identify CSF for EU civilian CSDP Missions. This method has not been previously evidenced in the literature for the purpose presented.

The dissertation was structured into the theoretical framework and the empirical component. It is grounded in a constructivist epistemology based on the conviction of learning through participation. It was an enriching academic and professional journey that also encountered some limitations.

The theoretical framework focused on CSDP Missions and the need for strategic measures to evaluate performance due to their increasing prevalence. The literature review revealed that research in EEAS and CSDP is limited in some domains, especially Business Administration. This limitation was also a research opportunity, creating and laying the foundations for refining and improving the decision-making process in CSDP.

Using an MCDA approach, the empirical component involved three phases: 1) Structuring through a "soft" approach using Cognitive Mapping techniques, 2) Evaluating the decision problem employing a NAM, specifically the CI, and 3) Recommendations for the developed evaluation model. Multiple sessions were conducted with an expert panel of DMs, where the methodology was presented, and practical applications were discussed, thus finally allowing for evaluating partial and overall performances in four different CSDP Missions and ranking the alternatives under study. A final validation session with a neutral and unbiased expert not previously involved in the study was essential in maintaining the credibility and trustworthiness of the study´s results and conclusions. The complexity of evaluating CSDP Missions was highlighted during the empirical framework as a limitation. However, the integrated use of Cognitive Mapping and CI techniques was appropriate for providing transparent and contextually applicable responses to the evaluation process. Another

limitation of this component, which was successfully overcome, was the constitution of a panel of DMs: selecting experts with qualifications and expertise in the relevant field was essential to ensure relevant and meaningful feedback. The limitations encountered related to the DMs panel: 1) difficulties in the panel creation since DMs needed to participate in working sessions spaced out over time, 2) difficulties interpreting the trigger question, 3) initial hesitations concerning "right" or "wrong" answers, and 4) biased value judgements of DMs at times can potentially impact the panel consensus.

This study, through MCDA, highlights and offers valuable contributions by addressing the limitations present in the traditional PSM for CSDP, enables a more comprehensive evaluation of performance and enhances decision-making in complex environments, such as CSDP Missions. The CM created during the structuring phase (*Figure 4.2*; see also the Tree of PsV in *Figure 4.3*) is the pillar of this study. It is a graphic representation that captures the mental changes and relationships between concepts within the DMs individual´s subjective worlds. It allows the visualisation of ideas, clarifying beliefs and rationales, promoting knowledge synergies, reducing omitted criteria, facilitating learning through discussion and information sharing, and identifying causal relationships. In CMs, clusters typically represent viewpoints, groups or categories of related ideas, concepts, or perspectives to make sense of complex information and visually represent their relationships. In this study, the CM clusters (*Figures 4.2 and 4.3*) represent the criteria that influence performance in CSDP Missions, which can be seen as the CSF.

Using CI during the evaluation phase brought a sophisticated and nuanced approach to decision-making in CSDP Missions by considering the interactions and dependencies between criteria. It enabled an accurate and comprehensive analysis, facilitating the integration of diverse perspectives and providing insights into the sensitivity of the decision outcomes. It enabled the definition of a ranking of alternatives and the respective graphic representation, thus obtaining partial performances and estimating the global performances for each alternative under study. Mission M2 obtained the highest score, and the one with the lowest was Mission M1 (73 and 52 points, respectively), although still considered to have an attractive situation. Concerning the limitations experienced with the CI application, some DMs challenged the use of the terms "Good and Bad", suggesting instead "Positive and Negative", reasoning that would favour a more objective evaluation. Despite this limitation, the model developed enables greater transparency in the CSDP Missions evaluation process and highlights areas of improvement.

In summary, this dissertation aims not to achieve an optimal solution but rather to facilitate the creation and development of new methodologies that can enhance the PMS for CSDP Missions. The DMs and the validation expert have underlined that the methodologies applied in this dissertation increased transparency and simplicity in the CSDP Missions evaluation process. The combined use of CM and CI was simple and has made it possible to standardise and harmonise the evaluation between

different CSDP Missions realities (i.e., deployed in different countries, different staff, different budgets and strategies). The following section will summarise the main contributions of this research.

5.2. Main Contributions

This research supports that MCDA can bring new contributions and added value to decision-making and PMS in CSDP Missions, including facilitating multi-stakeholder processes, building on expert knowledge and expertise, and evaluating trade-offs. PMS effectiveness can vary based on organisational context, design, and implementation. Thus, organisations must tailor their PMS approach to align with their goals, culture, and workforce dynamics. This dissertation model, if implemented, can potentially offer competitive advantages for EEAS and CSDP: 1) Goal alignment, 2) Improved performance, 3) Human resources management (i.e., expertise identification and employee development), 4) Increased motivation and engagement, 5) Clear performance expectations, 6) Data-driven decision-making.

This dissertation utilised an integrated approach combining a CM and the CI to address the interdependence of evaluation criteria and obtain practical results by aggregating critical information. This approach yielded positive results, with DMs expressing enthusiasm for its applicability and the ability to perform a detailed analysis of different CSDP Missions profiles. It is as if the CM offered a view of the Missions reality in “three dimensions”. This new model allows comparisons between CSDP Missions and, for example, understanding what makes a Mission score more in a specific cluster (CSF). Thus, this study's proposed model can strengthen the communication and liaison between the Missions, CPCC and CSDP since it is 1) a transparent approach, 2) a lean and agile approach, 3) easily acceptable and understood by DMs, 4) “universally” applicable to CSDP Missions. The created performance evaluation model has identified the CSF of the Mission under study where improvement is needed. By enabling the evaluation and comparison of CSF across different CSDP Missions, it can generate a “lessons learned” system helping to identify and implement corrective measures (when and if needed).

In conclusion, this dissertation successfully designs a model that supports PMS evaluation in civilian CSDP Missions. However, it is essential to note that the main contribution of this study lies in its constructivist nature, emphasising the importance of learning through participation. To conclude the thesis, some suggestions for future research will be presented.

5.3. Opportunities for Future Research

Despite obtaining insightful results that contribute significant value to the research field, it would be interesting to investigate alternative approaches. The study demonstrates the potential of using multicriteria methodologies (MCDA) with CMs and CI support to create transparent and realistic evaluation models for CSDP Missions. However, there is no perfect method, so future research could explore using other multicriteria evaluation techniques, conducting comparative studies, or developing software for faster result extraction. This study's focus on demonstrating the efficacy of these techniques in creating a CSDP Mission evaluation model suggests a potential for their application in other contexts. The main avenues suggested for future research: 1) with a basis on the model developed in this study, to identify, establish and implement a continuously monitoring evaluation system for CSDP Missions (i.e., performance dashboard), and 2) a similar MCDA approach (utilising CM and CI) can be applied to evaluate CSDP Missions Implementations Plans (MIP) achievement; However, the expert panel for such challenging research should be comprised of all stakeholders involved in the MIP: partners and counterparts (i.e., CSDP Mission, Host County authority, EEAS, CPCC, EUDEL in articulation with EU Embassies present in the host country).

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APPENDICES

APPENDIX A:

EUROPEAN EXTERNAL ACTION SERVICE (EEAS), ORGANISATION CHART

Figure A.1: Quick Response (QR) Code

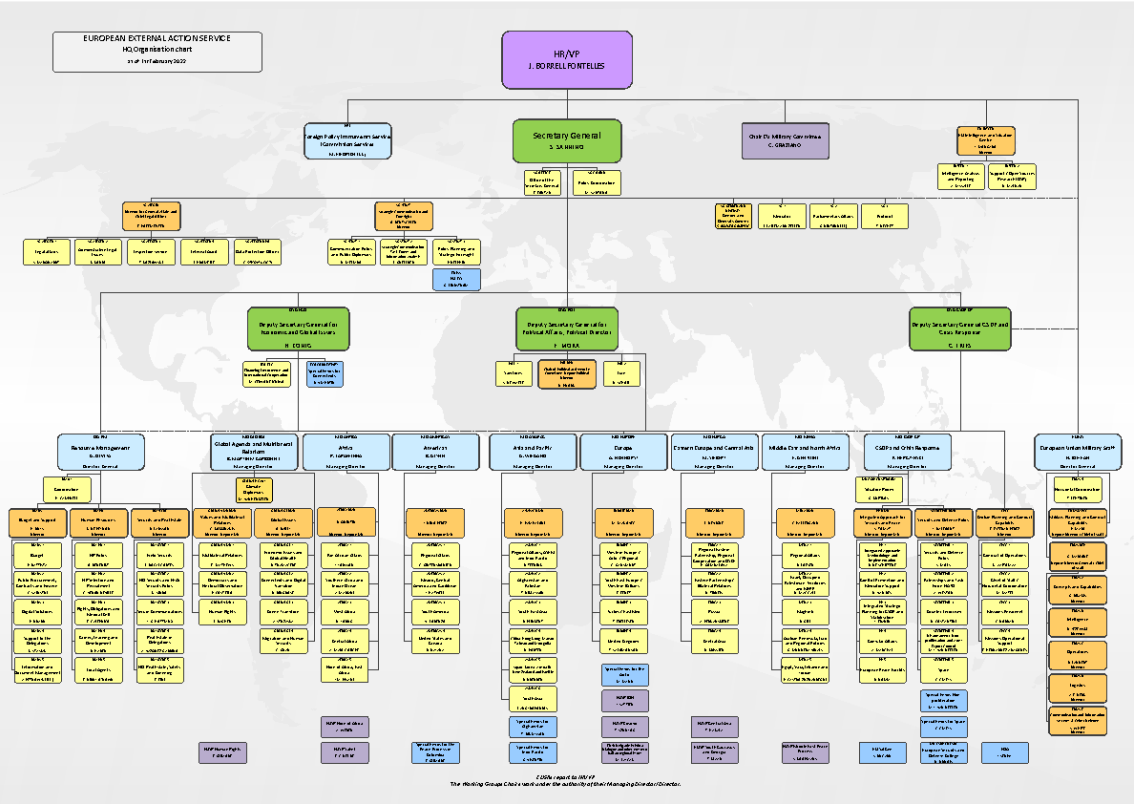

Figure A.2: EEAS Organisation HQ Chart

Source: https://www.eeas.europa.eu/sites/default/files/2022_-_02_-_01_-_eeas_orgchart.pdf

APPENDIX B:

FIVE LEADING FAMILIES OF THE DECISION SUPPORT METHODOLOGY

At the core of MCDA is the *Decision Support Methodology* (DSM) which can be classified into five leading families *(Figure B.1)*.

As the name implies, the *elementary method* is the simplest form of DSM (Hwang & Yoon, 1981). It constitutes the basis for initial MCDA assessments (i.e., *conjunctive/disjunctive* method, where the alternative choice depends on meeting one or more minimum or maximum levels of criteria). Though it is a simple preference model, it is insufficient to address multiple DMs preferences (Lai et al., 2008).

In *value measurement models* (Belton & Stewart, 2002), numerical scores represent the degree to which one decision option may be preferred. The scores are initially developed for each criterion and then synthesised to effect aggregation into higher-level preference models. According to Belton & Stewart (2002), the MCDA DSM, dealing with the explicit construction of value (preference scoring) under the guidance of a facilitator, includes MAVT (MultiAttribute Value Theory), AHP (Analytic Hierarchy Process), MACBETH (Measuring Attractiveness by a Categorical Based Evaluation TecHnique) and UTA (UTilité Additive). Non-additive ordinal regression UTA-like methods are included in the Choquet integral framework (Angliella et al., 2004).

Goal, aspiration or reference level models (Belton & Stewart, 2002), establish satisfactory levels for each criterion. The process then continues to select options closer to achieving desired goals and aspirations (Belton & Stewart, 2002). MCDA DSMs based on comparisons with internal references include TOPSIS (Technique for Order Preference by Similarity to Ideal Solutions) and DEA (Data Envelopment Analysis) (Diaby & Dias, 2017).

Outranking models (Belton & Stewart, 2002), compare pairwise alternative courses of action, initially in terms of each criterion evaluating the preference for one over the other. By aggregating preference information across all relevant criteria, this model aspires to establish the strength of evidence favouring the selection of one alternative over another (Belton & Stewart, 2002). DSMs include ELECTRE (Elimination Et Choix Traduisant la Réalité), PROMETHEE (Preference Ranking Organisation Method for Enrichment Evaluations), NAIADE (Novel Approach to Imprecise Assessment and Decision Environments), ORESTE (Organísation, Rangement et Synthése de donées relarionnelles), QUALIFLEX (Qualitative Flexible multiple criteria method), REGIME method (Diaby & Dias, 2017) and GAIA (Geometrical Analysis for Interactive Aid) (Brans & de Smet, 2016).

Dominance-based approaches (Greco et al., 2001; Moshkovich & Mechitov, 2013; Pawlak & Sowinski, 1994), compare alternatives directly instead of calculating an overall value (value-based approach) or comparing them with a reference (Diaby & Dias, 2017). Subjective parameters, such as

criteria weights, are not required to establish dominance relations. DSMs include the DRSA (Dominance-based Rough Set Approach) and VDA (Verbal Decision Analysis) (Diaby & Dias, 2017).

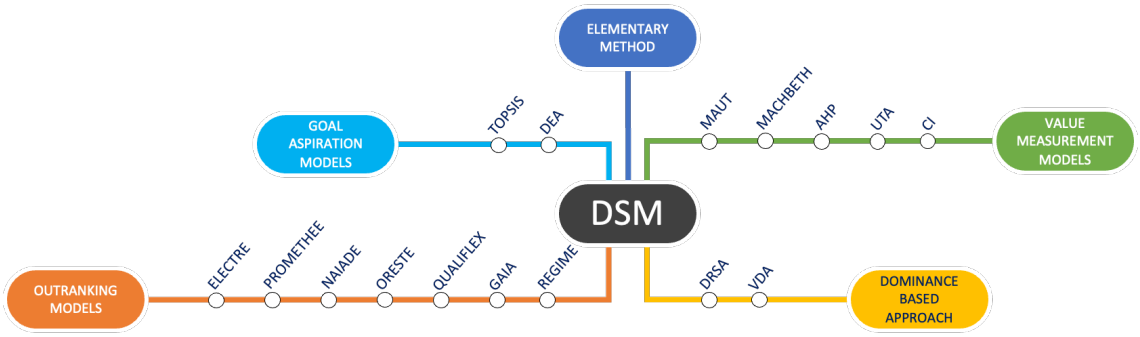

Figure B.1: Overview of DSM Leading Families and Respective Methods

APPENDIX C:

MIRO, ONLINE COLLABORATIVE WHITEBOARD PLATFORM

SCAN ME

Figure C.1: Quick Response (QR) Code

(miro.com)

Figure C.2: Overall View of MIRO, the Whiteboard Platform at the End of the First Session

(First Session: Structuring Phase)

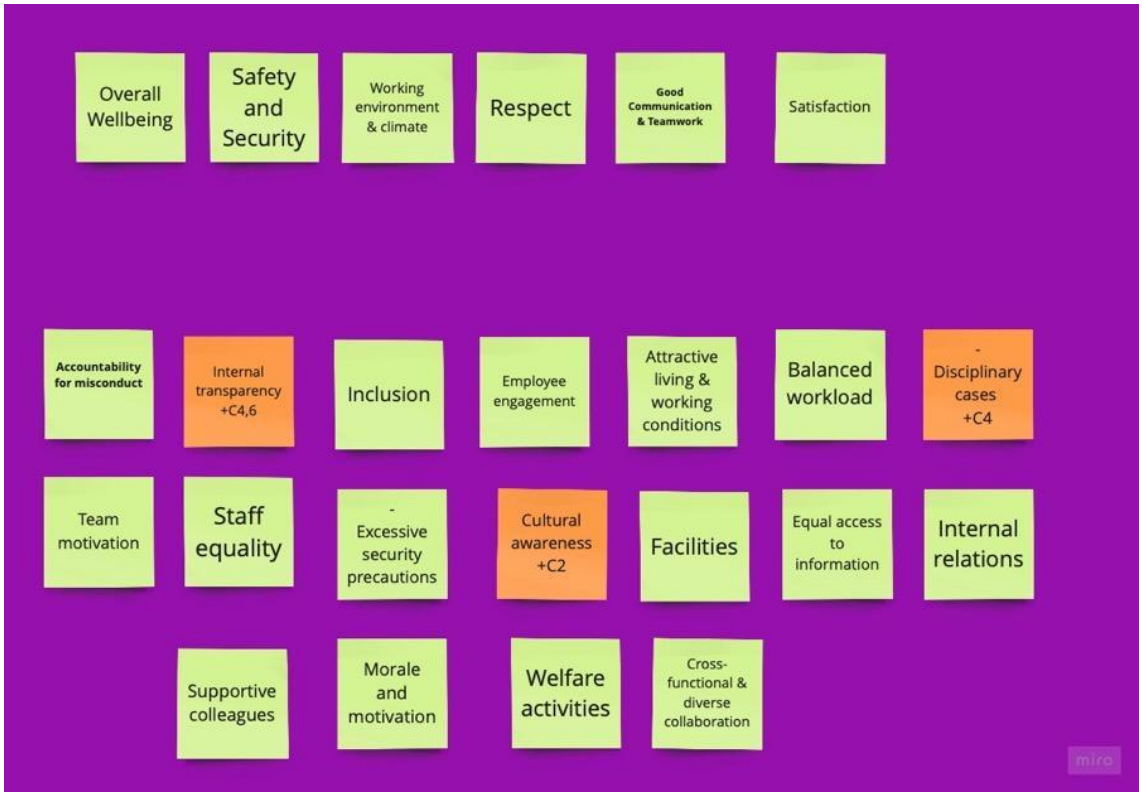

Figure C.3: Cluster 1, Working & Living Environment

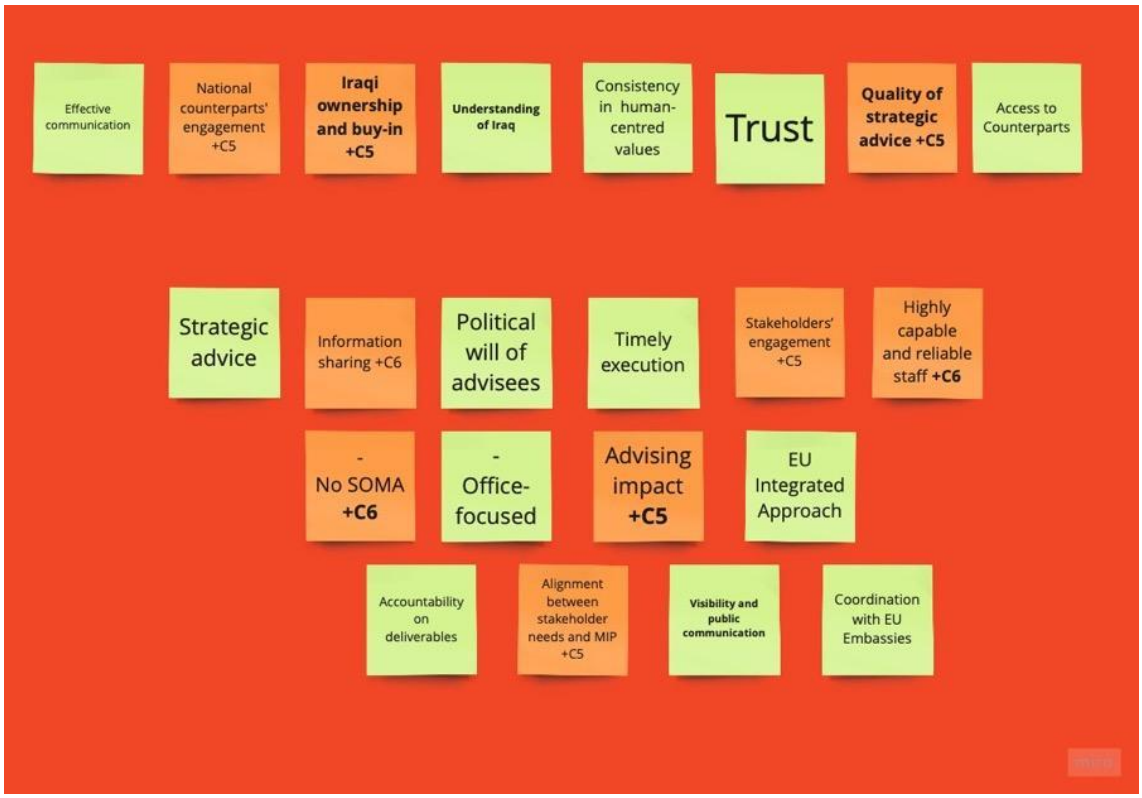

Figure C.4: Cluster 2, External Relations

Figure C.5: Cluster 3, Human Resources

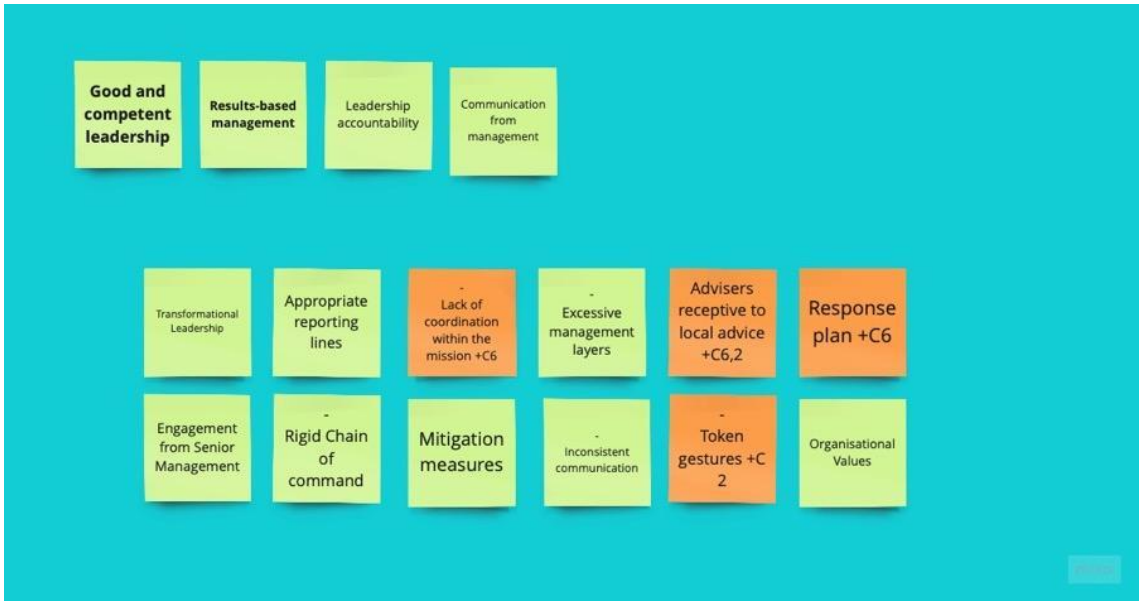

Figure C.6: Cluster 4, Leadership and Management

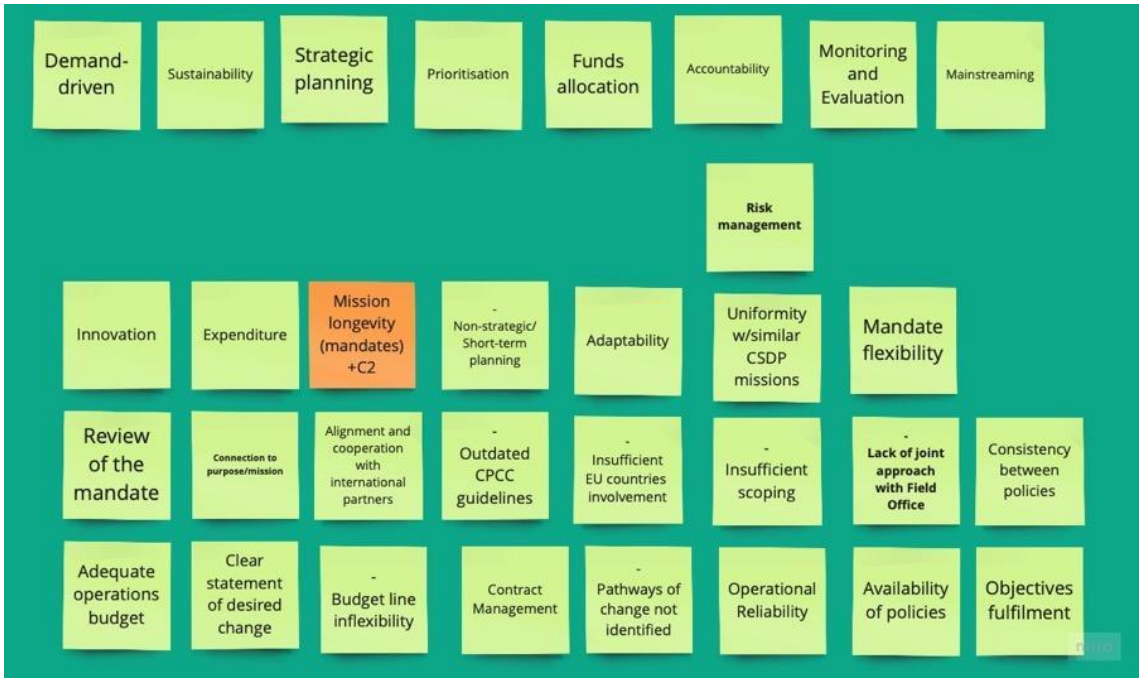

Figure C.7: Cluster 5, Mandate & Policies

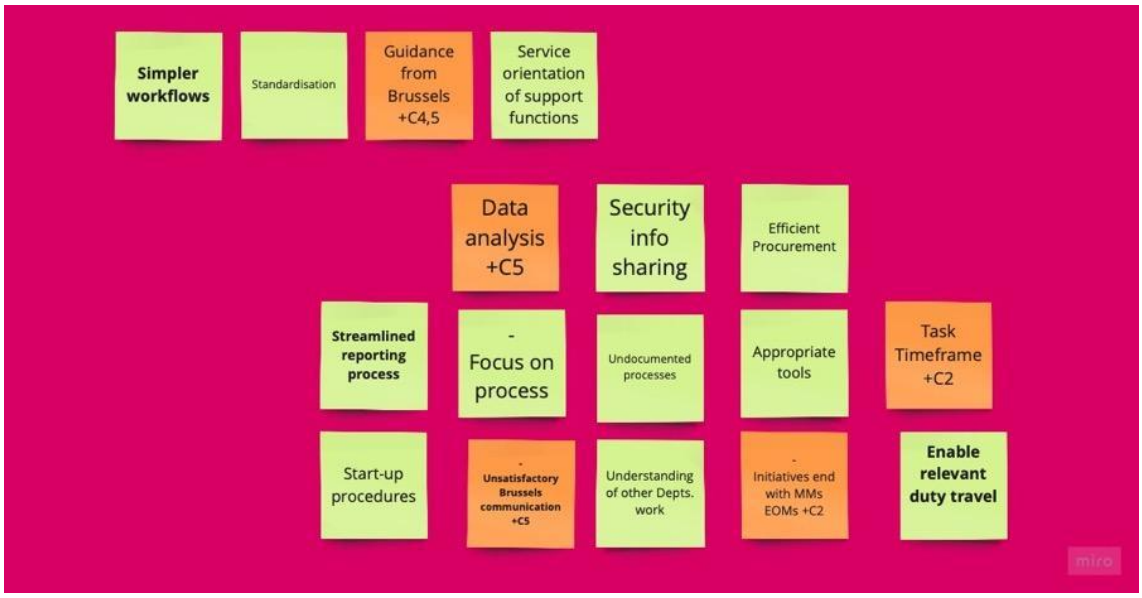

Figure C.8: Cluster 6, Internal Communications & Workflows

Appendix D:

Matrix of Interactions

CLUSTERS						
CR1	CR2	CR3	CR4	CR5	CR6	0-10
Working & Living Environment	External Relationship	Human Resources	Leadership & Management	Mandate & Policies	Internal Workflows	EVALUATION
Bad	Bad	Bad	Bad	Bad	Bad	0
Good	Bad	Bad	Bad	Bad	Bad	2
Bad	Good	Bad	Bad	Bad	Bad	2
Bad	Bad	Good	Bad	Bad	Bad	2
Bad	Bad	Bad	Good	Bad	Bad	3
Bad	Bad	Bad	Bad	Good	Bad	2
Bad	Bad	Bad	Bad	Bad	Good	1
Good	Good	Bad	Bad	Bad	Bad	3
Good	Bad	Good	Bad	Bad	Bad	3
Good	Bad	Bad	Good	Bad	Bad	4
Good	Bad	Bad	Bad	Good	Bad	3
Good	Bad	Bad	Bad	Bad	Good	2
Bad	Good	Good	Bad	Bad	Bad	3
Bad	Good	Bad	Good	Bad	Bad	3
Bad	Good	Bad	Bad	Good	Bad	3
Bad	Good	Bad	Bad	Bad	Good	3
Bad	Bad	Good	Good	Bad	Bad	3
Bad	Bad	Good	Bad	Good	Bad	3
Bad	Bad	Good	Bad	Bad	Good	3
Bad	Bad	Bad	Good	Good	Bad	4
Bad	Bad	Bad	Good	Bad	Good	4
Bad	Bad	Bad	Bad	Good	Good	3
Good	Good	Good	Bad	Bad	Bad	5
Good	Good	Bad	Good	Bad	Bad	6
Good	Good	Bad	Bad	Good	Bad	6
Good	Good	Bad	Bad	Bad	Good	5
Good	Bad	Good	Good	Bad	Bad	5
Good	Bad	Good	Bad	Good	Bad	5
Good	Bad	Good	Bad	Bad	Good	4
Good	Bad	Bad	Good	Good	Bad	6
Good	Bad	Bad	Good	Bad	Good	6
Good	Bad	Bad	Bad	Good	Good	6
Bad	Good	Good	Good	Bad	Bad	7
Bad	Good	Good	Bad	Good	Bad	6
Bad	Good	Good	Bad	Bad	Good	5
Bad	Good	Bad	Good	Good	Bad	7
Bad	Good	Bad	Good	Bad	Good	6
Bad	Good	Bad	Bad	Good	Good	5
Bad	Bad	Good	Good	Good	Bad	6
Bad	Bad	Good	Good	Bad	Good	6
Bad	Bad	Good	Bad	Good	Good	5
Bad	Bad	Bad	Good	Good	Good	5
Good	Good	Good	Good	Bad	Bad	7
Good	Good	Good	Bad	Good	Bad	7
Good	Good	Good	Bad	Bad	Good	6
Good	Good	Bad	Good	Good	Bad	7
Good	Good	Bad	Good	Bad	Good	7
Good	Good	Bad	Bad	Good	Good	7
Good	Bad	Good	Good	Good	Bad	6
Good	Bad	Good	Good	Bad	Good	6
Good	Bad	Good	Bad	Good	Good	5
Good	Bad	Bad	Good	Good	Good	6
Bad	Good	Bad	Good	Good	Good	7
Bad	Good	Good	Good	Good	Bad	8
Bad	Good	Good	Good	Bad	Good	7
Bad	Bad	Good	Good	Good	Good	6
Bad	Good	Good	Bad	Good	Good	6
Good	Good	Good	Good	Good	Bad	8
Good	Good	Good	Good	Bad	Good	7
Good	Good	Good	Bad	Good	Good	7
Good	Good	Bad	Good	Good	Good	8
Good	Bad	Good	Good	Good	Good	7
Bad	Good	Good	Good	Good	Good	8
Good	Good	Good	Good	Good	Good	10

Table D.1: Matrix of Interactions

(Second Session)

CLUSTERS						
CR1	CR2	CR3	CR4	CR5	CR6	0-10
Working & Living Environment	External Relationship	Human Resources	Leadership & Management	Mandate & Policies	Internal Workflows	EVALUATION
Bad	Bad	Bad	Bad	Bad	Bad	**0**
Good	Bad	Bad	Bad	Bad	Bad	**2**
Bad	Good	Bad	Bad	Bad	Bad	**2**
Bad	Bad	Good	Bad	Bad	Bad	**2**
Bad	Bad	Bad	Good	Bad	Bad	**3**
Bad	Bad	Bad	Bad	Good	Bad	**2**
Bad	Bad	Bad	Bad	Bad	Good	**1**

Table D.2: Combination of Criteria, One Criterion "Good"

CLUSTERS						
CR1	CR2	CR3	CR4	CR5	CR6	0-10
Working & Living Environment	External Relationship	Human Resources	Leadership & Management	Mandate & Policies	Internal Workflows	EVALUATION
Good	Good	Bad	Bad	Bad	Bad	**3**
Good	Bad	Good	Bad	Bad	Bad	**3**
Good	Bad	Bad	Good	Bad	Bad	**4**
Good	Bad	Bad	Bad	Good	Bad	**3**
Good	Bad	Bad	Bad	Bad	Good	**2**
Bad	Good	Good	Bad	Bad	Bad	**3**
Bad	Good	Bad	Good	Bad	Bad	**3**
Bad	Good	Bad	Bad	Good	Bad	**3**
Bad	Good	Bad	Bad	Bad	Good	**3**
Bad	Bad	Good	Good	Bad	Bad	**3**
Bad	Bad	Good	Bad	Good	Bad	**3**
Bad	Bad	Good	Bad	Bad	Good	**3**
Bad	Bad	Bad	Good	Good	Bad	**4**
Bad	Bad	Bad	Good	Bad	Good	**4**
Bad	Bad	Bad	Bad	Good	Good	**3**

Table D.3: Combination of Criteria (CR), Two CR "Good"

CLUSTERS						
CR1	CR2	CR3	CR4	CR5	CR6	0-10
Working & Living Environment	External Relationship	Human Resources	Leadership & Management	Mandate & Policies	Internal Workflows	EVALUATION
Good	Good	Good	Bad	Bad	Bad	**5**
Good	Good	Bad	Good	Bad	Bad	**6**
Good	Good	Bad	Bad	Good	Bad	**6**
Good	Good	Bad	Bad	Bad	Good	**5**
Good	Bad	Good	Good	Bad	Bad	**5**
Good	Bad	Good	Bad	Good	Bad	**5**
Good	Bad	Good	Bad	Bad	Good	**4**
Good	Bad	Bad	Good	Good	Bad	**6**
Good	Bad	Bad	Good	Bad	Good	**6**
Good	Bad	Bad	Bad	Good	Good	**6**
Bad	Good	Good	Good	Bad	Bad	**7**
Bad	Good	Good	Bad	Good	Bad	**6**
Bad	Good	Good	Bad	Bad	Good	**5**
Bad	Good	Bad	Good	Good	Bad	**7**
Bad	Good	Bad	Good	Bad	Good	**6**
Bad	Good	Bad	Bad	Good	Good	**5**
Bad	Bad	Good	Good	Good	Bad	**6**
Bad	Bad	Good	Good	Bad	Good	**6**
Bad	Bad	Good	Bad	Good	Good	**5**
Bad	Bad	Bad	Good	Good	Good	**5**

Table D.4: Combination of Criteria (CR), Three CR "Good"

CLUSTERS						
CR1	CR2	CR3	CR4	CR5	CR6	0-10
Working & Living Environment	External Relationship	Human Resources	Leadership & Management	Mandate & Policies	Internal Workflows	EVALUATION
Good	Good	Good	Good	Bad	Bad	7
Good	Good	Good	Bad	Good	Bad	7
Good	Good	Good	Bad	Bad	Good	6
Good	Good	Bad	Good	Good	Bad	7
Good	Good	Bad	Good	Bad	Good	7
Good	Good	Bad	Bad	Good	Good	7
Good	Bad	Good	Good	Good	Bad	6
Good	Bad	Good	Good	Bad	Good	6
Good	Bad	Good	Bad	Good	Good	5
Good	Bad	Bad	Good	Good	Good	6
Bad	Good	Bad	Good	Good	Good	7
Bad	Good	Good	Good	Good	Bad	8
Bad	Good	Good	Good	Bad	Good	7
Bad	Bad	Good	Good	Good	Good	6
Bad	Good	Good	Bad	Good	Good	6

Table D.5: Combination of Criteria (CR), Four CR "Good"

CLUSTERS						
CR1	CR2	CR3	CR4	CR5	CR6	0-10
Working & Living Environment	External Relationship	Human Resources	Leadership & Management	Mandate & Policies	Internal Workflows	EVALUATION
Good	Good	Good	Good	Good	Bad	8
Good	Good	Good	Good	Bad	Good	7
Good	Good	Good	Bad	Good	Good	7
Good	Good	Bad	Good	Good	Good	8
Good	Bad	Good	Good	Good	Good	7
Bad	Good	Good	Good	Good	Good	8
Good	Good	Good	Good	Good	Good	10

Table D.6: Combination of Criteria (CR), Five and Six CR "Good"