T.C.
GAZIANTEP UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
DEPARTMENT OF BUSINESS ADMINISTRATION

COMPARISON OF COUNTRIES' SOCIOECONOMIC GOVERNANCE POLICIES USING MULTI-CRITERIA DECISION MAKING METHOD

MASTER'S THESIS

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ABSTRACT

COMPARISON OF COUNTRIES' SOCIOECONOMIC GOVERNANCE POLICIES USING MULTI-CRITERIA DECISION MAKING METHOD

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Today, the development level of countries is measured not only by economic growth but also by multi-dimensional factors such as social welfare, the rule of law and environmental sustainability. Scientific methods are needed to objectively evaluate this complex structure. In this study, the TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) method, one of the Multi-Criteria Decision-Making (MCDM) techniques, and logistic regression analysis were used to conduct a comparative analysis of socioeconomic governance policies across 15 countries for the years 2018, 2020, 2022 and 2024. While the SGI(Sustainable Governance Indicators) database contained data for 41 countries in 2018, 2020 and 2022. This number decreased to 30 in 2024. While selecting 15 countries, the countries that were included in the 4-year period were taken into consideration. The research covers Austria, Belgium, Canada, Denmark, Estonia, Finland, Germany, Ireland, Latvia, Lithuania, Italy, New Zealand, Norway, Portugal and Sweden. In the study, the socioeconomic governance success of the countries was evaluated using various criteria such as social welfare, economic governance, environmental sustainability and rule of law. The TOPSIS method provided comparability of success levels in governance by ranking countries based on their distance from the ideal and negative ideal solutions. Furthermore, logistic regression analysis modeled the effects of specific socioeconomic indicators on governance success, determining which factors are decisive in the decision-making process. Consequently, North Europen countries and Germany with high governance quality ranked at the top, while performance in some Baltic and Eastern Europen countries was relatively lower.

Keywords: Multi-Criteria Decision-Making, Logistic Regression, Socioeconomics, Governance.

ÖZET

ÇOK KRİTERLİ KARAR VERME YÖNTEMLERİNİ KULLANARAK ÜLKELERİN SOSYOEKONOMİK YÖNETİŞİM POLİTİKALARININ KARŞILAŞTIRILMASI

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Günümüzde ülkelerin gelişmişliği, sadece ekonomik büyümeyle değil; sosyal refah, hukukun üstünlüğü ve çevresel sürdürülebilirlik gibi çok boyutlu faktörlerle ölçülmektedir. Bu karmaşık yapıyı objektif bir şekilde değerlendirmek için bilimsel yöntemlere ihtiyaç duyulmaktadır. Bu çalışmada, Çok Kriterli Karar Verme yöntemlerinden biri olan TOPSIS (İdeal Çözüme Benzerlik ile Sıralama Tekniği) ve Lojistik Regresyon Analizi kullanılarak, 2018, 2020, 2022 ve 2024 yıllarındaki sosyoekonomik yönetişim politikaları 15 ülke arasında karşılaştırmalı olarak incelenmiştir. SGI(Sustainable Governance Indicators) veri tabanında 2018, 2020 ve 2022 yıllarında 41 ülke verileri yer alırken bu sayı 2024 yılında 30'a düşmüştür. 15 ülke seçimi yapılırken 4 yılda da yer alan ülkeler göz önünde bulundurulmuştur. Araştırma Avusturya, Belçika, Kanada, Danimarka, Estonya, Finlandiya, Almanya, İrlanda, Letonya, Litvanya, İtalya, Yeni Zelanda, Norveç, Portekiz ve İsveç ülkelerini kapsamaktadır. Araştırmada, ülkelerin sosyoekonomik yönetişim başarıları; sosyal refah, ekonomik yönetişim, çevresel sürdürülebilirlik ve hukukun üstünlüğü gibi çeşitli ölçütler kullanılarak değerlendirilmiştir. TOPSIS yöntemi, ülkelerin ideal ve negatif ideal çözüme ne kadar uzak olduğuna göre sıralama yaparak, yönetişimdeki başarı seviyelerinin karşılaştırılabilir olmasını sağlamıştır. Ayrıca, lojistik regresyon analizi, belirli sosyoekonomik göstergelerin yönetişim başarısı üzerindeki etkilerini modelleyerek hangi faktörlerin karar verme sürecinde belirleyici olduğunu belirlemiştir. Sonuç olarak, yüksek yönetişim kalitesine sahip olan kuzey Avrupa ülkeleri ve Almanya en üst sıralarda yer alırken, bazı Baltık ve Doğu Avrupa ülkelerinde performansın görece düşük olduğu görülmüştür.

Anahtar Kelimeler: Çok Kriterli Karar Verme, Lojistik Regresyon, Sosyo Ekonomi, Yönetişim.

PREFACE

In this study, the socio-economic governance policies of 15 countries in 2018, 2020, 2022, and 2024 were comparatively analyzed using the TOPSIS method, one of the Multi-Criteria Decision Making methods, and Logistic Regression analysis.

I would like to express my gratitude to my advisor, Assoc. Prof. Dr. Ömer Faruk RENÇBER, who spared no effort in sharing his valuable knowledge and time with me at every stage of determining the topic of this thesis and preparing it, and who took a keen interest in my work and guided me at every opportunity, as well as to my wife, who supported me throughout my thesis training.

İlhami DEMİR

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LIST OF ABBREVIATIONS

AHP	:	Analytical Hierarchy Process
ANP	:	Analytic Network Process
COPRAS	:	Complex Proportional Evaluation Method
MCDM	:	Multi-Criteria Decision Making
ELECTRE	:	Elimination and Selection Method Expressing Reality
ENTROPY	:	Weighting Method
MACBETH	:	Measurement of Charm with Categorical-Based Evaluation Technique
MAUT	:	Multi-Attribute Utility Theory
PROMETHEE	:	Preference Ranking Organization Method for Enrichment Evaluations
SAW	:	Simple Additive Weighting
TOPSIS	:	Technique for Ranking Preferences Based on Similarity to the Ideal Solution
UTADIS	:	Utilities Additives Discriminantes
et al.	:	And So On
VIKOR	:	Vise Kriterijumska Optimizacija Kompromisno Resenje Method
WSM	:	Weighted Sum Model
WASPAS	:	Weighted Total Product Evaluation
WPM	:	Weighted Product Model
SPSS	:	Statistics Package for Social Sciences

INTRODUCTION

One of the most important features that distinguishes us from other living things is that we use our mind to decide by trying to make the best choice in many events and problems in our lives. These decisions can be easily taken with the experience of the person, which is less important and does not require more thinking. At other times, there are decisions that experience is not sufficient on its own, affecting one's life, difficult to take and evaluating each detail. Some decisions need to be taken very carefully and considering the details; The fact that there are many alternatives in front of the decision-maker, thanks to the opportunities provided by today, is associated with various situations, such as the ability to go beyond being local and have a global effect. In addition, people have to make important decisions both in the business world and for states because they are social beings. However, the effects of these decisions can affect not only the person or persons who make the decision, but also the employees of the company and the environment, all individuals of the state they live in, and all people and other creatures in the world that have become a global society. This effect is spread very quickly thanks to the communication tools and the development of technology. For these reasons, the decision-making process should be handled with a careful, objective, data-oriented, systematic and scientific approach in order to make decisions to be taken at the micro, meso and macro level in a correct and healthy way.

Nowadays, the term “governance” is a concept associated with creating rules and collective actions that can help the development of countries. In this context, governance is defined as the order or structure that arises as a result of the joint work of the relevant actors in a social and political system (Bozkurt et al., 1998: 274). Although it is possible to see definitions in different ways in the articles about

governance, it is noted that this concept is generally a form of management that does not make a clear distinction between the public and private sectors and is an updated concept for more effective management (Stoker, 1998: 17-18).

Governance can also be seen as a process created by people with interconnected positions and opposite interests (Cope et al., 1997: 447). The reason for this is that governance sees people in society and evaluates the political, social and economic interactions of these people as an arrangement or control pattern (Tekeli, 1996: 52-53). Thus, although governance is known to come from the rule, it is noted that some people or institutions are effective beyond this concept. In this context, it can be said that the constitutional and official legal approaches of the management system are limited and misleading (Yüksel, 2000: 149). This limitation becomes possible thanks to the governance that ends the distinction between politics and administration in public administration by interacting with society.

The globalization and the transfer of authority drew the agenda of the administration at the beginning of the 21st century. This situation pushed administrations to prepare new designs against current and future challenges. While the administrations developed new methods for effective public programs in the globalized world, they had to provide skills to increase. Many public bureaucracies have renewed the structures and personnel layouts of the institution in order to implement their usual direct programs (Kettl, 2005: 152). In the face of the realities of the new economy, which advocates the superiority of the private sector against the monopoly public sector, under the guidance of market competition, many different types of reform have emerged in the reshaping of the organizational and administrative structure of public administration on the basis of the experiences of private sector administration. The tendencies at this point are mostly in the form of commercializing governments, implementing successful examples, managing public institutions such as private sector institutions, and entering the private sector institutions and commercial partnerships. These tendencies, which are observed worldwide and aim to restructure the administration, are still seen in many Asia, African and Latin American countries today. In more detail, when managerial independence and flexibility in the

private sector are examined, different ministries and units turn into private sector-like autonomous structures; This provides the opportunity to move quite freely to the relevant units in financial, personnel and managerial issues.

Today, countries are compared with different methods according to their economic performance, and the results obtained as a result of comparison can be considered as the economic achievements of those countries in certain time periods. Multi-Criteria Decision Making (MCDM) methods are often preferred in research as appropriate methods used in comparison of such organizations and offer the results of sorting, choosing and classifying alternatives with their consequences.

In making economic evaluations, decision -making techniques in which many alternatives and criteria are considered are appropriate methods for such analyzes. Due to the requirement of a multi-criteria, the MCDM methods have been selected as the best disciplines because they have examined many different factors, taking into account many different factors. Because the ranking or comparison of countries according to their economic performances can be realized with mathematical approaches, in which many criteria and all criteria are taken into account.

Türkiye's economy has been growing in recent years. From time to time, during the European Union membership process, issues related to the economic situation of Türkiye are brought to the agenda. Türkiye's economic situation will create a record for future discussions compared to the European Union member and candidate countries.

Due to the effects of globalization tendencies on the world economy, some changes have been made in production systems. Depending on this situation, significant changes are experienced in the economic guidance tasks of the state. Since the 1980s, with the influence of the new globalization movements called the "second globalization wave", economic policies have manifested in every field, especially in regional development policies. Previously, regionally based development policies have now started to be expressed with market-centered accumulation systems. This transformation has led to more importance of new concepts such as “non-commercial interdependence”, “learning regions”, “social capital”, “new development focuses” and “network relations”.

This study aims to compare the socioeconomic governance policies of the countries with a multi-criteria decision-making method. In this context, the data published by SGI will be used.

CHAPTER ONE

MULTI-CRITERIA DECISION-MAKING PROCESS

1.1. Decision-Making Process

The decision can be defined as the solid judgment given by considering the realization of a specific objective or eliminating the problems encountered. According to the general definition, decision-making can be explained as the choice and implementation of individuals, the organization or the decision to achieve goals and objectives (Yıldırım & Önder, 2018).

Decision-making is the selection of the most appropriate or appropriate options among available options, taking into account established criteria, to achieve a designated goal (Özbek, 2021). Rather than a single action, decision-making is a process consisting of evaluating alternatives and selecting the most beneficial one. The stages of the decision-making process begin with goal determination and problem definition. This is followed by examination of the goals and problems, prioritization, option selection, and examination and evaluation of the established options. Finally, the selection criterion is determined and selected. This completes the decision-making process (Koçel, 2001).

The decision-making process requires consistently monitoring the steps required to solve a problem or achieve a particular goal. This stage generally consists of five main steps: defining the problem, collecting data, evaluating alternatives, making a decision, and implementing it. The first step is to understand and clearly articulate the situation requiring a decision. At this stage, it is crucial to gather and evaluate all relevant information. Information gathering helps provide a solid foundation for the decision, enabling decision-makers to make more informed and effective choices.

During the decision-making process, various factors people encounter can have a significant impact on the characteristics and outcomes of their decisions. These factors range from a person's logical thinking style to their emotions and ethical values. For example, when planning a vacation, an individual may adopt environmentally protective behaviors and make a rational choice by considering the outcomes of these behaviors. However, emotional factors, such as matters about environmental issues or the opinions of others, also appear to be more influential in this decision-making process. Furthermore, other factors that influence individuals' choices include personal characteristics and their social and cultural environments. For example, when choosing a meal, the degree to which users trust factors such as service quality, prices, and menu options is an important factor influencing their decision-making process. Therefore, the decision-making process is in constant interaction with individual and environmental factors, and this interaction is critical in determining the outcome of the decision.

Decision-making processes can be divided into two main categories: intuitive and analytical (Saaty, 2000:321; Kabak and Çınar, 2020:43). Intuitive methods are approaches that lack data support and are far from objective, relying on individuals' experiences (Abdulvahitoğlu, 2021). Analytical methods, on the other hand, operate using numerical data and scientific techniques. This approach aims to achieve better results by separating problems into subproblems within a hierarchical structure (Abdulvahitoğlu, 2021).

The decision-making process describes a series of activities that require a certain time and process. Choosing among options to achieve the desired goal proceeds in a specific order. There is no definitive rule for this order; the order can be modified depending on the nature, size, and structure of the decision (Yazırdağ, 2018:14).

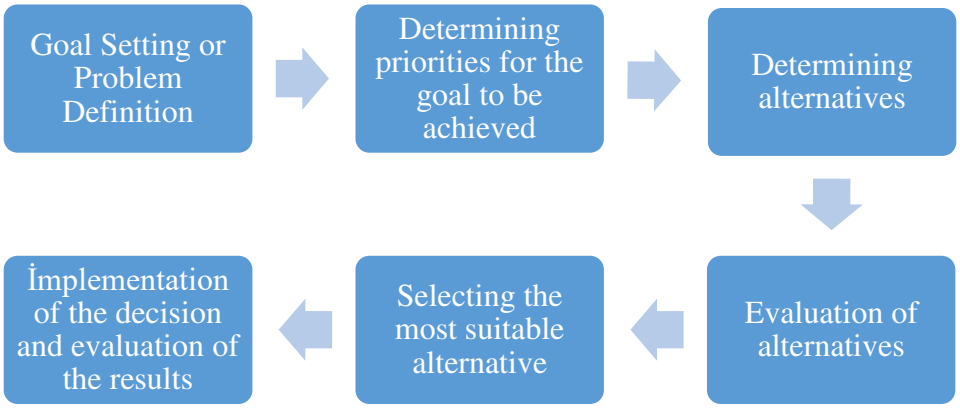

Figure 1: Decision-Making Process

Source: Yazırdağ, 2018:14-15

Decisions that have a significant impact and involve numerous criteria, decision-makers, and alternatives that will manifest themselves over time should be carefully examined. Furthermore, structural methods that consider decision-makers' thoughts, choices, intentions, and goals together should be preferred (Kabak, Sağlam, and Aktaş, 2017:35).

Decision-making processes involve many different elements, and these elements can be listed as follows (Turan, 2013:54-55):

Decision Maker: The individual or group who will choose from among the identified alternatives.

Goal: The goal the individual or group seeks to achieve at the end of the process.

Decision Criteria: All the data that will influence the individual or group's choice among alternatives.

Options: The set of alternatives from which decision makers will choose based on predetermined criteria and criteria.

Events: Unpredictable and uncontrollable factors that influence decision makers' choices.

Outcome: The values that emerge after each option and event.

Although decision-making is divided into different categories, decisions within each category consist of three main components. These components are the process of choosing between two or more options, the consequences of the decision, and the

environmental conditions affected by the choices made (Koçi, 2009). In the decision-making process, possessing quality information, rather than having too little or too much information, is crucial (Saaty, 2008:218). While the decision-maker cannot control potential future environmental conditions, when they evaluate existing information and possess sufficient and accurate information about these conditions, decision-making occurs in a clearer environment. Lack of information leads to decision-making under uncertainty, while sufficient information about the probabilities of environmental events leads to decision-making under risk (Koçi, 2009:14).

Many different classifications have been made regarding decision-making, one of which is presented below (Abdulvahitoğlu, 2021:21; Özden, 2019:81).

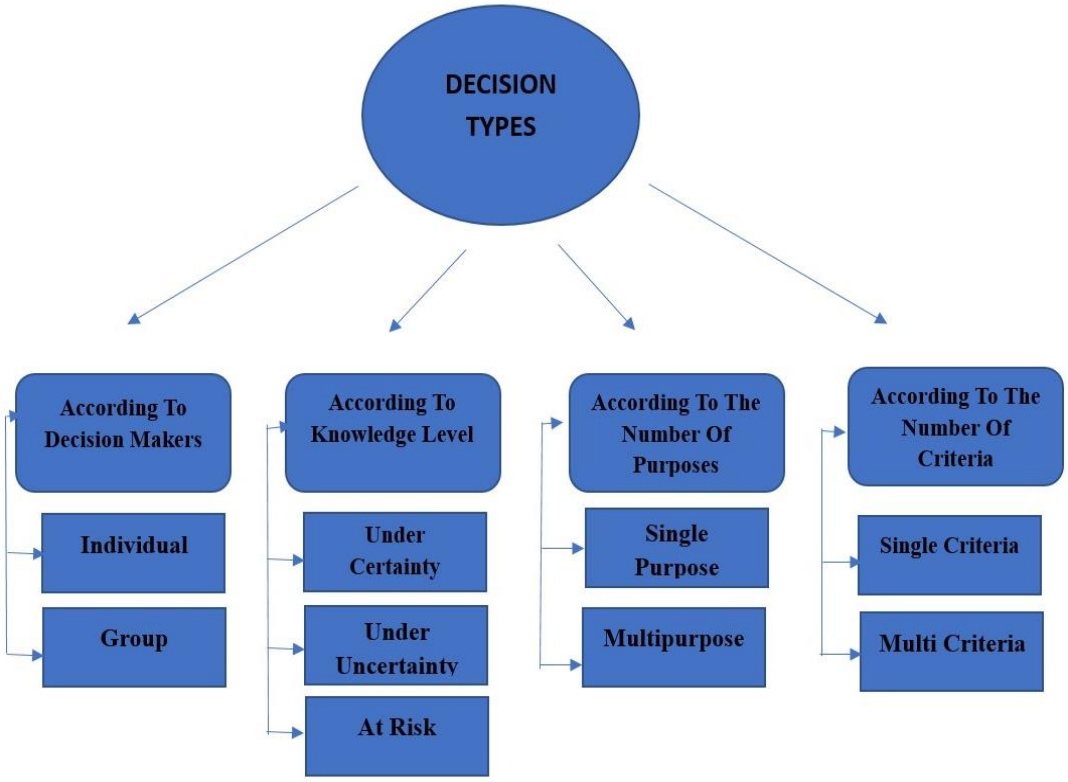

Figure 2: Types of Decisions

Source: Abdülvahitoğlu, 2021:24; Özden, 2019:82

1.2. The Impact of Decisions

The impacts of decisions extend beyond immediate consequences, affecting the current situation and shaping future outcomes. When individuals or organizations make choices, they undergo a complex evaluation process that balances potential benefits with the risks that come with them. While decisions impact at different levels, each choice has significant consequences. Understanding these dynamics allows individuals and organizations to critically evaluate their decision-making processes and ensure that the decisions they make contribute to positive outcomes.

Today's increasingly complex and uncertain decision-making environments necessitate a multidimensional analysis framework for organizations, managers, and researchers (Courtney, Kirkland, Viguerie, 1997:79; Saaty, 1980). Traditional single-variable approaches or approaches limited to simple comparisons may fail to grasp the dynamic nature of decision-making processes and the fact that multiple factors interact (Simon, 1955; March, 1994). Problems we encounter across a wide spectrum, particularly strategic management, marketing, business finance, public policy, healthcare management, and education, necessitate a comprehensive and multidimensional analytical perspective (Keeney-Raiffa, 1993). At this point, it is important to understand the background of the decision-making process, identify which factors shape this process, and identify which tools are used at which stages (Simon, 1979; Tversky-Kahneman, 1974). Understanding the dynamics of decision-making sheds light on both the theoretical knowledge infrastructure and the methodologies used in practice.

1.3. The Role of MCDM in the Decision-Making Process

The impact of globalization, technological transformations, and uncertain market conditions necessitates organizations to evaluate strategic, tactical, and operational decisions from a multifaceted perspective. The inadequacy of single-dimensional analysis methods has led decision-makers and researchers to adopt analytical methods that allow for the simultaneous evaluation of multiple variables. At this stage, multivariate analysis techniques are being incorporated into the decision-making process to better understand complex problems and develop comprehensive solutions.

The decision-making process is dynamic and generally involves rule-based and descriptive approaches, encompassing stages such as problem identification, generating alternatives, evaluating them, making choices, and implementing them. The conceptual framework of this process suggests that individuals, groups, or organizations act from a rational or limited rational perspective, considering their goals, constraints, resources, and values. However, in complex decision-making problems, considering the many interacting factors alone is insufficient. The need to classify the relationships, hidden structures, and common patterns among these factors enhances the value of multivariate analysis methods.

The decision-making process is a complex cognitive process encompassing stages such as problem definition, information gathering, alternative generation, evaluation, and selection. This process is shaped by individual preferences, organizational constraints, and environmental factors. Multi-Criteria Decision Making techniques are widely used to model and analyze complex decision-making scenarios.

One Multi-Criteria Decision Making method is the Analytical Hierarchy Process, which allows decision makers to prioritize multiple criteria and evaluate alternatives based on these criteria. Another common method is ELECTRE, which determines the most suitable option through pairwise comparisons of alternatives. Furthermore, the TOPSIS method, which ranks alternatives according to their proximity to the ideal solution, has found application in various business decision-making contexts.

The importance of MCDM methods in decision-making processes lies in their ability to simultaneously address often opposing objectives. These techniques provide a structured decision-making framework that can be particularly useful in complex and uncertain circumstances (Zavadskas et al., 2018; Sahoo-Goswami, 2023).

In recent years, researchers have investigated the use of MCDM methods in many business areas, such as supplier selection, personnel recruitment, and investment decisions (Sahoo and Goswami, 2023). Overall, the importance of decision-making concepts and multivariate analysis methods like MCDM plays a vital role in effective corporate governance.

Multi-Criteria Decision Making (MCDM) can play a crucial role in decision-making processes. In today's business world, managers and decision-makers must

consider numerous factors. MCDM methods ease the management of complex situations, enabling systematic choices among various alternatives. For example, in a study by Pala (2023), the financial performance of companies operating in the BIST Technology and Information Technology Sector was evaluated using MCDM methods. These methods provide a more comprehensive assessment by considering not only financial data but also other criteria that influence companies' overall performance. Furthermore, another study by Yücenur (2022) demonstrates how MCDM methods can be used to determine field hospital locations during the COVID-19 pandemic. These examples prove how effectively MCDM can be used in decision-making processes in diverse fields such as healthcare and technology. Practices such as comparing two different MCDM methods provide a more solid foundation for decisions. In this context, the structure and systematic approach provided by MCDM provide a basis for transitioning to the role of multivariate analysis methods. Multivariate analysis methods increase the complexity of the decision-making process while performing an effective evaluation of alternatives.

1.4. MCDM Methods

Multı-Criteria Decision Making (MCDM) techniques are used to model and analyze decision-making scenarios where multiple and often conflicting criteria are evaluted simultaneously

1.4.1. Selection Problems in Multi-Criteria Decision Making

Decision-making is a crucial aspect of organizational management, and a thorough understanding of the process and methods is essential for effective decision-making. The decision-making process is a complex cognitive process consisting of multiple stages, including problem identification, information gathering, alternative development, evaluation, and selection. This stage is influenced by various factors, including individual preferences, organizational constraints, and environmental conditions. Multi-Criteria Decision Making (MCDM) methods are widely used in the literature to model and analyze complex decision scenarios.

Identifying Choice Problems: Choice problems are common in various fields, especially in decision-making situations where multiple factors must be considered. In practice, these problems arise when individuals or organizations are faced with choosing among several options based on numerous criteria, and they often require a

complex evaluation process. Factors such as costs, benefits, risks, and preferences can influence the choice process and make determining the most suitable option difficult. For example, in the commercial arena, sellers must decide which products to offer based on factors such as competitive conditions, customer demand, and profit.

Multivariate analysis is crucial for handling these complex situations. By considering multiple variables simultaneously, decision makers can better understand the impact of different factors on their choices. This method offers a more comprehensive assessment than traditional methods that focus solely on a single criterion, such as revenue. The use of multivariate decision-making techniques, such as Weighted Sum Product Assessment (WASPAS) or Analytical Hierarchy Process (AHP), allows for a structured analysis that coordinates multiple aspects of the choice problem. As we delve deeper into the importance of multivariate decision-making, it becomes increasingly clear that these techniques not only improve decision quality but also provide a systematic problem-solving tool in complex situations.

Types of Choice Problems: Choice problems can be categorized based on the context in which decisions are made and the criteria used to evaluate alternatives. The first type is multi-criteria choice problems, which require evaluating options based on multiple conflicting criteria. For example, when choosing a supplier, factors such as cost, quality, and delivery time may need to be considered; this often requires striking a balance between these factors (Dalbudak and Rençber, 2022:17). The second type is single-criterion choices focused on a single clear objective, such as selecting the lowest-cost option. While this approach offers a simpler structure, it may not consider other important components. The third category is ordinal choice problems, where alternatives are ranked according to preferences without requiring quantitative evaluation. For example, when choosing from a project list, stakeholders can express their preferences without requiring numerical evaluation.

Understanding these types helps identify effective decision criteria that will influence the choice process. Each type may require different methods to effectively compare and evaluate alternatives. This listing leads to the next section, where we explore common strategies for solving choice problems. By applying these methods, decision makers can systematically address the challenge of making more informed choices (Durak, 2024).

Common Methods Used to Solve Choice Problems: When faced with choice problems, many methods and approaches exist that can help decision makers systematically evaluate options and determine the most appropriate course of action. Commonly applied methods for solving these problems include both qualitative and quantitative techniques, each with its own strengths. Qualitative methods offer researchers the opportunity to delve into complex issues through interviews, focus groups, or field observations, providing valuable insights into the decision-making process. For example, field studies have shown that exploring cognitive strategies can significantly impact students' problem-solving skills in science education (Balliet, Riggs, Maltese, 2015:1109). Quantitative methods, on the other hand, use numerical data and statistical analysis to identify trends and draw conclusions, thus providing a more objective perspective on available options.

Combining quantitative and qualitative methods can enable a more detailed understanding of choice problems with more detailed data and insights. This hybrid method can reveal critical elements not visible from a single perspective. Ultimately, decision makers can use different methodologies to overcome complexities and effectively evaluate their choices when choosing between options. In this context, the Analytical Hierarchy Process (AHP), which systematically analyzes decision problems and prioritizes options based on specific criteria, is a highly effective method. AHP provides a powerful framework for making informed decisions, making it a useful tool for choice challenges in diverse fields.

Choice problems are Multi-Criteria Decision Making (MCDM) processes in which alternatives are ranked according to specific criteria or the decision maker's preferences. Various techniques are used to evaluate alternatives in these processes. Prominent MCDM techniques include AHP, MAUT, TOPSIS, ELECTRE, PROMETHEE, and MACBETH (Demir, Özyalçın, & Bircan, 2021: 19).

1.4.2. Classification Problems in Multi-Criteria Decision Making

Multi-Criteria Decision Making (MCDM) techniques are critical in decision-making processes where multiple criteria are considered. These techniques guide decision-makers by ranking or categorizing alternatives (Greco, Ehrgott, Figueira, 2016). Classification methods are used to place alternatives into specified classes and

are widely applied, particularly in the fields of financial risk analysis, performance evaluation, and customer segmentation (Roy, 1991).

Definition of Classification Problems: In the MCDM process, classification involves placing alternatives into appropriate groups based on specified criteria and classes. This process is important not only in ranking alternatives but also in placing them within specific decision groups (Roy, 1991). For example, classifying loan applications as "approved" or "rejected" is a classification problem.

The main purpose of MCDM classification problems is to simplify complex decision-making processes by placing decision alternatives into the most appropriate classes, taking into account multiple criteria (Greco et al., 2016).

Types of Classification Problems: Within the context of Multi-Criteria Decision Making (MCDM), classification problems refer to the process of assigning alternatives to specified classes. These classification types are organized in various configurations to meet different needs in the decision-making stages. They are fundamentally divided into three main groups: sequential classification, category-based classification, and inter-class transition (Roy, 1991; Pawlak, 1991). Sequential classification involves classifying alternatives according to an order of importance. This type of classification is used when alternatives need to be evaluated according to their importance. Classes are arranged in order of importance (e.g., "high priority," "medium priority," "low priority") and help decision makers determine which alternatives to allocate resources to.

In category-based classification, alternatives are placed into predetermined, independent categories. These categories are defined without any ranking relationship between the classes (Roy, 1991:49). Their characteristics include assigning alternatives to only one category and creating classes that are easily distinguishable by decision makers.

Interclass transition occurs when an alternative can belong to more than one class. This type of classification is generally preferred for problems involving uncertainty and fuzziness (Pawlak, 1991). Its characteristics include the ability to associate alternatives with a level of affiliation between classes, and approaches such as Fuzzy Logic and Rough Set Theory are suitable for such situations.

Consequently, MCDM methods offer decision makers both flexibility and clarity when evaluating alternatives. While each technique offers benefits in specific situations, it is critical for decision makers to choose the method that best suits their specific needs. In the future, further development of these systems and their integration with artificial intelligence applications will further improve decision-making processes. In this context, advances at both theoretical and practical levels will continue to offer new opportunities in the field of multi-criteria decision making.

Common Methods Used to Solve Classification Problems: MCDM classification problems aim to prioritize options according to specific criteria or rank them according to quality. Such problems are often crucial in situations requiring the most efficient allocation of limited resources (Greco et al., 2016).

Many methods have been developed to solve problems such as classifying projects according to their strategic importance, evaluating products based on their price-performance ratios, or prioritizing suppliers based on their service quality. Commonly used methods in MCDM include ELECTRE, PROMETHEE, UTADIS, Rough Set Theory, and AHP-ANP-Based Classification.

1.4.3. Ranking Problems in Multi-Criteria Decision Making

Multi-Criteria Decision Making (MCDM) describes decision-making processes that consider multiple criteria. Ranking techniques enable the examination of options according to specific criteria and the ranking of options from best to worst. These methods guide decision-makers when choosing between alternatives or determining the most appropriate option (Figueira, Greco, Ehrgott, 2005).

MCDM offers an effective approach to solving complex decision-making problems by evaluating multiple criteria simultaneously (Seo-Sakawa, 1988).

In many fields, from financial services to healthcare, decision-makers often must choose between various options, each with its own advantages and disadvantages. MCDM uses different techniques to support this process by considering factors such as cost, quality, and risk, allowing for a more comprehensive analysis of each option. Over time, MCDM methods began to include complex models that take into account the uncertainty and variability in the data (Bali, 2014; Ağaç and Baki, 2016; Durak, 2024).

Definition of Ranking Problems: Ranking techniques play a key role in MCDM by providing a systematic way to prioritize alternatives based on established criteria. These techniques help decision makers visualize options in an organized manner, making the process of selecting the most suitable option more effective (Borgulya, 1997).

Ranking methods such as the Analytical Hierarchy Process (AHP) or the Technique for Ranking Preferences Based on Similarity to the Ideal Solution (TOPSIS) allow decision makers to clearly express their preferences and enable informed decision-making based on their objectives.

The integration of ranking methods helps identify important attributes in studies such as Majumdar et al. (2020) and Alnaqbi et al. (2024), where systematic frameworks were used to rank and evaluate service quality elements. In both cases, the application of systematic ranking techniques supported more informed decision-making by highlighting areas for improvement. This structured approach prioritizes interventions and aligns with the broad goals of evidence-based practice for the effective allocation of resources.

Types of Ranking Problems: In Multi-Criteria Decision Making (MCDM) processes, evaluating and ranking alternatives according to different criteria helps decision makers identify the most suitable option. Ranking types are shaped by the structure of the decision-making problem and the decision maker's objectives. MCDM ranking types are generally divided into three main categories:

Complete Ranking: Complete ranking refers to the continuous arrangement of all options from best to worst. This method allows the decision maker to establish a clear order of priority among the options.

Partial Ranking: Partial ranking is a technique that ranks only a portion of the options or evaluates them without creating a full ranking. Some options may be equally important or may not be ranked.

Category-Based Ranking (Classification): Category-based ranking refers to the placement of options into predetermined categories. This type of classification focuses on classifying the options rather than ranking them. These methods are used to clearly rank, classify or group alternatives (Figueira et al., 2005).

Common Methods Used to Solve Ranking Problems: In the Multi-Criteria Decision Making (MCDM) process, many different ranking methods are used to evaluate and prioritize alternatives based on multiple criteria. Here are some commonly preferred ranking methods:

Analytic Hierarchy Process (AHP): This method allows decision makers to compare alternatives in pairs by evaluating their performance across criteria. It also uses a scale to measure decisions and derives priority vectors by calculating eigenvalues (Saaty, 1984).

Topsis Technique: TOPSIS identifies the best option by determining the geometric distance of each alternative from an ideal solution and a negative-ideal solution. The alternatives closest to the ideal solution and farthest from the negative-ideal solution are ranked highest (Krohling-Pacheco, 2015).

Weighted Sum Model (WSM): In WSM, each criterion is assigned a weight based on its importance. Each alternative is scored for each criterion and the weighted scores are added together to create an overall score for the ranking.

Weighted Product Model (WPM): WPM uses weights like WSM, but multiplies the score on each criterion by the strength of its respective weights. This method highlights the relative performance of alternatives (Odu, 2019).

Preference Ranking Organization Method for Enrichment Evaluations (PROMETHEE): PROMETHEE uses pairwise comparisons to evaluate alternatives based on criterion preferences. By creating a preference flow for each alternative, this process aids in the ranking phase (Zhao-xu-min, 2010).

Elimination and Selection Expressing Reality (ELECTRE): This approach requires creating a concordance and discordance index for comparing options. It helps identify superiority relationships between options and allows for a ranking (Alinezhad-Khalili, 2019).

Multiple Attribute Utility Theory (MAUT): MAUT uses a function method that combines performance across criteria to evaluate alternatives. In this process, it allows risk preferences and uncertainty elements to be taken into account (Mateo, 2012).

Fuzzy MCDM Methods: These methods use fuzzy logic to deal with uncertainties during the evaluation of alternatives. Methods such as Fuzzy AHP and Fuzzy TOPSIS are frequently preferred (Torfi, Zanjirani Farahani, Rezapour, 2010).

Data Envelopment Analysis (DEA): DEA is a nonparametric method used to measure the efficiency of decision-making units (DMUs) by comparing multiple inputs and outputs. It ranks options by efficiency scores (Wen, 2015:978).

Simple Additive Weighting (SAW): SAW is a simple ranking technique in which alternatives are evaluated, scored, and aggregated according to criteria (Thakkar, 2021:978).

Each of these methods has its own advantages and disadvantages. The choice of method is generally determined by the specific situation and needs of the decision-making problem. Because the main methods are detailed in the selection and ranking problems, they are not reviewed here.

1.4.4. Definition Problems in Multi-Criteria Decision Making

The goal in these types of problems is to define alternatives and the consequences that will arise if these alternatives are chosen (Ishizaka & Nemery, 2013).

1.5. Classification of Multi-Criteria Decision-Making Methods

MCDM methods, which have been developed and are increasing in number as a result of the complex structure of decision-making problems encountered today, have become used in many social, cultural, financial and politicial areas.

1.5.1. TOPSIS Method

TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) is a multi-criteria decision-making method developed based on the research of Hwang and Yoon.

Developed as an alternative to the ELECTRE method, TOPSIS is used to solve multi-criteria decision-making problems. This method ranks alternatives based on their similarity to the best solution (positive ideal solution) and presents a recommendation to decision makers (Opricovic and Tzeng, 2004:445).

The TOPSIS method is built on the principles of the ELECTRE method. Therefore, the initial processes of both methods are expected to be similar. Both ELECTRE and TOPSIS follow the same path up to the normalization stage of the decision matrix. However, differences emerge in subsequent steps. The difference is that while ELECTRE makes a choice based on the superiority of one alternative over another, TOPSIS indicates that the best alternative is the one closest to the positive ideal and farthest from the negative ideal.

A Multi-Criteria Decision Making (MCDM) problem with "n" alternatives and "m" criteria can be expressed by representing n points in an m-dimensional space. Kwangsun Paul Yoon and Ching-Lai Hwang developed the TOPSIS method based on the assumption that the alternative solution point is closest to the positive-ideal solution and farthest from the negative-ideal solution. The TOPSIS method can be applied directly to the data without any conversion. This method allows the classification of alternative solutions according to specific criteria and the calculation of the distances to the ideal solution between the highest and lowest possible values of each criterion (Yurdakul and İç, 2003:18).

With TOPSIS, the distances of each alternative from the positive and negative-ideal solutions are calculated using the Euclidean distance metric. Because the method considers the option closest to the positive-ideal solution as the best solution, the alternatives can be ranked by comparing their distances (Cheng et al. 2002:975).

The primary goal of the TOPSIS method is to prioritize multiple alternatives according to specific criteria, and this method has a solution process consisting of a limited number of steps. TOPSIS combines alternatives and criteria using a decision matrix. A formulation structure is used to reach a final decision. To achieve this, the Decision Matrix must first be prepared.

The solution process with the TOPSIS method proceeds in the same steps as the ELECTRE method, up to the weighting of the normalized decision matrix. Following these steps, the other four steps that differ from the ELECTRE method are explained below.

- ✓ Step 1: Determining the Ideal (A*) and Negative Ideal (A-) Solutions
- ✓ Step 2: Calculating the Separation Measure
- ✓ Step 3: Calculating the Relative Closeness to the Ideal Solution

- ✓ Step 4: Ranking the Alternatives

1.5.2. PROMETHEE Method

PROMETHEE is one of the multi-criteria decision-making methods developed to determine the best option. This method is widely used today because it allows for the effective and easy handling of many criteria. PROMETHEE was developed based on the practical difficulties encountered by prioritization methods in the existing literature.

PROMETHEE is one of the newest multi-criteria decision-making methods and was introduced by Jean-Pierre Brans in 1982. It was further developed by Brans and Philippe Vincke in 1985. The main features of this method are simplicity, clarity, and balance. It uses preference functions when ranking. It is important that all parameters are clearly defined to facilitate the decision-maker's process. The PROMETHEE method allows for both partial (PROMETHEE I) and full (PROMETHEE II) rankings of a limited number of alternatives (Brans et al., 1986:228).

The PROMETHEE method is actually a very straightforward ranking technique. This approach is a well-thought-out support system that enables evaluation and decision-making based on multiple criteria. The decision matrix is the initial stage in PROMETHEE implementation. This table is where alternatives are evaluated against various criteria. Two additional types of information are required to implement the PROMETHEE method. First, the accepted weights of the criteria are required. This weighting is considered information about the relative importance of the criteria. Second, information is needed about the decision maker's preference function. This information is used to compare the impact of each alternative (Dağdeviren, 2008:397).

The term "enrichment" in the method's name comes from the fact that, instead of a simple method, the initial decision matrix is evaluated based on predetermined preference functions.

The PROMETHEE method evaluates alternatives according to different preference functions, enabling the determination of both partial and full priorities, thus enabling more in-depth analyses. Rankings using PROMETHEE offer two significant advantages over other ranking methods. First, it allows for the use of a different preference function for each criterion. Second, it allows for the creation of partial and

full rankings of alternatives. These advantages increase the efficiency and accuracy of the process in the institutions where it is implemented (Dağdeviren and Eraslan, 2008:69).

PROMETHEE is an easy-to-understand option among multi-criteria decision-making methods. Unlike other methods, it offers six types of preference functions, thus solving these problems.

Using PROMETHEE I, it is possible to obtain a result by classifying alternatives as superior (P), equal (I), and incomparable (R) based on the determined preferences. However, this result does not provide a complete ranking; alternatives are ranked only by comparing them based on their negative and positive current values. This process is called partial ranking. With PROMETHEE II, once the net current values of the alternatives are calculated, they can be ranked from best to worst. This completes the comparison of alternatives evaluated on multiple criteria.

In problems related to selecting and ranking the best among alternatives, the PROMETHEE method is similar to the ELECTRE and TOPSIS methods in its first four steps.

In the PROMETHEE method, pairwise comparisons of alternatives continue after this stage without normalizing the criteria. In contrast, in the TOPSIS and ELECTRE methods, after the fifth stage, the data are converted to a normalization matrix and weighted. In the PROMETHEE method, once a decision matrix consisting of alternatives and criteria is created, the alternatives are compared pairwise using the six preference functions proposed by Brans.

1.5.3. COPRAS Method

Another multi-criteria decision-making technique, the COPRAS (Complex Proportional Evaluation) method, was developed in 1996 by Zavadskas and Kaklauskas at Vilnius Gediminas Technical University (Yalçın, 2020).

The COPRAS method is used to evaluate options and rank alternatives based on the criteria's utility and priority levels. Criterion values are used in evaluations to minimize unfavorable elements while maximizing beneficial ones (Aksoy, Ömürbek, & Karaatlı, 2015:28).

COPRAS determines the advantage levels of alternatives. Compared to other methods, the COPRAS method has a shorter processing time. This method is suitable for small-scale problems and presents the scores of alternatives as percentages (Albayrak, 2019).

The COPRAS method consists of six steps. These steps are listed below (Zavadskas et al., 2007):

- ✓ Step 1: Creating the Decision Matrix
- ✓ Step 2: Creating the Normalized Decision Matrix
- ✓ Step 3: Creating the Weighted Normalized Decision Matrix
- ✓ Step 4: Calculating the Sum of Useful and Unuseful Criteria
- ✓ Step 5: Calculating the Relative Importance of Alternatives
- ✓ Step 6: Determining the Benefit Ratings of Alternatives

COPRAS is a technique widely used in the literature for multi-criteria decision-making. Factors contributing to its popularity include its ease of application and the ability to evaluate and rank various options (Şahin, 2019).

COPRAS has been studied in various fields in the literature due to its ease of application in decision-making problems involving numerous alternatives and complex criteria. Examples include: ranking alternatives in a building life cycle (Zavadskas, 2001:169), designing active renovation options used in building improvements (Kaklauskas, 2005:361), selecting contractors (Andruskevicius, 2005:158), (Kaklauskas, 2006:454), and evaluating road design alternatives (Zavadskas et al., 2007:195). The COPRAS method has been applied in the following areas: Risk analysis in critical infrastructures (Yazdani, Alidoosti and Zavadskas, 2011:27), performance measurement (Das, 2012:230), site selection for greenhouses, assessment of affordability of housing (Mulliner, 2013:270), decision making in machine tool selection (Aghdaie, Zolfani and Zavadskas, 2013) and evaluation of options when choosing a hotel (Sarıçalı and Kundakçı, 2016).

1.5.4. AHP (Analytic Hierarchy Process) Method

The AHP method was developed in 1977 by Thomas Lorie Saaty to find solutions to complex and multidimensional problems (Saaty, 1990).

The AHP is a technique capable of evaluating both numerical and qualitative elements in the decision-making process. This method uses linear weights, incorporating the preferences, experiences, knowledge, intuition, judgments, and thoughts of individuals or groups (Saaty, 1980:215).

With its advantages of being simple, practical, and flexible, the AHP has been subjected to extensive research since its development and has been used in many applications related to MCDM (Ho and Ma, 2018:399).

The AHP stands out as a key method in decision-making processes. It aims to find rational and intuitive solutions to determine the best option among alternatives presented in light of various criteria. In this phase, the decision maker conducts simple pairwise comparisons and uses them to develop overall priorities that will rank alternatives. This system provides a means of increasing consistency while allowing for inconsistencies among decisions (Saaty and Vargas, 2001:1).

This technique allows for both objective and subjective evaluations. This ensures that the knowledge and experience of the experts involved in the problem-solving process become as important as the data to be used. The decision-making process is a decisive factor.

AHP is a distinct measurement theory that generates value scales from pairwise comparisons and ratings and utilizes both qualitative and quantitative data (Saaty and Özdemir, 2003:1063).

For an organized and prioritized decision problem, it is necessary to break the problem into the following steps (Saaty, 2008:83).

1. The problem is defined and the type of information to be achieved is determined.

2. Objectives begin with the highest objective; then, objectives are determined from a broad perspective, and criteria that establish connections between elements are arranged in the middle of the hierarchy tree, with alternatives arranged at the bottom.

3. Pairwise comparison matrices are prepared, and each criterion at the higher level is compared with criteria at the lower level.

4. The weights of the criteria are calculated using the priority rankings obtained from the pairwise comparison matrices for each criterion.

1.5.5. ANP (Analytic Network Process) Method

ANP, like AHP, was developed by Thomas L. Saaty. Compared to AHP, ANP offers a more general approach. While AHP uses a top-down hierarchical model, ANP implements an interactive hierarchical structure (Timor, 2011: 18). It is based on feedback and interdependence between decision criteria and alternatives. It emerged as a more accurate model for difficult decision-making situations. ANP defines problems, the connections between criteria, and the directions of these connections, creating a network model suitable for the purpose. The fundamental principles of AHP and the logic of pairwise comparison also apply to the ANP method (Ömürbek, 2013: 54). Dependence within a set of criteria is called internal dependence, while dependence between sets of criteria is called external dependence (Niemira & Saaty, 2004: 575). The analytic network process structure is given below.

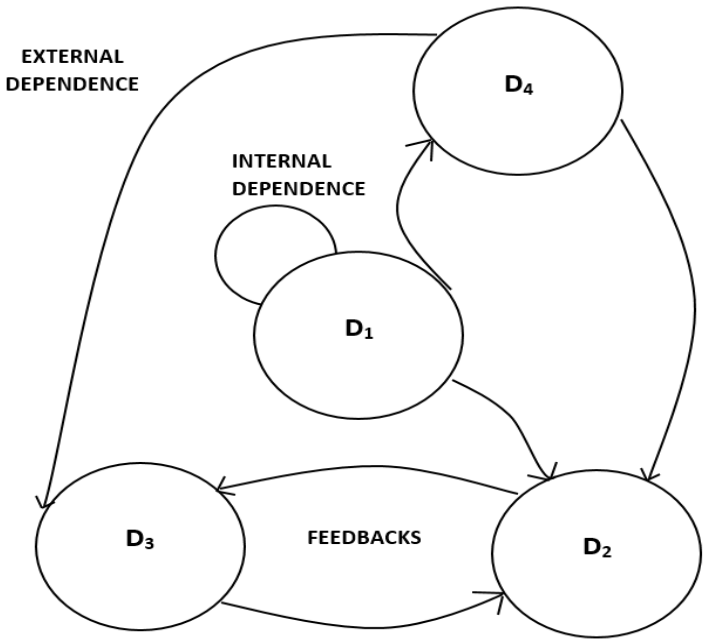

Figure 3: Analytic Network Structure Process

Source: Vargas & Harker, 1987: 1384

The application steps of the ANP method are carried out in the following order (Kaya, 2019: 41).

- ✓ Step 1: Determining clusters, elements, and relationships
- ✓ Step 2: Comparing the effects of clusters and cluster elements

- ✓ Step 3: Creating the pairwise comparison matrix
- ✓ Step 4: Creating the supermatrix
- ✓ Step 5: Creating the weighted supermatrix
- ✓ Step 6: The process is concluded by obtaining the limit matrix and calculating the importance weights.

1.5.6. MAUT (Multi-Attribute Utility Theory) Method

MAUT aims to maximize utility in problems with multiple, conflicting criteria (Kul, 2012: 34). It helps us find the most beneficial option for the problem, based on both qualitative and quantitative criteria. The method makes subjective information calculable, allowing us to select the most beneficial option (Løken & Botterud, 2007: 1586). When applying the MAUT method, the following steps should be followed sequentially (Tunca et al. 2016: 4-5):

- ✓ Step 1: Determine the criteria and the attributes that will aid in criterion selection
- ✓ Step 2: Determine the attribute weights
- ✓ Step 3: Determine the decision matrix
- ✓ Step 4: Calculate normalized utility values
- ✓ Step 5: Calculate total utility values

1.5.7. VIKOR (Vise Kriterijumska Optimizacija Kompromisno Resenje) Method

VIKOR, which stands for "VlseKriterijumska Optimizacija I Kompromisno Resenje," is an MCDM method founded by Yu in 1973 and Zeleny in 1982. It entered the literature in 2004 through Opricovic and Tzeng as an MCDM method that can use datasets consisting of various measurement units (Arslan, 2018).

The VIKOR method is a method developed to solve a discrete decision problem, employing incomparable and conflicting criteria (http://acıkders.ankara.edu.tr). This method allows decision makers to reach a final decision by ranking alternatives and focusing on making choices to determine

compromise solutions (the most suitable solution closest to the ideal) (Obricovic & Tzeng, 2004:445).

Unlike other methods, the VIKOR method can reflect the outcome by maximizing group benefit and minimizing the regret of those with opposing views (Opricovic & Tzeng, 2007:514). The steps of the VIKOR method are:

- ✓ Step 1: Creating the Decision Matrix (A)
- ✓ Step 2: Determining the Best and Worst Criterion Values
- ✓ Step 3: Creating the Normalized Decision Matrix (R)
- ✓ Step 4: Creating the Weighted Normalized Decision Matrix (V)
- ✓ Step 5: Calculating the Si and Ri Values
- ✓ Step 6: Calculating the Qi Values
- ✓ Step 7: Ranking the Alternatives and Checking the Conditions

1.5.8. ELECTRE (Elimination and Choice Expressing Reality) Method

The ELECTRE method compares each option in pairs across criteria using the data in the decision matrix and offers a systematic approach based on the superiority relationships established through these comparisons. The ELECTRE method constitutes a group of multi-criteria decision-making analysis methods that encompasses a variety of techniques. In fact, the ELECTRE group (ELECTRE I, II, III, IV, IS, and TRI), which is based on the same basic principles and exhibits only minor differences, diversifies according to the problem type and functional differences (Karakaşoğlu, 2008; Roy, 1991).

The ELECTRE method stands out for its ability to compare alternatives or decision-making units (DMUs) and determine the best option. This process results in a ranking through comparisons where all alternatives are evaluated according to their criteria values and weights, allowing the alternatives to be ranked from best to worst. This method is not ideal. Thus, a preference ranking is created based on the superiority of one option over another. Decision makers can find the most suitable alternative by following the steps of the ELECTRE method. The ELECTRE method, which is a basic approach based on the principle of “dominance”, examines whether the degree of superiority between the options exceeds a certain level and questions whether the value in the opposite direction remains below a certain threshold value (Eryürek, 2003:38).

1.5.9. The ENTROPY Method

Rudolf Clausius introduced the term "entropy" to thermodynamics in 1863. He defined it as a representation of the amount of thermodynamic energy and related it to the temperature of a system and the heat applied to it (Fang, Rajasekera, & Tsao, 2012: 1). In 1948, Claude E. Shannon introduced the concept of "information entropy" (Karaatlı, 2016: 66). This concept measures uncertainty and is widely applied in engineering, management, and similar fields. Information entropy serves as an indicator of both the quality and quantity of information collected in decision-making scenarios and reflects the accuracy and reliability of decisions after they are made. The entropy weighting method helps quantify the amount of useful information from available data, proving to be a robust metric when faced with varying evaluation situations during different decision-making processes (Wu, Sun, Liang, & Zha, 2011: 5163). Additionally, the entropy method is used to determine the importance levels of criteria in decision-making problems without the need for hierarchical modeling support (Çakır & Perçin, 2013: 79). A low entropy value indicates that the system is at a correspondingly low level. The weight of the index is determined based on the level of information obtained by the entropy method, one of the fixed-weight approaches (Vatansever & Akgül, 2018: 122).

1.6. Related Research

This study applied MCDM methods to assess sustainability performance. Numerous studies in domestic and international literature demonstrate how MCDM methods can be used individually or in combination.

Bektaş and Güleç (2021) analyzed the performance of 15 cement companies listed on the BIST (Istanbul Stock Exchange), considering both financial and non-financial criteria. For this analysis, they used ratio analysis, business life cycle curve analysis, data envelopment, and Malmquist analysis techniques based on data from 2008 to 2019. An examination of the 2019 sustainability reports focused on environmental and social responsibility revealed that the companies engaged in positive activities. The companies' financial indicators were noted to have high liquidity, low debt, and high profitability compared to other companies. The vast majority of the analyzed companies were found to be in the maturity stage.

Binboğa and Özdil (2021) aimed to investigate how the inclusion of companies in the Borsa Istanbul 100 Index in the sustainability index affects their financial performance. Sustainability measurement was conducted considering the economic aspect. They examined indicators such as companies' current ratios, earnings per share, pre-tax profits, return on equity, and return on assets. They conducted their analyses using the MCDM methods ENTROPY and TOPSIS. The research concluded that there was no significant difference between companies included in the BIST Sustainability Index and those not included in the index.

Ateş and Usman (2021) examined the sustainable development performance of developing countries. The research sample consisted of 25 countries included in the Morgan Stanley Capital International Emerging Market Index. Sustainable development performance indicators focused on economic, environmental, social, governance, and financial dimensions. Thirty-seven criteria were generated from these dimensions and evaluated using the Grey Relational Analysis method. The study identified the countries with the highest sustainable development performance as the Czech Republic, South Korea, and Greece, while the countries with the lowest performance were India, Pakistan, and the Philippines. The findings concluded that high economic and financial performance do not necessarily guarantee high sustainable development performance, and that sustainable development performance can be achieved by demonstrating high performance in conjunction with environmental, social, and governance performance.

Aksoylu and Taşdemir (2020) conducted a study covering three aspects of sustainability. The study included six companies operating in the manufacturing industry and machinery and material production sectors, listed in the BIST Sustainability Index. Information was obtained from the 2018 sustainability reports. The TOPSIS method was used for performance analysis, and corporate sustainability performance was ranked. Otokar Otomotiv ve Savunma Sanayi A.Ş. received the highest score in the analysis.

Şeker and İslamoğlu (2020) investigated the economic sustainability of TÜPRAŞ, a company operating in the energy sector, between 2008 and 2015. Data obtained from TÜPRAŞ was analyzed using the ENTROPY and PROMETHEE methods. When annual rankings were made in terms of the economic aspect of

sustainability, 2015 stood out as the year with the best performance. Because there is no single globally accepted index, it was not possible to assess the company's sustainability. The research was concluded by conducting only an annual performance evaluation.

Şahin (2019) examined the corporate sustainability of Boytaş in the furniture sector between 2013 and 2018, in terms of its economic, environmental, and social aspects. Sustainability performance was assessed using the ENTROPY-based TOPSIS method. The analysis was conducted by examining three dimensions of sustainability and discussing an additional dimension that brings these dimensions together. It was determined that economic performance generally increased, environmental performance fluctuated, and social performance yielded similar results to the overall analysis.

Aytekin and Erol (2018) evaluated whether companies' financial performance was a sufficient indicator in the sustainability index. The study used the periods November 2014 to October 2015 for BIST 30 companies, November 2015 to October 2016 for BIST 50 companies, and November 2016 to October 2017, when 63 companies were evaluated. Ten financial indicators of non-financial institutions were examined and analyzed using the ARAS (Additive Ratio Assessment) method. The rankings obtained from the analyses were compared with those of the companies in the BIST Sustainability Index. Consequently, financial performance alone was found to be a sufficient indicator for inclusion in this index.

Öztel, Aydın, and Köse (2018) conducted research on this topic, emphasizing the importance of the concept of corporate sustainability. The economic, environmental, and social dimensions of Ak Enerji were evaluated annually. The criteria for sustainability dimensions were determined using the ENTROPY and TOPSIS methods, and comparisons were made by calculating their weights. The research was conducted without subjective judgments. It concluded that there was an inconsistency between the economic, environmental, and social dimensions. In the years when the economic dimension was successful, the environmental and social dimensions were unsuccessful.

Perçin and Sönmez (2018) aimed to examine the continued financial success of five insurance companies operating on the Borsa Istanbul. Indicators such as profitability, activity, leverage, and liquidity ratios were determined, and measurements were conducted using the ENTROPY and TOPSIS methods. Ak Sigorta, traded on the BIST, received the highest score in the financial performance assessment, and this high value was determined to be due to the ratio of short-term debt to assets.

Raut, Cheikhrouhou, and Kharat (2017) chose to examine the sustainability performance of six major Indian banks. The study employed BSC (Balanced Scorecard), Fuzzy AHP, and Fuzzy TOPSIS techniques. Sustainability was assessed from the perspectives of financial stability, customer relationship management, internal business processes, and environmentally friendly management systems. BSC was used for criteria selection, Fuzzy AHP for weighting, and Fuzzy TOPSIS for ranking and evaluation. The analyses revealed that the environmentally friendly management system was not sufficiently robust compared to other criteria and that insufficient attention was paid to the developing banking sector in India.

Akçakanat, Eren, and Aksoy (2017) compared the activity and sustainability reports of seven banks operating in Türkiye using MCDM methods. The results were evaluated using methods such as ENTROPY, ARAS, MOOSRA, and COMPAS and are presented in the comparison table. Ziraat Bank ranked highest in all four methods. It has been stated that this situation is a result of Ziraat Bank's social factors having a higher value than other banks and environmental factors being more effective.

Afful-Dadzie, Afful-Dadzie, and Turkson (2016) examined the sustainability performance of seven European banks between 2008 and 2013 using triple performance indicators. An industry threshold encompassing all dimensions of sustainability was established, and banks falling below this threshold were considered unsuccessful. The TOPSIS method was used in the analysis. Instead of focusing on companies' implementation of sustainability practices to a certain degree, recommendations were developed to define a sustainability threshold for companies and monitor their performance levels.

Aracı and Yüksel (2016) examined the 2013 sustainability reports of 15 companies included in the BIST Sustainability Index. Among these reports, prepared within the framework of the GRI (Global Reporting Initiative) Reporting Guidelines, 4 of the 15 companies were determined to be compliant with the GRI G4 principles. The analysis of 8 companies reported a sustainability disclosure score of 75%, with TOFAŞ Türk Otomobil Fabrikası A.Ş. and Yapı ve Kredi Bankası A.Ş. ranking first and second. It has been stated that reporting by companies in the BIST Sustainability Index in accordance with GRI reporting principles will facilitate research comparisons and reliability.

Ergüden and Çatlıoğlu (2016) ranked the sustainability performance of companies in the energy sector on the BIST in 2013 using the TOPSİS method, based on the criteria of "investment climate, amount of renewable energy produced, recycling, and greenhouse gas emissions." The companies included in the study were Akenerji, Aygaz, TÜPRAŞ, and Zorlu Enerji. It was concluded that Zorlu Enerji contributed the most to sustainability in Türkiye. Aygaz was the lowest-performing bank in the ranking.

Aras, Tezcan, and Furtuna (2018) compared the management sustainability performances of six traditional banks and one participation bank based on 2013. In this study, in addition to the economic, environmental, and social aspects of sustainability, corporate governance and financial dimensions were also examined, and a five-dimensional corporate sustainability model was created. ENTROPY and TOPSİS methods were used in the study. It was revealed that there was no significant performance difference between traditional and participatory banks in terms of sustainability elements. The report stated that a sufficient result in corporate sustainability cannot be achieved by performing well in only one dimension.

Shanmugam, Lakshmi, and Visalakshmi (2015) surveyed 50 companies operating in the Indian manufacturing sector, including automobiles, cement, pharmaceuticals, chemicals, and textiles. A survey was conducted to collect data from the companies. Their corporate social responsibility performance was analyzed using structural equation modeling and the AHP method. The results showed that the automobile sector is more successful in corporate social responsibility.

Öztel, Alp, and Köse (2015) viewed the economic, environmental, and social sustainability dimensions of Linde (chemicals) as a multi-criteria decision-making problem. Multiple indicators were determined for each dimension they examined. The indicators of these three sustainability dimensions were defined as the criteria for the MCDM problem. They analyzed sustainability performance between 2009 and 2013 using the ENTROPY and MAUT methods. The analysis results revealed a steady increase in economic and social sustainability performance, while their environmental performance fluctuated.

Diaz-Balteiro, Voces, and Romero (2011) examined the sustainability of Europe's paper industry. Each country's sustainability was defined by 14 economic, environmental, and social indicators. Data were collected through a survey of international experts. A MCDM analysis of the data was conducted using the AHP method. This analysis concluded that Finland has the most sustainable paper industry in Europe.

Research on sustainability performance in Türkiye is found in various sectors, including banking, energy, manufacturing, airlines, and insurance. Studies conducted through sustainability reports and financial statements have generally focused on performance assessments for a single company, sector, or specific time period. These studies generally focus on assessing corporate sustainability by addressing the three dimensions of sustainability or on determining the impact of financial reports on corporate sustainability. However, studies that separately assess the economic, environmental, and social dimensions of sustainability and aggregate the criteria related to these dimensions under corporate sustainability performance exist only in the manufacturing sector. No study has been found that combines economic, environmental, social, and corporate performance measures within the BIST Sustainability Index, using data from the energy, automotive, and food sectors, which report in accordance with the GRI Reporting Initiative.

CHAPTER TWO

SOCIO-ECONOMIC GOVERNANCE POLICIES IN MULTI-CRITERIA DECISION-MAKING

Governance is a concept associated with establishing rules and collective actions that can contribute to the development of countries. Just as governance involves multiple actors, there also multiple methods for measuring and ranking activities derived from social and economic concepts.

2.1.Areas of Application for MCDM Methods

It would be unrealistic to evaluate a country's social and economic success using a single criterion. Therefore, the sheer number of criteria forces us to resort to MCDM methods.

2.1.1. Comparing Levels of Socio-Economic Development

The standard of living of individuals residing in a region depends on numerous factors, including infrastructure, education quality, demographic characteristics, accessible healthcare, economic strength, and cultural background. This reveals the various factors that must be considered when assessing the development level of a region, city, or country. It is also a fact that, just as across countries, cities and even neighborhoods within a country have varying levels of development, and these levels change over time. Analyzing this diversity is crucial for issues such as taxes, incentives, and investment planning. Identifying the impact of existing policies and developing appropriate policies, particularly for underdeveloped regions, is crucial for achieving sustainable development.

Just as development levels vary across countries, it is also common to see variations in the development levels of different regions or cities within each country. Ideally, these differences are expected to be as low as possible. Significant development disparities between regions lead to intense migration from less developed to more developed regions. This leads to numerous problems in developed regions, such as unplanned urbanization, unplanned expansion, traffic, and transportation, while also hindering progress in less developed regions. Therefore, closing development gaps between regions becomes more difficult in the long term and exacerbates the problem (Ersungur et al., 2007:55; Ertaş and Atik, 2016:199; Özkubat and Selim, 2019:449).

Development is a phenomenon that encompasses both economic and social aspects; while economic aspects support income growth, social aspects are related to sociocultural change. Therefore, examining differences in socioeconomic development across provinces requires the joint consideration of many indicators that affect or are affected by socioeconomic development. In other words, this necessitates a holistic approach (Albayrak, 2005:153). The methods for measuring development are a separate topic of discussion. Viewing a country's development solely as a country's growth and assessing its level solely through macroeconomic data such as GDP (Gross Domestic Product) or total employment has begun to be questioned by researchers. Until the 1970s, economic indicators were considered the sole criterion for development and socioeconomic development. However, after these years, the view that development cannot be assessed solely by economic indicators and that criteria related to social development should also be taken into account emerged (Yıldız et al., 2012:147; Zorlutuna & Erilli, 2018:13).

2.1.2. Evaluating the Effectiveness of Public Policies

In today's governments, the public's desire to participate in decision-making processes is increasingly recognized. In line with this understanding, participation methods emerge in the form of public consultations by officials, surveys, interviews, discussions, user influence on government, and democratic voting. All of these features are also included in Public Policy Evaluation (PPE) studies (Fouquet et Perriault, 2010: 30).

Every policy is associated with a theory addressing social transformation. In this respect, the implementation of a policy aims to solve a problem. For example, reactions or unrest observed in a shantytown might indicate dissatisfaction with the quality of life or emotional states related to a housing problem. In the face of such problems, public authorities strive to maintain peace by increasing living standards in the neighborhood. Any public initiative undertaken in this area can be considered a reflection of public policies. Issues such as public policy analysis and evaluation are among the innovations introduced within the framework of the new public management approach. Public policy analysis provides insights into how policies will be implemented and defined at specific stages. Public policy evaluation, on the other hand, provides specific judgments about whether implemented programs are appropriate for their intended purposes and intentions. Public policy analysis generally focuses on what governments and public administrations do, why they do it, and what tools they use.

In line with the understanding of public administration, effectiveness, efficiency, economy, and governance have gained greater importance as performance factors. In this context, the role and mission of the state have become questionable. Public administration practices have modernized and improved public activities to a certain extent. Public administration has introduced significant innovations in transparency, openness, participation, and information.

Public policy analysis is an action-oriented, multi-method field of research and practice that utilizes a wide range of knowledge, particularly public administration, including political science, law, economics, and sociology, to identify, analyze, and resolve social problems (Parsons, cited in: Yıldız and Sobacı, 2013: 26). Because it is a practical field, public policy analysis has been likened by some authors to the medical profession. Just as a physician reaches a diagnosis by observing and analyzing symptoms of a disease and recommends treatment based on this diagnosis, public policy analysts prefer this era of diagnosis and treatment (Smith and Larimer, cited in: Yıldız and Sobacı, 2013: 26). With the increasing demand for social services, social interventions, and therefore expenditures, they have increased significantly. In the face of the resulting financial issues, it is necessary to question social resources and expenditures. This is where the question of public policy evaluation comes into

play. Public Policy Evaluation (PPE) aims to establish relationships between institutional goals and analyze social actions. In this sense, the results of implemented legal, administrative, and financial tools are compared with the initially established objectives.

The following actions are frequently followed in the public action sequence: First, a social problem is identified, and decision-makers develop a policy and design a program based on it, working with stakeholders. Strategic actions are then implemented. Studies on whether the actions were implemented and the impact of the results are supported by indicators. Thus, whether the objectives were achieved is examined within the framework of these indicators. Evaluation is not merely about monitoring quantitative indicators; qualitative data is also considered (Fouquet and Perriault, 2010: 31-32). The implementation of public policies is defined as the set of decisions and activities, encompassing private and public interventions, that enable the achievement of objectives. Outputs are the goods and services produced by the activities. The level of problem resolution is the effects of the policies. Etymologically, evaluation means the calculation of values. Value can be moral, aesthetic, economic, or civic. Value is often made understandable by converting it into a quantitative measure. To evaluate an action in terms of public interest, all stakeholders must agree on references (legitimate criteria). In this context, the evaluation of a public action is generally examined in terms of consistency, relevance, efficiency, effectiveness, impact, and attractiveness (Fouquet et Perriault, 2010: 31).

2.1.3. Analysis of Sustainable Development Indicators

From a business perspective, the concept of sustainability is explained as corporate sustainability. Within this framework, corporate sustainability refers to businesses conducting their operations by considering the needs and interests of not only their current stakeholders but also their future stakeholders (Dyllick and Hockerts, 2002: 131). Therefore, businesses should focus on creating long-term value and increasing their profitability rather than short-term profitability. This approach represents a new dynamic perspective that can be applied to businesses instead of the traditional growth and profit maximization model. While recognizing the importance of corporate growth and profitability, this approach also emphasizes the need for businesses to consider societal goals related to sustainable and economic development,

based on environmental protection, social equity, and economic growth, in their operations (Wilson, 2003: 1).

Considering environmental and social capital while preserving economic capital allows companies to achieve their short- and long-term goals (Hernádi, 2012: 24). Social sustainability can be defined as the process of preserving social capital and improving the living and working conditions of society and individuals by considering the quality of life of future generations (Gençoğlu and Aytaç, 2016: 52). To achieve social sustainability, a business must develop human and social capital and manage it sustainably (Dyllick and Hockerts, 2002: 134).

Sustainability reporting is a reporting system that encompasses the elements of economic wealth, social equity, and environmental protection in an integrated manner while companies perform their functions to create long-term value (Perrini and Tencati, 2006: 297). Non-financial information is presented to individuals related to the company through sustainability reports. These reports are publicly available reports that present data on corporate activities related to economic, environmental and social dimensions in the context of sustainability to business stakeholders (Heemskerk et al. 2002: 7).

Because there is a voluntary and mandatory reporting approach, companies preparing sustainability reports can act more freely by adopting the voluntary reporting method and adjusting the report's substance according to their own conditions or complying with the rules determined according to the mandatory reporting approach (Aksoy Hazır, 2018: 43-44). With the amendment made to Article 88 of the Turkish Commercial Code No. 6102 regarding sustainability reporting in our country, published in the Official Gazette dated 04.06.2022 and numbered 31856, the Public Oversight, Accounting and Auditing Standards Authority (KGK) was authorized to determine the Turkish Sustainability Reporting Standards (KGK, 2022). The Board Decision on the Turkish Sustainability Reporting Standards (TSRS) was published in the Official Gazette dated 29/12/2023. This Decision determined the companies subject to sustainability reporting and announced that these companies would be required to submit mandatory reporting as of January 1, 2024. Accordingly, businesses with total assets of 500 million Turkish Lira, annual net sales revenue of 1 billion Turkish Lira, and 250 employees are included in the mandatory reporting scope if at

least two of these companies exceed the specified thresholds in two consecutive reporting periods (KGK, 2024).

2.1.4. Abstract Concepts Such As Governance Quality, Transparency, and Perception of Corruption

The presence of corrupt activities in a country varies depending on various factors, including the country's economic, social, political, and cultural structure, leading to a gradual weakening of the social fabric. Determining whether corruption levels in a country are low or high—in other words, measuring corruption—is accomplished through a corruption index.

Many organizations have developed various indices to assess corruption. These indices include the Global Competitiveness Index (GCI, 1997), the Bribe Payers Index (BPI), the International Country Risk Guide Index (ICRG), the Opacity Index (OI), the Kaufmann, Kraay, and Zoido-Lobaton Indices (KKZ), and the Transparency International Corruption Perceptions Index (CPI). Among these widely used indices, the most widely used is the Corruption Perceptions Index developed by Transparency International. This index provides information on corruption levels by examining more countries over the years. For example, while 90 countries were examined in 2000, this number increased to 180 in 2017. This enables comparison of corruption levels worldwide. Countries are scored between 0 and 100 on the Corruption Perceptions Index. A score close to 100 percent indicates a low level of corruption; A score close to 0 indicates a high level of corruption.

Global corruption levels are presented below by the international organization Transparency International, by region and geographic category. According to this data, areas highlighted in red represent the highest levels of corruption, while areas highlighted in yellow represent the regions or countries with the lowest levels of corruption.

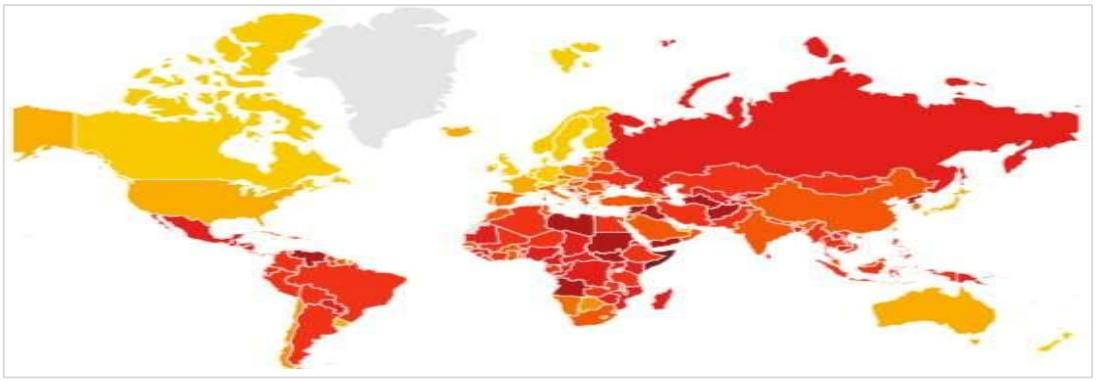

Figure 4: Global Corruption Levels (2017)
Source: Transparency International, www.transparency.org

The global average corruption perception index was recorded as 43 in 2017 (Transparency International, 2018:6). The European Union and Western Europe were identified as the least corrupt regions with a score of 66, while Sub-Saharan Africa was among the regions with the highest level of corruption with a score of 32 (Transparency International, 2018:6). In addition to a country's corruption scores, its social, cultural, and economic circumstances also influence this. When comparing corruption levels between countries, it is important to consider cultural and moral characteristics. Since legal regulations and the culture of compliance vary across countries, this should be taken into account when evaluating corruption perception indices (Fisman & Miguel, 2011:90).

When assessing the corruption perception index, it is believed to be useful to examine countries' social and economic levels, and therefore their socioeconomic structures. In this context, to enable a general comparison, Table 1 shows the 15 countries with the highest and lowest corruption perception index values in 2015, along with their social and economic development levels. The human development index is used as the social development indicator; this index is developed by the UNDP (United Nations Development Programme) based on three key criteria: health, education, and living standards. The health dimension is measured by life expectancy; the education dimension is measured by the average years of schooling for individuals over 25 and the expected years of schooling for school-aged children; and the standard of living dimension is measured by per capita national income. This index is obtained by averaging these measures. For economic development comparisons, the Economic Development Index (EDI) developed by the Legatum Institute is used.

The table shows the Corruption Perception Index (CPI), the Human Development Index (HDI) and the Economic Development Index (EDI). Countries' scores on these indices range from 0 to 100; as the score increases from 0 to 100, the level of corruption decreases, while human and economic development increase. For comparison purposes, the indices of countries with the least corruption were examined first. These countries are those with the highest corruption perception index scores, which means they are the cleanest in terms of corruption. Subsequently, the countries with the highest corruption indices were listed, with Türkiye's values appearing at the bottom of the table.

An examination of the table reveals that the countries with the lowest levels of corruption (the highest corruption index) in 2015 were Scandinavian countries. In addition, some EU countries, New Zealand, Singapore, the US, and Japan also ranked higher. The countries with the highest levels of corruption (the lowest corruption index) are generally considered underdeveloped or underdeveloped African countries. Türkiye ranks 66th in this ranking with a score of 42.

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Table 1. The 15 Countries with the Highest and Lowest Levels of Corruption and Türkiye's Corruption Perception, Human Development and Economic Development Indices (2015).

No	Countries	CPI	HDI	EDI	Countries	CPI	HDI	EDI
1	Denmark	91	92	79	Afghanistan	11	47	50
2	Finland	90	89	77	Sudan	12	49	45
3	Sweden	89	91	80	Angola	15	53	45
5	Netherlands	87	92	80	Iraq	16	64	45
6	Norway	87	94	78	Venezuela	16	76	49

Table 1 (Continue)

No	Countries	CPI	HDI	EDI	Countries	CPI	HDI	EDI
7	Switzerland	86	93	79	Yemen	18	48	38
8	Singapore	85	92	78	Zimbabwe	21	51	57
9	Canada	83	92	77	Comoros*	24	49	48
10	Germany	81	92	79	Uganda*	25	49	61
11	Luxembourg	81	89	78	Tajikistan*	25	62	57
12	United Kingdom	81	90	78	Nicaragua*	26	64	59
13	Australia	79	93	76	Madagascar*	26	51	47
14	Iceland	79	92	74	Kenya*	26	55	57
15	Belgium	77	89	76	Cameroon*	26	51	55
	Türkiye	**42**	**76**	**66**				

Source: Corruption data from Transparency International, 2016:6-7

* Countries with lower scores on the Corruption Perceptions Index have been included in the ranking due to insufficient data on human development and/or economic development indices.

When examined from the perspective of human development and economic growth, countries with the highest scores on the corruption index also appear to rank highly in terms of socioeconomic development. The human development index, based on criteria such as education level, quality of life, life expectancy, and per capita income, reflects the sociocultural structure of countries and their level of development in this regard. Therefore, it is among the primary factors affecting the level of economic development and the corruption index. An examination of these indices also reveals that the corruption index varies in direct proportion to other factors.

2.2.Criteria for Socioeconomic Governance Policies in Multi-Criteria Decision Making

2.2.1. Economic Performance (GDP, Unemployment, Income Distribution)

In today's world, countries' economic performance is compared in various ways, and these comparisons can clearly reveal their economic situation at specific periods. Analyzing a country's economic situation is similar to evaluating the economic success of businesses. However, the criteria used here are generally based

on macroeconomic indicators. The primary goal of economic policies is to increase people's living standards and ensure a secure life. Therefore, achieving economic success is crucial for international competition. Therefore, analyzing and measuring a country's economic performance is of paramount importance. However, despite recent research on performance evaluation methods, the application of these methods remains limited. Recent studies have raised awareness of the limitations of economic performance measurements. Therefore, efforts are needed to develop and implement more effective and comprehensive performance evaluation methods.

Evaluating the economic performance of countries using Multi-Criteria Decision Making (MCDM) techniques can be considered a decision-making process and analyzed. Decision-making methods that utilize multiple options and criteria for evaluating economic performance are suitable methods for such comparisons. Ranking countries based on their economic performance at specific times can be achieved through mathematical models that consider numerous different criteria and all of these criteria simultaneously. It is well known that GDP (Gross Domestic Product), as a criterion for economic performance, has a "threshold effect" in the economy. According to this notion, as GDP increases, a nation's quality of life improves to a certain extent. Above this threshold, the impact of an increase in GDP on public welfare is unpredictable. This is because the benefits derived from increased market spending are offset by input costs related to income-related gains, time loss, and the depletion of certain natural resources (Costanza et al., 2009: 9). In fact, GDP has increasingly strayed from its initial purpose and has been misapplied, becoming an indicator of the economic and social well-being of nations. Indeed, countries around the world consider it the most important measure of economic development. However, Kuznets, considered the chief architect of GDP, has repeatedly emphasized that an increase in GDP is not synonymous with economic progress (Costanza et al., 2014:91).

When determining GDP, it is crucial to take into account that people consume natural resources faster than they can be replenished. Paul Hawken stated, "We sell today what we borrowed from the future, and we call it GDP," implying that while economic development occurs, natural resources are depleted (Costanza et al. 2014:97). However, one of the weakest points of GDP is its disregard for potential social expenditures that ensure the psychological well-being of the population.

However, as is well known, it is impossible to fully measure the financial value of social expenditures (Rauch and Chi, 2010: 104).

Per Capita Income: Accurately calculating national income and per capita income is crucial for analyzing a country's economic success. National income clearly reflects a country's economic success. Per capita income, in turn, provides information about the average income level of its inhabitants. In international comparisons, national income is generally expressed in US dollars. To reach GDP in dollar terms or GDP per capita values, nominal GDP must be proportional to the exchange rate (Alkın et al., 2005).

Growth Rate: Economic development in a country means increasing production volume. Among the production functions frequently cited in records, capital and labor are the two main factors. An increase in production volume can be achieved through the contributions of capital and labor. In short, the growth rate is the percentage change in nominal GNP (Gross National Product) (Yalçın, 2003).

Unemployment Rate: The ratio of those who are able and willing to work but cannot find work to the active population is considered the country's unemployment rate. Therefore, a high unemployment rate in a country indicates that the implemented economic policies are ineffective. A high unemployment level in a country means that the people face various economic and social challenges. The first of these is the inadequate utilization of the labor force, one of the most important production elements of the economy, and consequently, the country's total production volume is insufficient. Most importantly, citizens, considered social beings, are deprived of the minimum income necessary to sustain their lives (Eleren and Karagül, 2008:1). Given that the primary goal of all economic activities and services is to increase social welfare and, consequently, a country's international competitiveness, the importance of unemployment, which has both negative economic and social effects, for a country's success in economic performance is widely accepted in the literature (Eleren and Karagül, 2008:12).

Inflation Rate: Inflation is the significant increase in the prices of goods and services frequently used in daily life. Inflation is not the increase in the price of a specific product or service, but rather the general, continuous increase in prices across

all goods and services. Consumer price-based inflation measures the variation in the price of goods and services purchased by consumers (Urfalıoğlu and Genç, 2013). One of the most important elements of stability in national economies is inflation, which represents a situation in which the general level of prices tends to rise continuously. Inflation, the most significant economic issue of the last thirty years, particularly in Türkiye, not only demonstrates some flaws in implemented economic policies but also is the source of many incalculable sociological problems for society. If inflation in a country is constantly on the rise or cannot be reduced, it is impossible for that country to develop with firm steps (Eleren and Karagül, 2008:14).

External Debt: It's quite clear that the liquidity of a country's external debt affects economic growth. In other words, a large external debt payment means a large outflow of foreign currency from the country. This reduces the capital required for imports. Consequently, economic growth is negatively affected. Some studies indicate a significant relationship between the external debt payment ratio and investment and growth (Moss and Chiang, 2003:4). Indeed, there is some evidence that high external debt payments negatively impact economic growth.

2.2.2. Education and Health Indicators

Education and health are rights that individuals have from the moment of birth. These services are essential for people to sustain their lives. Both the public and private sectors provide these services and provide external benefits to society. Health and education services directly impact the socio-economic development of countries by ensuring productivity and progress in the lives of individuals and societies.

Education enhances individuals' knowledge and skills, equipping them with the ability to understand and evaluate. With the increasing industrialization and division of labor, education is transforming into an institutional structure. Education has become a process that represents the power of individuals and societies to sustain their lives. Education plays important functions not only for individuals but also for societies. Through education, individuals have the opportunity to improve their living standards. Education also plays a critical role in the socio-economic development of countries. Improving the quality of human resources, as a fundamental element of development, is made possible through education. Education develops individuals,

enabling them to contribute to social and economic progress and be productive in all areas.

Healthy individuals contribute more effectively to economic and social production. Therefore, health is of great importance for both individuals and society. Today, the relationship between education and health is one of the most important topics to be studied in the social sciences. Generally, since the 1980s, there has been an increase in the number of studies that thoroughly analyze the connection between education and health and the mechanisms that influence this connection (Çelik, 2015: 1). The relationship between these two factors is shown to be of critical importance for the development and progress of countries. Individuals who are healthy, both physically and mentally, can participate effectively in economic and social life. Therefore, health is crucial for both individuals and society. Health services not only provide individuals with a healthy and safe life, but are also essential services for ensuring the continuity and productivity of societies. While education and health can be studied separately, they also appear as complementary and related fields. Since the 1980s, the number of studies on the link between education and health and the mechanisms affecting this link has increased (Çelik, 2015: 1).

The Organisation for Economic Co-operation and Development (OECD) is an organization that supports governments in raising the welfare of countries and in economic growth, equality, financial stability, and development. Education is considered a key source of social progress and change, encouraging and accelerating economic development (Çapanoğlu, 2017: 1). Another factor that directly impacts the level of development is health status. In recent years, OECD countries have increased the importance of the education and health sectors. Countries have begun to make numerous investments in education and health.

With the development of international relations, many international organizations have been established among countries for various purposes; economic, social, cultural, and political objectives are prominent among these. The Organisation for Economic Co-operation and Development (OECD) stands out as one of the most important of these organizations. The OECD is an international economic organization established by the Paris Convention signed on December 14, 1960. The organization is headquartered in Paris and comprises 37 member countries. The OECD aims to raise

living standards, ensure economic growth, promote equality, maintain financial stability, and assist countries in their development efforts.

2.2.3. The Rule of Law and Institutional Quality

Economics and law are two important phenomena that have existed throughout human history and strongly demonstrate their existence today. Conceptually, law is defined as the set of laws that regulate society and determine the state's power of enforcement (TDK, 2025), while economics is defined as the totality of how people produce and distribute their output for the purpose of survival, as well as the relationships resulting from these activities (Demirtaş, 2010: 243). In this respect, while law is an active science based on determining "ought-to-be" behaviors, economics has a passive nature due to its examination of the "current situation" in the process of rational decision-making (Gürpınar, 2020: 9). This difference between the two sciences allows for the establishment of a harmonious relationship.

Law and economics are concepts that ensure social order and carry out activities for the existence of society; they also significantly nourish each other. Therefore, the existence of an intertwined relationship between law, which strives to regulate social life based on principles, and the economy, a significant factor in maintaining social life, should be considered a natural phenomenon (Türkbağ, 2003:59). In this context, strengthening the relationship between law and the economy is a factor that contributes to increasing social welfare (Baykal, 2008: 77).

Ensuring the rule of law in a country has a positive impact on the economy. A strong relationship between law and the economy is closely related to the rule of law (Şaşmaz, 2019: 11). Law influences the economic system by establishing the laws that regulate the efficiency of economic institutions and actors. The influence of law on the economy creates the legal framework of rules and institutions that will ensure the orderly and orderly functioning and development of the market (Baykal, 2008:77). Therefore, ensuring legal developments and the rule of law contribute to the proper functioning of the market mechanism (Cevizli, 2013: 10). A well-functioning market mechanism increases the sense of confidence of domestic and foreign investors and ultimately contributes to the country's economic growth process (Kılınç, 2020: 47).

2.2.4. Participation, Accountability, and Access to Public Services

Globalization has led to different approaches in many areas, including public administration. The monolithic, centralized, and rigid structure of the administrative approach has failed to adequately meet changing societal demands, leading to the emergence of the concept of governance. This term was first used in the World Bank's 1989 report, "Sub-Saharan Africa: From Crisis to Sustainable Growth." Subsequently, governance and good governance issues have frequently appeared in reports by the International Monetary Fund (IMF), the Organization for Economic Co-operation and Development (OECD), and the United Nations Development Programme (UNDP) (Akbaş, 2015:333).

The term governance, in its simplest form, means "co-management and interaction." Within the concept of governance, the distinction between the governing and the governed is erased, expanding its boundaries (Aydınlı and Memiş, 2015:116). Good governance is concerned with how to make governance more positive and is particularly important for developing countries. In Turkiye, the term "good governance" was first used synonymously with "good governance" during the preparations for the Istanbul Habitat II Conference (TEPAV, 2008: 3). The principles required to ensure good governance have been addressed in various ways by many organizations, including the World Bank, the International Monetary Fund, the United Nations Development Program, and the European Union. However, in our country, elements such as legality, participation, transparency, accountability, consistency, and effectiveness have been recognized and enshrined in public administration laws.

In terms of public administration, participation refers to the involvement of non-governmental institutions, organizations, or individuals in the decision-making, planning, and implementation stages of governance. In this context, participation can take the form of being influenced by a civil society organization's recommendations on governance, or it can take the form of informing citizens during policy implementation or receiving feedback after implementation. In any case, regardless of the method used, participation stands out as an effective way to increase and improve management capacity (Arıbaş, 2015:80).

Good governance requires supporting participation at all levels and in all situations. To achieve effective results in governance processes, the public must take into account the demands of relevant institutions and citizens, and stakeholders must be willing to contribute to the organization of their relations with the state (Doğan, 2016:73; Aydınlı and Memiş, 2015:143). Participation in government has been significantly increased through civil society, particularly in Western societies where voting rates are steadily declining, to ensure the legitimacy of public activities and strengthen citizen-state relations. While participation tools in government are limited in our country compared to Europe, significant improvements in participation have been made with the reforms implemented in the 2000s. In this context, city councils, established by Municipal Law No. 5393, serve as a good example of active participation at the local level. Furthermore, Law No. 4982 on the Right to Information, which entered into force in 2004, encouraged participation by making access to information the rule and restrictions the exception, and established a legal basis for transparency and accountability in government.

Access to public services refers to a citizen's access to information about government processes. Information can be disclosed by authorities on their own initiative or provided upon citizens' requests. However, in both cases, the information must be clear and understandable. Since the provision of information is carried out by the relevant public institutions, this process implies unilateral participation. This prevents citizens from actively participating in the process; however, it is important for the transparency of government and the functioning of oversight mechanisms. Furthermore, citizens' right to information must be legally guaranteed, and they must be made aware of their right to participate in government by exercising their right to request information. In Türkiye, thanks to Law No. 4982 on the Right to Information, access to information has become a general rule, while restrictions are an exception (BEHK, 2003).

Means for accessing public services are as follows (TEPAV, 2008: 60):

- Official bulletin boards
- Information telephone lines
- Press releases, press conferences

2.2.5. Sustainability and Environmental Policies

The concept of sustainability was first introduced in the Brundtland Report in 1987. This report stated that meeting the needs of present generations should not jeopardize the needs of future generations (WCED, 1987). This concept represents a holistic understanding of development encompassing environmental, social, and economic dimensions. Since the 2000s, the United Nations Sustainable Development Goals (SDGs) have made this understanding a global policy issue.

Environmental policies constitute the environmental component of sustainable development. These policies generally include the following areas:

- Reducing carbon emissions
- Promoting renewable energy sources
- Waste management and recycling
- Conserving natural resources
- Sustaining biodiversity

The concept of environmental governance holds a significant place in policy. This concept involves the involvement of a wide range of stakeholders in environmental decisions, ensuring transparency, and embracing the principle of accountability. Sustainable development, however, cannot be explained by one-dimensional models focusing solely on the environmental dimension; on the contrary, it helps protect ecosystems and resources essential for economic and social life to meet humanity's future needs. Economic and "social issues" (e.g., lifestyles) are viewed as the primary causes of environmental problems, and it is argued that these problems must be eliminated or transformed. In this context, achieving ecological development aims to increase eco-sustainability by minimizing the production and use of harmful substances—that is, environmental pollution, the consumption of valuable resources, and consequently, environmental degradation (Littig and Grießler, 2005).

The desire of international organizations to gain a competitive advantage in a changing and developing world has led to the rapid depletion of natural resources and their inability to adequately meet the needs of individuals and society. Businesses must implement various measures and regulations to maintain their existence. To this end,

reports are prepared that provide information and benefits both internally and externally. Sustainability, which is of great importance to businesses today, requires the creation of sustainability reports that emphasize its economic, environmental, and social dimensions. Sustainability reports play a significant role as a supporting tool in collecting, analyzing, and communicating critical data for corporate sustainability, and in setting and communicating sustainability goals (Schaltegger, Bennett & Burritt, 2006: 2-4).

Institutions or organizations place great importance on sustainability performance, and sustainability reports are prepared for this purpose. Because these reports must be prepared within a systematic framework, the Global Reporting Initiative (GRI) provides a common reporting framework by establishing certain standards to be applied in the preparation of reports. The effectiveness of sustainability reports is directly proportional to the quality of the data contained in these reports. Sustainability reports prepared in accordance with GRI standards provide holistic access to activities during the reporting period and year-end data as part of the organization's management approach and strategies (Kocamış & Yıldırım, 2016: 44).

Sustainability performance can be challenging to assess because it encompasses many indicators. To overcome these challenges, the numerous criteria must be objectively transformed into a single criterion. Multi-Criteria Decision Making (MCDM) methods offer an interdisciplinary approach, offering a transparent and participatory approach with weights assigned to each criterion (Erol, Sencer & Sarı, 2011: 1089). MCDM methods have become an important tool for measuring sustainability performance by contributing to the objective evaluation of multiple criteria. These methods are frequently preferred to manage the decision-making process and achieve the fastest results, especially in situations where there are many alternatives and criteria.

CHAPTER THREE

METHODS

In this study, countries' socioeconomic governance policies were compared using TOPSIS, a Multi-Criteria Decision Making (MCDM) method, and logistic regression analysis as a supplementary method. The dataset used in the study includes indicators for 15 countries for the years 2018, 2020, 2022, and 2024, taken from the Sustainable Governance Indicators (SGI) database. The countries included in the study are: Austria, Belgium, Canada, Denmark, Estonia, Finland, Germany, Ireland, Italy, Latvia, Lithuania, New Zealand, Norway, Portugal, and Sweden. The following four core criteria were taken from the SGI dataset for each year:

- Social Welfare
- Economic Governance
- Environmental Sustainability
- Rule of Law

Each criterion was considered equally important and weighted equally (0.25). Each country's annual SGI scores were normalized according to these criteria and evaluated.

TOPSIS, a multivariate decision-making method, was used, and analyses were conducted using the MCDA Index Tool (Excel add-in). The TOPSIS method was implemented in the following steps:

1. Creating the decision matrix
2. Calculating the normalized decision matrix

3. Creating the weighted normalized matrix

4. Determining positive and negative ideal solutions

5. Calculating the distances of each alternative to the ideal solutions

6. Ranking by determining the relative proximity value

Following the TOPSIS rankings, a binary dependent variable was created based on whether the countries ranked in the top 5 each year, and logistic regression analysis was conducted based on this variable. SPSS 27.0 software was used for this analysis. Social welfare, economic governance, environmental sustainability, and the rule of law were used as independent variables in the regression model. The statistical validity of the model was assessed using the Omnibus Test, the Hosmer-Lemeshow Goodness-of-Fit Test, and the Nagelkerke R^2 Coefficient. Because some coefficients were higher than expected, the model exhibited a perfect separation problem. This was considered a limitation of the analysis. Because the SGI data is an internationally accepted scientific data source, no separate reliability test was conducted; however, it is recommended that it be supported by tests such as Cronbach's Alpha in future studies.

3.1. Research Model

This research adopts a comparative analysis model to evaluate countries' socioeconomic governance policies from a multidimensional perspective. In the model, countries are treated as alternatives, and the selected governance criteria are considered as evaluation criteria. Thus, each country's performance between specified years is measured in a multi-criteria structure, creating a numerical analysis framework.

Within the scope of the research model, countries' performance is analyzed using the TOPSIS method, using indicators obtained from the SGI (Sustainable Governance Indicators) database. In this model, the proximity of each alternative to the ideal solution is calculated based on data normalized according to the criteria, and countries are ranked. These rankings allow countries to be identified as strong or weak in governance. Furthermore, logistic regression analysis is applied to examine the potential factors affecting the rankings obtained with the TOPSIS method. This analysis statistically tests the significance of the variables that influence countries' high

or low performance. Thus, not only the rankings but also the variables affecting the ranking are evaluated within the model. In this respect, the research model both provides an objective structure to the decision-making process and comparatively analyzes countries' governance performance from a multi-criteria perspective. In this context, the research model offers a multi-dimensional evaluation approach based on quantitative data analysis.

3.1.1. TOPSIS Method and Application

TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) is one of the multi-criteria decision-making methods first developed by Hwang and Yoon (1981). This method allows each alternative to be evaluated based on its proximity to the positive ideal solution and its distance from the negative ideal solution. The positive ideal solution represents the best values for each criterion, while the negative ideal solution represents the worst values. The TOPSIS method allows the ranking of alternatives based on criteria weighted by the decision maker.

In this study, the TOPSIS method is applied to evaluate the socioeconomic governance performance of countries. In the first stage, the alternatives to be analyzed (country + year) and the evaluation criteria (social welfare, economic governance, environmental sustainability, and rule of law) are determined. Then, a decision matrix is created, and the Min-Max normalization method is applied for each criterion.

After the normalization process, equal weights (0.25) are used for each criterion, resulting in a weighted normalized decision matrix. In the next stage, the best and worst values for each criterion are determined, and the positive ideal solution and negative ideal solution are calculated. The Euclidean distances of each alternative from these two solutions are determined, and the alternatives are ranked by calculating their closeness coefficients.

All these processes are carried out using the online decision support tool called the MCDA Index Tool. Criterion weights are entered on this platform, the normalization method is selected, and TOPSIS scores are automatically calculated. The resulting scores allow for a comparative evaluation of countries and determine their performance levels. In this context, the study implements a multi-criteria decision-making process supported by quantitative analysis methods.

3.1.2 Logistic Regression Method and Application

Logistic regression is a statistical analysis method used when the dependent variable is categorical. This analysis is used to estimate the probability of a situation occurring (e.g., success/failure, presence/absence). Binary logistic regression, particularly used for binary outcomes, is preferred when the dependent variable is classified into two categories: 1 and 0. Logistic regression produces results by evaluating the effect of independent variables on the dependent variable using the odds ratio.

In this study, a dependent variable is created that is classified as high (1) or low (0) based on whether the performance levels of countries, obtained using the TOPSIS method, are above a certain threshold. Structural variables thought to influence this classification (e.g., indicators such as economic size, per capita income, and political stability) are included in the model as independent variables.

Logistic regression analysis is conducted using SPSS software. The model's suitability and significance are assessed using relevant statistical tests. This not only yields performance rankings, but also scientifically examines the factors influencing these rankings. In this respect, logistic regression is used as a complementary analysis method that enhances the explanatory power and depth of the study. In this context, the study also aims to reveal the underlying structural causes of the ranking results.

CHAPTER FOUR

DATA ANALYSIS AND FINDINGS

4.1. Data Analysis Using the TOPSIS Method

First, after decision matrix is created, the decision matrix will be normalized, then the weighted matrix will be created by multiplying it with weight value, and the ideal solutions and distances will be calculated and ranked.

4.1.1. Step One: Creating the Decision Matrix

In the first step of the TOPSIS method, the decision matrix to be used in the evaluation process is created. This matrix contains the values of the alternatives according to the specified criteria. In this study, the alternatives are country-year combinations created for each year for 15 countries in the SGI database between 2018 and 2024. Thus, each alternative represents the data for a specific country for a specific year.

The criteria in the decision matrix are grouped under the headings of social welfare, economic governance, environmental sustainability, and rule of law. Each country's scores for these criteria are entered into the table, thus completing the first step of the multi-criteria decision-making process. No transformation was performed on the data in this step; only the original SGI data was converted into a matrix. The resulting decision matrix forms the basis of the analysis process for use in subsequent steps of the TOPSIS method.

Table 2. Decision Matrix

Years	Countries	Social Welfare	Economic Governance	Environmental Sustainability	Rule of Law
2018	Austria	6,299	6,485	6,098	8,250

Table 2 (Continue)

Years	Countries	Social Welfare	Economic Governance	Environmental Sustainability	Rule of Law
2018	Belgium	6,306	6,272	5,560	8,000
	Canada	7,133	7,010	5,602	7,750
	Denmark	7,757	7,862	7,450	9,750
	Estonia	6,796	7,056	6,780	8,250
	Finland	7,311	7,314	7,667	8,250
	Germany	6,962	7,521	7,618	9,000
	Ireland	6,569	6,691	5,980	5,750
	Italy	5,798	5,549	5,709	7,250
	Latvia	5,147	6,460	6,904	8,000
	Lithuania	6,011	6,658	6,802	7,750
	New Zealand	7,107	6,748	5,918	9,500
	Norway	7,984	7,343	7,825	9,500
	Portugal	5,798	5,397	5,994	7,750
	Sweden	7,604	7,837	8,796	9,500
2020	Austria	6,271	6,551	5,958	8,250
	Belgium	6,342	6,237	5,585	8,000
	Canada	7,202	6,890	5,627	7,750
	Denmark	7,742	7,907	7,971	9,750
	Estonia	6,874	7,286	6,549	8,250
	Finland	7,261	7,254	7,598	8,250
	Germany	7,084	7,470	6,688	9,000
	Ireland	6,635	6,862	6,032	7,500
	Italy	5,409	4,585	6,234	7,000
	Latvia	5,164	6,597	6,897	8,000
	Lithuania	6,141	6,841	6,806	7,750
	New Zealand	7,169	6,664	6,054	9,500

Table 2 (Continue)

Years	Countries	Social Welfare	Economic Governance	Environmental Sustainability	Rule of Law
2020	Norway	8,013	7,350	8,133	9,500
	Portugal	6,009	5,888	6,235	7,750
	Sweden	7,458	7,884	8,750	9,500
2022	Austria	6,333	6,405	6,275	8,000
	Belgium	6,489	6,148	5,413	7,750
	Canada	7,253	6,575	5,757	7,750
	Denmark	7,695	7,841	8,060	9,750
	Estonia	6,860	7,117	6,902	8,500
	Finland	7,260	7,225	7,755	8,250
	Germany	7,068	7,290	7,529	9,000
	Ireland	6,806	7,000	6,422	7,750
	Italy	5,972	5,661	6,635	7,000
	Latvia	5,209	6,451	6,927	8,000
	Lithuania	6,117	6,586	6,774	7,750
	New Zealand	6,952	6,601	6,096	9,500
	Norway	7,903	7,041	8,004	9,500
	Portugal	6,185	5,990	6,330	7,500
	Sweden	7,491	7,660	8,780	9,500
2024	Austria	6,389	6,844	6,464	7,667
	Belgium	6,955	6,022	6,419	8,000
	Canada	6,733	5,753	6,627	8,667
	Denmark	8,041	8,033	7,361	9,667
	Estonia	6,012	6,997	6,308	9,333
	Finland	7,377	7,685	7,988	10,000
	Germany	7,066	7,399	7,694	9,000
	Ireland	6,723	6,220	5,680	7,667

Table 2 (Continue)

Years	Countries	Social Welfare	Economic Governance	Environmental Sustainability	Rule of Law
2024	Italy	5,747	5,475	6,276	6,333
	Latvia	5,986	6,438	5,857	8,333
	Lithuania	6,277	6,648	6,151	7,667
	New Zealand	6,472	6,272	5,719	8,667
	Norway	8,116	7,240	8,141	9,000
	Portugal	6,138	6,119	6,526	7,667
	Sweden	7,697	7,568	8,855	9,333

This study examined the performance of 15 different countries across four key governance indicators between 2018 and 2024. The data shows that the Scandinavian countries of Denmark, Norway, Sweden, and Finland ranked high in all areas every year. These countries have particularly high scores in the rule of law and environmental sustainability areas. For example, Sweden reached the highest score in environmental sustainability in 2024, with a score of 8,855. Similarly, Finland achieved the highest score in the rule of law area, with a score of 10,000.

The data generally indicates stable development over the years. However, fluctuations were observed in some countries. For example, Italy's economic governance score was 5,549 in 2018, falling to 4,585 in 2020, but rising to 5,475 in 2024. This suggests that economic fluctuations directly impact governance indicators.

On the other hand, a gradual improvement has been observed in the indicators of the Baltic countries of Estonia, Latvia, and Lithuania. Estonia, in particular, has shown significant improvement in this area, increasing its rule of law score from 8,250 in 2018 to 9,333 in 2024. Latvia and Lithuania have similarly shown upward trends in environmental sustainability and economic governance.

New Zealand generally scores high in social welfare and rule of law, but lower in environmental sustainability than other developed countries. This suggests that, despite its improved level of welfare, some improvements in environmental policies are still needed.

Finally, Southern European countries such as Portugal and Italy generally lag behind other countries. The relatively low scores in social welfare and economic governance in these countries suggest the need for more holistic policies for sustainable development.

Overall, it can be said that countries have made progress in four main areas over the years, but this progress has occurred at different speeds and in different areas. This suggests that countries prioritize certain areas in their governance strategies or face structural challenges in some areas.

4.1.2. Step Two: Normalizing the Decision Matrix

In the second step of the TOPSIS method, the criterion values in the decision matrix are normalized because they may have different units of measurement. This process ensures comparability of alternatives across criteria and ensures that each criterion has equal impact.

In this study, the Min-Max method was used for normalization. According to this method, minimum and maximum values are determined for each criterion, and the criterion scores are rescaled between 0 and 1 according to the following formula:

$$rij = xij - mi\,n(xj)\,ma\,x(xj) - mi\,n(xj)\,r_{ij} = \frac{x_{ij} - \mathrm{mi\,n}(x_j)}{\mathrm{ma\,x}(x_j) - \mathrm{mi\,n}(x_j)}$$

$$= max(xj) - min(xj)xij - min(xj)$$

Here;

- rij represents the normalized value,
- xij represents the original criterion value,
- min(xj) represents the minimum value of the relevant criterion,
- max(xj) represents the maximum value of the relevant criterion.

The normalized matrix aligns each criterion to the same scale, making it suitable for weighting criteria and identifying ideal solutions. As a result of this process, all criterion values are assigned a value between 0 and 1, ready for the third stage of the analysis: the creation of the weighted normalized matrix.

Table 3. Normalized Decision Matrix (Min-Max)

Years	Countries	Social Welfare	Economic Governance	Environmental Sustainability	Rule of Law
2018	Austria	0,388	0,551	0,199	0,523
	Belgium	0,390	0,489	0,043	0,455
	Canada	0,669	0,703	0,055	0,386
	Denmark	0,879	0,950	0,592	0,932
	Estonia	0,556	0,717	0,397	0,523
	Finland	0,729	0,791	0,655	0,523
	Germany	0,611	0,851	0,640	0,727
	Ireland	0,479	0,611	0,165	0,386
	Italy	0,219	0,279	0,086	0,250
	Latvia	0,000	0,544	0,433	0,455
	Lithuania	0,291	0,601	0,404	0,386
	New Zealand	0,660	0,627	0,147	0,864
	Norway	0,956	0,800	0,701	0,864
	Portugal	0,219	0,236	0,169	0,386
	Sweden	0,828	0,943	0,983	0,864
2020	Austria	0,379	0,570	0,158	0,523
	Belgium	0,403	0,479	0,050	0,455
	Canada	0,692	0,668	0,062	0,386
	Denmark	0,874	0,963	0,743	0,932
	Estonia	0,582	0,783	0,330	0,523
	Finland	0,712	0,774	0,635	0,523
	Germany	0,653	0,837	0,370	0,727
	Ireland	0,501	0,660	0,180	0,318
	Italy	0,088	0,000	0,238	0,182
	Latvia	0,006	0,584	0,431	0,455
	Lithuania	0,335	0,654	0,405	0,386

Table 3 (Continue)

Years	Countries	Social Welfare	Economic Governance	Environmental Sustainability	Rule of Law
2020	New Zealand	0,681	0,603	0,186	0,864
	Norway	0,966	0,802	0,790	0,864
	Portugal	0,291	0,378	0,239	0,386
	Sweden	0,779	0,957	0,970	0,864
2022	Austria	0,400	0,528	0,250	0,455
	Belgium	0,452	0,453	0,000	0,386
	Canada	0,710	0,577	0,100	0,386
	Denmark	0,858	0,944	0,769	0,932
	Estonia	0,577	0,734	0,432	0,591
	Finland	0,712	0,765	0,680	0,523
	Germany	0,647	0,784	0,615	0,727
	Ireland	0,559	0,700	0,293	0,386
	Italy	0,278	0,312	0,355	0,182
	Latvia	0,021	0,541	0,440	0,455
	Lithuania	0,327	0,580	0,395	0,386
	New Zealand	0,608	0,585	0,198	0,864
	Norway	0,928	0,712	0,753	0,864
	Portugal	0,350	0,407	0,266	0,318
	Sweden	0,790	0,892	0,978	0,864
2024	Austria	0,418	0,655	0,305	0,364
	Belgium	0,609	0,417	0,292	0,455
	Canada	0,534	0,339	0,353	0,636
	Denmark	0,975	1,000	0,566	0,909
	Estonia	0,291	0,699	0,260	0,818
	Finland	0,751	0,899	0,748	1,000
	Germany	0,647	0,816	0,663	0,727

Table 3 (Continue)

Years	Countries	Social Welfare	Economic Governance	Environmental Sustainability	Rule of Law
2024	Ireland	0,531	0,474	0,078	0,364
	Italy	0,202	0,258	0,251	0,000
	Latvia	0,283	0,537	0,129	0,545
	Lithuania	0,381	0,598	0,214	0,364
	New Zealand	0,446	0,489	0,089	0,636
	Norway	1,000	0,770	0,792	0,727
	Portugal	0,334	0,445	0,323	0,364
	Sweden	0,859	0,865	1,000	0,818

Table 2, the decision matrix used in the study, includes indicators of social welfare, economic governance, environmental sustainability, and rule of law for 15 countries between 2018 and 2024. However, because these indicators are measured at different scales, the values were brought to the same scale using the Min-Max normalization method before the analysis. This reduced all criteria to a value between 0 and 1 and made them comparable.

This normalization process allowed for a relative assessment of how well each country performed in the relevant year and criteria. For example, Norway's highest score of 1,000 on the social welfare criterion in 2024 indicates that it is the benchmark country on this criterion. Similarly, Sweden's score of 1,000 on the environmental sustainability criterion in 2024 demonstrates that Sweden is the most successful country in environmental matters for that year.

On the other hand, the fact that countries like Italy have low normalized values across many years and criteria suggests that these countries face specific structural challenges in terms of governance. For example, Italy's 2024 "rule of law" score of 0,000 indicates that it had the lowest performance compared to other countries in this criterion. This suggests that the country faced serious problems with its legal security and justice systems at the time.

Furthermore, the Scandinavian countries (Denmark, Norway, Sweden, and Finland) generally demonstrated high performance in all years. Denmark, in particular, achieved high scores of around 0,975 and 1,000 in both social welfare and economic governance in 2024. This demonstrates that the country's public administration is effective and its services to citizens are strong.

An examination of normalized data reveals that countries exhibit stable or fluctuating performance not only in one area but also across many different criteria. This demonstrates the need for multifaceted strategies rather than focusing on a single policy area. This is because social, economic, environmental, and legal governance are intertwined and must be considered together for sustainable development.

4.1.3. Step Three: Creating the Weighted Normalized Decision Matrix

In the third step of the TOPSIS method, the criteria values previously normalized using the Min-Max method are multiplied by the determined criteria weights to obtain a weighted normalized decision matrix. This process is performed to determine the impact of each criterion on the decision process and increase the objectivity of the results.

In this study, because the criteria are considered equally important, the weight value for each criterion is set at 0,25. Accordingly, each normalized criterion value is multiplied by a factor of 0,25 to obtain weighted values.

The matrix obtained from this process is used to determine positive ideal and negative ideal solutions. The weighted normalized matrix is one of the crucial steps in the TOPSIS analysis process for determining the best alternative suitable for the decision maker.

Table 4. Weighted Normalized Decision Matrix

Years	Countries	Social Welfare	Economic Governance	Environmental Sustainability	Rule of Law
2018	Austria	0,097	0,138	0,050	0,131
	Belgium	0,098	0,122	0,011	0,114
	Canada	0,167	0,176	0,014	0,097

Table 4 (Continue)

Years	Countries	Social Welfare	Economic Governance	Environmental Sustainability	Rule of Law
2018	Denmark	0,220	0,238	0,148	0,233
	Estonia	0,139	0,179	0,099	0,131
	Finland	0,182	0,198	0,164	0,131
	Germany	0,153	0,213	0,160	0,182
	Ireland	0,120	0,153	0,041	0,097
	Italy	0,055	0,070	0,021	0,063
	Latvia	0,000	0,136	0,108	0,114
	Lithuania	0,073	0,150	0,101	0,097
	New Zealand	0,165	0,157	0,037	0,216
	Norway	0,239	0,200	0,175	0,216
	Portugal	0,055	0,059	0,042	0,097
	Sweden	0,207	0,236	0,246	0,216
2020	Austria	0,095	0,143	0,040	0,131
	Belgium	0,101	0,120	0,012	0,114
	Canada	0,173	0,167	0,015	0,097
	Denmark	0,219	0,241	0,186	0,233
	Estonia	0,145	0,196	0,083	0,131
	Finland	0,178	0,194	0,159	0,131
	Germany	0,163	0,209	0,093	0,182
	Ireland	0,125	0,165	0,045	0,080
	Italy	0,022	0,000	0,060	0,045
	Latvia	0,001	0,146	0,108	0,114
	Lithuania	0,084	0,164	0,101	0,097
	New Zealand	0,170	0,151	0,047	0,216
	Norway	0,241	0,200	0,198	0,216
	Portugal	0,073	0,094	0,060	0,097

Table 4 (Continue)

Years	Countries	Social Welfare	Economic Governance	Environmental Sustainability	Rule of Law
2020	Sweden	0,195	0,239	0,242	0,216
2022	Austria	0,100	0,132	0,063	0,114
	Belgium	0,113	0,113	0,000	0,097
	Canada	0,177	0,144	0,025	0,097
	Denmark	0,215	0,236	0,192	0,233
	Estonia	0,144	0,184	0,108	0,148
	Finland	0,178	0,191	0,170	0,131
	Germany	0,162	0,196	0,154	0,182
	Ireland	0,140	0,175	0,073	0,097
	Italy	0,070	0,078	0,089	0,045
	Latvia	0,005	0,135	0,110	0,114
	Lithuania	0,082	0,145	0,099	0,097
	New Zealand	0,152	0,146	0,050	0,216
	Norway	0,232	0,178	0,188	0,216
	Portugal	0,087	0,102	0,067	0,080
	Sweden	0,197	0,223	0,245	0,216
2024	Austria	0,105	0,164	0,076	0,091
	Belgium	0,152	0,104	0,073	0,114
	Canada	0,134	0,085	0,088	0,159
	Denmark	0,244	0,250	0,141	0,227
	Estonia	0,073	0,175	0,065	0,205
	Finland	0,188	0,225	0,187	0,250
	Germany	0,162	0,204	0,166	0,182
	Ireland	0,133	0,119	0,019	0,091
	Italy	0,051	0,065	0,063	0,000
	Latvia	0,071	0,134	0,032	0,136

Table 4 (Continue)

Years	Countries	Social Welfare	Economic Governance	Environmental Sustainability	Rule of Law
2024	Lithuania	0,095	0,150	0,054	0,091
	New Zealand	0,112	0,122	0,022	0,159
	Norway	0,250	0,193	0,198	0,182
	Portugal	0,083	0,111	0,081	0,091
	Sweden	0,215	0,216	0,250	0,205

In Table 4, because each decision criterion (social welfare, economic governance, environmental sustainability, and rule of law) carries varying levels of importance, a weighted normalized decision matrix was created by applying weights to the normalized decision matrix. This process incorporates not only the performance levels of countries but also the relative importance of the criteria into the analysis.

An examination of the weighted matrix reveals that Scandinavian countries (especially Denmark, Sweden, Norway, and Finland) generally stand out with both high criteria scores and after weighting these criteria. For example, in 2024, Finland stands out as one of the countries with high scores in both environmental sustainability (0,187) and rule of law (0,250). Similarly, Denmark ranked highly in 2024 with a score of 0,244 for social welfare and 0,250 for economic governance.

Some countries, such as Italy, have lower scores compared to other countries according to this table. In particular, Italy's 2024 score of 0,000 for the rule of law criterion demonstrates its weakest performance in this area and the lowest raw value during the normalization process. At the same time, criteria such as social welfare (0,051) and economic governance (0,065) also show very low values. This suggests that Italy experienced both social and administrative difficulties during this period.

On the other hand, while New Zealand has relatively low scores in areas such as environmental sustainability, it stands out by achieving high scores in the rule of law criterion every year (for example, it always reached scores around 0,216 or 0,159 in this criterion in 2018, 2020, 2022, and 2024). This suggests that the country has a

strong rule of law structure but lags behind other developed countries in terms of environmental policies.

While Baltic countries such as Latvia, Lithuania, and Estonia have averaged some criteria, they have shown relative improvements over the years, particularly in environmental sustainability and economic governance. This suggests that these countries have strengthened their sustainable development policies over time.

As a result, this matrix allows for a more holistic assessment of countries' governance performance, not just based on scores but also based on criteria weightings. This allows for a more accurate calculation of each country's distance from the ideal solution in the next step of the TOPSIS method.

Step Four: Calculating Ideal Solutions and Distances

In the fourth step of the TOPSIS method, the positive ideal solution (A^+) and negative ideal solution (A^-) are determined using the normalized and weighted decision matrix. The positive ideal solution corresponds to the highest values for each criterion, while the negative ideal solution corresponds to the lowest values. These two reference points are used as a basis for comparing the performance of each alternative.

After the ideal solutions are determined, the Euclidean distance of each alternative from these solutions is calculated. This process determines how close each alternative is to the ideal situation and how far it is from the negative ideal situation. These distances are calculated using the following formulas:

$$S_i^+ = \sqrt{\sum_{j=1}^{n}\left(v_{ij} - v_j^+\right)^2}\ ;\quad S_i^- = \sqrt{\sum_{j=1}^{n}\left(v_{ij} - v_j^-\right)^2}$$

Here:

- S_i^+ : Distance to positive ideal solution,
- S_i^- : Distance to negative ideal solution,
- vij: Weighted normalized criterion value,
- v_j^+ , v_j^-: Ideal and negative ideal value of the relevant criterion.

Finally, the TOPSIS score (C_i) of each alternative, i.e., the coefficient of closeness to the ideal solution, is calculated with the following formula:

$$C_i = \frac{S_i^-}{S_i^+ + S_i^-}$$

This score assigns a value between 0 and 1 to each alternative. The closer the score is to 1, the closer the alternative is to the positive ideal and the higher its preference level. This step yields a TOPSIS score and associated ranking for each alternative.

Table 5. Positive and Negative Ideal Values According to Criteria

Criterion	**Positive Ideal (A^+)**	**Negative Ideal (A^-)**
Social Welfare	0,25	0,00
Economic Governance	0,25	0,00
Environmental Sustainability	0,25	0,00
Rule of Law	0,25	0,00

Note: Values were obtained with equal weighting (0.25) after Min-Max normalization.

In the TOPSIS method, to understand how good or bad each alternative (country) is, it is first necessary to determine the positive ideal (A^+) and negative ideal (A^-) values for each criterion. These values represent the best and worst possible situations for the relevant criteria. In other words, positive ideal values indicate the "best performance," while negative ideal values indicate the "weakest performance." The four main criteria used in this study (social welfare, economic governance, environmental sustainability, and rule of law) were normalized using the Min-Max method, then given equal weight, and the maximum value for all criteria was set at 0.25. This means that there is no prioritization among the criteria, and each is considered equally important. As seen in the table, the positive ideal value for each criterion is set at 0.25, and the negative ideal value is set at 0.00. This means that:

• The closer a country's value is to 0.25 for any criterion, the more successful it is on that criterion.

• Conversely, the closer a country's value is to 0.00, the lower its performance in that area.

These values will be used in the next step to calculate each country's distance from the positive and negative ideal solution. This will provide a more concrete picture of countries' overall success scores and rankings.

In conclusion, this table is one of the fundamental building blocks of TOPSIS analysis and provides a critical reference point for assessing how close or distant countries are from ideal performance on which criteria.

Table 6. TOPSIS Score and Related Rankings

Years	Countries	S^+ (Distance to Positive Ideal)	S^- (Distance to Negative Ideal)	C_i (TOPSIS Score)	Ranking
2018	Austria	0,301	0,219	0,422	40
	Belgium	0,340	0,194	0,363	52
	Canada	0,303	0,262	0,463	30
	Denmark	0,109	0,425	0,797	13
	Estonia	0,233	0,280	0,546	26
	Finland	0,170	0,341	0,667	17
	Germany	0,153	0,357	0,699	15
	Ireland	0,306	0,221	0,419	41
	Italy	0,397	0,111	0,218	58
	Latvia	0,338	0,208	0,381	48
	Lithuania	0,295	0,218	0,424	39
	New Zealand	0,250	0,316	0,558	23
	Norway	0,097	0,418	0,812	9
	Portugal	0,376	0,133	0,261	57
	Sweden	0,057	0,453	0,888	1
2020	Austria	0,307	0,219	0,416	42
	Belgium	0,338	0,194	0,364	51
	Canada	0,302	0,260	0,462	31
	Denmark	0,074	0,441	0,856	6
	Estonia	0,237	0,289	0,549	25
	Finland	0,176	0,334	0,655	19

Table 6 (Continue)

Years	Countries	S^+ (Distance to Positive Ideal)	S^- (Distance to Negative Ideal)	C_i (TOPSIS Score)	Ranking
2020	Germany	0,197	0,335	0,630	20
	Ireland	0,306	0,226	0,425	37
	Italy	0,439	0,078	0,151	60
	Latvia	0,334	0,214	0,391	45
	Lithuania	0,284	0,231	0,448	33
	New Zealand	0,242	0,317	0,567	22
	Norway	0,080	0,429	0,842	7
	Portugal	0,340	0,165	0,326	55
	Sweden	0,066	0,448	0,871	2
2022	Austria	0,300	0,210	0,412	43
	Belgium	0,351	0,187	0,347	53
	Canada	0,301	0,249	0,453	32
	Denmark	0,071	0,439	0,860	5
	Estonia	0,215	0,297	0,580	21
	Finland	0,171	0,338	0,664	18
	Germany	0,157	0,348	0,689	16
	Ireland	0,269	0,255	0,486	28
	Italy	0,361	0,144	0,286	56
	Latvia	0,334	0,208	0,384	47
	Lithuania	0,293	0,216	0,425	38
	New Zealand	0,248	0,306	0,552	24
	Norway	0,102	0,409	0,800	11
	Portugal	0,333	0,170	0,337	54
	Sweden	0,068	0,442	0,866	4
2024	Austria	0,290	0,228	0,440	35
	Belgium	0,284	0,229	0,446	34

Table 6 (Continue)

Years	Countries	S^+ (Distance to Positive Ideal)	S^- (Distance to Negative Ideal)	C_i (TOPSIS Score)	Ranking
2024	Canada	0,274	0,241	0,468	29
	Denmark	0,111	0,440	0,798	12
	Estonia	0,271	0,286	0,514	27
	Finland	0,092	0,428	0,823	8
	Germany	0,147	0,358	0,709	14
	Ireland	0,331	0,201	0,378	49
	Italy	0,414	0,103	0,199	59
	Latvia	0,325	0,207	0,388	46
	Lithuania	0,313	0,206	0,397	44
	New Zealand	0,309	0,231	0,427	36
	Norway	0,103	0,415	0,801	10
	Portugal	0,318	0,185	0,368	50
	Sweden	0,067	0,444	0,869	3

The TOPSIS method used in the study, shown in Table 6, aims to reveal the overall success levels of countries by calculating the distance of each country from the ideal (best) and anti-ideal (worst) situations. In this method, the S^+ value represents a country's distance from the positive ideal (the best country), and the S^- value represents its distance from the negative ideal (the worst country). The resulting Ci (TOPSIS score) indicates the overall success score. This score ranges from 0 to 1, and the closer the Ci value is to 1, the more successful the country is.

Analyzing the data reveals that the country with the highest TOPSIS score between 2018 and 2024 was Sweden in 2018 ($C_i = 0.888$). This country was followed by Sweden again in 2020 (0.871), Sweden in 2024 (0.869), and Sweden in 2022 (0.866). This demonstrates that Sweden has consistently demonstrated high success in governance performance over a multi-year period. Sweden's high performance in

environmental sustainability and rule of law criteria has been particularly influential in this success.

However, other Scandinavian countries such as Denmark, Finland, and Norway have also ranked highly in all years. For example, Finland ranked 8th in 2024 with a score of 0.823, while Denmark ranked 12th with a score of 0.798. These results demonstrate that the Scandinavian countries are successful in general governance, social welfare, and environmental policies.

Italy, on the other hand, has remained at the bottom of the rankings every year. In particular, in 2020, it ranked last out of 60 countries with a TOPSIS score of only 0.151. This low performance suggests that Italy generally performs weaker than other countries in areas such as economic governance and the rule of law. Similarly, Portugal and Belgium generally rank in the middle to lower middle, presenting an unstable outlook.

New Zealand, on the other hand, generally ranked in the upper-middle group, particularly noting its strong performance in the rule of law. However, low scores in the environmental sustainability criterion may have limited its overall score.

Generally, countries' rankings have not changed significantly over the years, with only minor fluctuations. This suggests that the quality of governance has not undergone radical short-term changes and that countries' stable policies are decisive in this area.

4.1.4. Step Six: Creating a Binary Variable Based on TOPSIS Results

The relative closeness values (C_i scores) obtained from the TOPSIS method indicate the degree of closeness of each alternative to the ideal solution. Based on these values, the alternatives in the study were ranked, aiming to identify the highest-performing alternatives.

To this end, a binary dependent variable was created based on the ranking results. This variable indicates whether each alternative (country-year) ranks within the top 5 in the TOPSIS ranking. Alternatives were coded as follows:

- "1" if ranked in the top 5,

• "0" if ranked outside the top 5.

This binary variable was used as the dependent variable for the logistic regression analysis to be conducted in the next stage. The aim was to examine whether the criteria affecting countries' high governance performance are statistically significant.

Table 7. Rankings and Top 5

Years	Countries	S^+ (Distance to Positive Ideal)	S^- (Distance to Negative Ideal)	C_i (TOPSIS Score)	Ranking	Top 5
2018	Sweden	0,057	0,453	0,888	1	1
2020	Sweden	0,066	0,448	0,871	2	1
2024	Sweden	0,067	0,444	0,869	3	1
2022	Sweden	0,068	0,442	0,866	4	1
2022	Denmark	0,071	0,439	0,860	5	1
2020	Denmark	0,074	0,441	0,856	6	0
2020	Norway	0,080	0,429	0,842	7	0
2024	Finland	0,092	0,428	0,823	8	0
2018	Norway	0,097	0,418	0,812	9	0
2024	Norway	0,103	0,415	0,801	10	0
2022	Norway	0,102	0,409	0,800	11	0
2024	Denmark	0,111	0,440	0,798	12	0
2018	Denmark	0,109	0,425	0,797	13	0
2024	Germany	0,147	0,358	0,709	14	0
2018	Germany	0,153	0,357	0,699	15	0
2022	Germany	0,157	0,348	0,689	16	0
2018	Finland	0,170	0,341	0,667	17	0
2022	Finland	0,171	0,338	0,664	18	0
2020	Finland	0,176	0,334	0,655	19	0
2020	Germany	0,197	0,335	0,630	20	0

Table 7 (Continue)

Years	Countries	S^+ (Distance to Positive Ideal)	S^- (Distance to Negative Ideal)	C_i (TOPSIS Score)	Ranking	Top 5
2022	Estonia	0,215	0,297	0,580	21	0
2020	New Zealand	0,242	0,317	0,567	22	0
2018	New Zealand	0,250	0,316	0,558	23	0
2022	New Zealand	0,248	0,306	0,552	24	0
2020	Estonia	0,237	0,289	0,549	25	0
2018	Estonia	0,233	0,280	0,546	26	0
2024	Estonia	0,271	0,286	0,514	27	0
2022	Ireland	0,269	0,255	0,486	28	0
2024	Canada	0,274	0,241	0,468	29	0
2018	Canada	0,303	0,262	0,463	30	0
2020	Canada	0,302	0,260	0,462	31	0
2022	Canada	0,301	0,249	0,453	32	0
2020	Lithuania	0,284	0,231	0,448	33	0
2024	Belgium	0,284	0,229	0,446	34	0
2024	Austria	0,290	0,228	0,440	35	0
2024	New Zealand	0,309	0,231	0,427	36	0
2020	Ireland	0,306	0,226	0,425	37	0
2022	Lithuania	0,293	0,216	0,425	38	0
2018	Lithuania	0,295	0,218	0,424	39	0
2018	Austria	0,301	0,219	0,422	40	0
2018	Ireland	0,306	0,221	0,419	41	0
2020	Austria	0,307	0,219	0,416	42	0
2022	Austria	0,300	0,210	0,412	43	0
2024	Lithuania	0,313	0,206	0,397	44	0
2020	Latvia	0,334	0,214	0,391	45	0
2024	Latvia	0,325	0,207	0,388	46	0

Table 7 (Continue)

Years	Countries	S^+ (Distance to Positive Ideal)	S^- (Distance to Negative Ideal)	C_i (TOPSIS Score)	Ranking	Top 5
2022	Latvia	0,334	0,208	0,384	47	0
2018	Latvia	0,338	0,208	0,381	48	0
2024	Ireland	0,331	0,201	0,378	49	0
2024	Portugal	0,318	0,185	0,368	50	0
2020	Belgium	0,338	0,194	0,364	51	0
2018	Belgium	0,340	0,194	0,363	52	0
2022	Belgium	0,351	0,187	0,347	53	0
2022	Portugal	0,333	0,170	0,337	54	0
2020	Portugal	0,340	0,165	0,326	55	0
2022	Italy	0,361	0,144	0,286	56	0
2018	Portugal	0,376	0,133	0,261	57	0
2018	Italy	0,397	0,111	0,218	58	0
2024	Italy	0,414	0,103	0,199	59	0
2020	Italy	0,439	0,078	0,151	60	0

4.1.5. General Evaluation and Interpretation of TOPSIS Results

This study evaluated the governance performance of 15 countries in 2018, 2020, 2022, and 2024, based on the criteria of social welfare, economic governance, environmental sustainability and the rule of law. The TOPSIS method was used in the analyses and for each year, countries' C_i scores were obtained by calculating their distance from the best (positive ideal) and worst (negative ideal) situations. Based on these scores, countries were ranked according to their overall level of success.

One of the most striking results when evaluating the data is that Sweden ranked first across all timeframes. Sweden's TOPSIS scores were measured as 0,888, 0,871, 0,866, and 0,869 in 2018, 2020, 2022, and 2024, respectively, maintaining its top spot each year. This demonstrates Sweden's well-balanced and successful

performance across both environmental and governance criteria. Furthermore, Sweden has consistently stood out as the only country in the "Top 5" each year.

Sweden was followed by other Scandinavian countries such as Denmark, Norway, and Finland in the top 5 rankings. Denmark, in particular, demonstrated its strong governance structures by ranking second and third in 2022 and 2020. A common characteristic of these countries is their high standards in social services, environmental policies, and legal systems. This supports the claim that the Scandinavian model brings stability and success.

On the other hand, Italy has ranked near the bottom of the list in almost every year. In particular, in 2020, it ranked last out of 60 countries with a score of only 0.151. This demonstrates Italy's poor performance, particularly in criteria such as economic governance and the rule of law. Similarly, some countries, such as Portugal and Belgium, generally ranked in the middle to lower ranks, exhibiting fluctuations in their governance quality. Baltic countries such as Estonia, Latvia, and Lithuania generally ranked in the middle, occasionally showing upward movement but failing to crack the top 10. Canada, Germany, and New Zealand, on the other hand, generally performed positively in terms of governance but failed to reach the top, as did Sweden and Denmark.

An overall assessment of these results suggests that:

• Countries with stable and high-quality governance models demonstrate sustained long-term success.

• The rule of law, social welfare, and environmental sustainability are critical factors directly affecting a country's overall TOPSIS scores.

• An imbalance between criteria (e.g., high scores in one area and very low scores in another) can negatively impact a country's overall ranking.

• Countries' governance performance does not change significantly over time; rather, the results reflect the continuity of policies and the robustness of social systems.

The study's findings suggest that Scandinavian countries are clearly ahead in governance, while some European countries require structural reforms and that governance quality can be improved through multidimensional policies.

4.2.Data Analysis with Logistic Regression

In this study, logistic regression analysis was applied to analyze the factors that determine whether countries rank in the top 5 in the TOPSIS rankings. The dependent variable was a binary variable (0: no, 1: yes) indicating whether each alternative ranks in the top 5 according to the TOPSIS results.

Four key governance criteria, taken from the Sustainable Governance Indicators (SGI) database, were included in the model as independent variables:

- Social Welfare
- Economic Governance
- Environmental Sustainability
- Rule of Law

The analysis was conducted using the SPSS 27.0 statistical package. The model's fit and significance were assessed using the Omnibus Test, the Hosmer-Lemeshow Goodness of Fit Test, and the Nagelkerke R^2 Coefficient.

Due to the high discriminatory power of some variables, the model exhibited a problem of perfect separation. This suggests that the model may be able to separate some variables almost perfectly, and therefore some regression coefficients may be statistically exaggerated. This was noted as a limitation in the analysis.

4.2.1. Overall Significance of the Model (Omnibus Test)

Logistic regression analysis was used to determine the factors affecting the probability of countries ranking in the top 5 according to the TOPSIS method. The overall significance of the model was tested using the Omnibus Test of Model Coefficients table.

Table 8. Logistic Regression Model Omnibus Test Results

Step	Chi-square(χ^2)	df	p
Model	34.420	4	0.000

As seen in Table 7, the overall significance of the model is at p <0.001. This result indicates that at least one independent variable makes a significant contribution to the model and that the overall validity of the model is statistically supported.

4.2.2. Evaluating Model Fit (Hosmer and Lemeshow Test)

The Hosmer-Lemeshow goodness-of-fit test was applied to determine the extent to which the model fit the data set. The test results are presented below

Table 9. Hosmer and Lemeshow Goodness-of-Fit Test Results

Chi-square(χ^2)	df	p
0.000	8	1.000

According to Table 8, a p-value greater than 0.05 indicates that the model fits the data perfectly. However, such a high p-value also raises the possibility of overfitting and potential discrimination problems.

4.2.3. Accuracy Rate and Classification Success

The classification performance of the model was evaluated using the SPSS-generated Classification Table.

Table 10. Classification (Accuracy) Table

Actual Value	Prediction0	Prediction 1	Accuracy (%)
top5 = 0	55	0	100.0
top5 = 1	0	5	100.0
Overall			100.0

The model correctly classified all observations. While this suggests a superficial model strength, it should be taken as a serious warning that the data formed excessively distinct groups and that the model suffered from a perfect separation problem.

4.2.4. Coefficients and Significance of Independent Variables

The regression coefficients, standard errors, Wald values, p-values, and odds ratios (Exp(B)) of the independent variables are presented in the table below.

Table 11. Regression Coefficients of Independent Variables

Variable	B	S.E.	Wald	P	Exp(B)
Social Welfare	-92.130	4710.675	0.000	0.984	0.000
Economic Governance	108.102	5772.861	0.000	0.985	8.872
Environmental Sustainability	322.465	10696.744	0.001	0.976	1.109
Rule of Law	-65.002	2854.145	0.001	0.982	0.000
Constant	-2091.114	66597.611	0.001	0.975	0.000

As seen in Table 10, the p-values of all independent variables in the model are above 0.05. Furthermore, very high positive or negative coefficient values and extreme Exp(B) values indicate statistical instability in the model. These findings clearly demonstrate that the model suffers from a perfect separation problem. Such problems can negatively impact the reliability of logistic regression due to small sample sizes or artificial differences in the data content.

4.2.5. General Assessment and Interpretation

This section discusses the general results of the logistic regression analysis applied to determine the factors influencing whether countries rank in the top 5 in the success rankings calculated using the TOPSIS method. The dependent variable in the model is a binary variable defined by whether a country is in the top 5 (0: not, 1: in the top 5). Four key criteria (social welfare, economic governance, environmental sustainability, and rule of law) taken from the SGI database are included as independent variables.

Regarding the overall significance of the model, the Omnibus Test result ($p = 0.000$) indicates that the model is statistically significant overall. This suggests that at least one independent variable has an impact on the probability of a country being in the top 5. From this perspective, the model is valid and establishes a significant relationship with the data.

However, the Hosmer-Lemeshow goodness-of-fit test result (p = 1.000) indicates that the model provides an exceptional fit to the data. While this may seem positive at first glance, such a high p-value could mean that the model is overfitting the data, and some variables are almost perfectly separating the data. This suggests a problem with perfect separation in the model.

This is most clearly evident in the classification table results. The model correctly classified all 60 countries and achieved 100% accuracy. In other words, the model completely accurately predicted both those in the top 5 and those outside of them. While this result appears quite successful on the surface, it also indicates that some variables in the dataset have excessive discriminatory power, and therefore, the generalizability of the model in real life may be low. Such "perfect" results are not generally expected in realistic models, so this finding should be treated with caution. An examination of the regression coefficients for the independent variables reveals that they have extreme values , such as Social Welfare (-92.130), Economic Governance (108.102), Environmental Sustainability (322.465), and Rule of Law (-65.002), and none of them has a p-value below the significance threshold of 0.05. Furthermore, the Exp(B) or likelihood ratio values for these variables were sometimes 0.000 or extremely high (e.g., 8.872). This suggests that the regression coefficients are statistically unreliable and the model is inconsistent in explaining the variables.

When all these results are evaluated together, it can be said that the model works technically, but presents some problems due to the structure of the data. In particular, the relatively small sample size (n=60) and the very distinct positions of some countries in the top five may have caused the model to discriminate between variables too sharply. This situation points to the problem of perfect separation, which is occasionally encountered in logistic regression analysis and weakens the generalizability of the results.

In conclusion, this analysis generally supports the impact of governance criteria on country rankings. However, the findings should be evaluated with caution in statistical terms, and the model should be tested repeatedly with different data sets.

CONCLUSION AND EVALUATION

This study aims to comparatively analyze the governance performance of 15 countries between 2018 and 2024 by evaluating their sustainable governance indicators using TOPSIS, a Multi-Criteria Decision Making (MCDM) method, and logistic regression analysis as a supplementary tool. The countries' achievements over the years were analyzed using a decision matrix built around four key criteria: social welfare, economic governance, environmental sustainability, and the rule of law.

In the rankings obtained using the TOPSIS method, Scandinavian countries, particularly Sweden, Denmark, Finland, and Norway, have consistently achieved high and consistent performance in governance quality, consistently ranking high year after year. This demonstrates that these countries' social policy structures, environmental sustainability approaches, and rule of law practices are based on strong institutional foundations. The findings largely align with the principles of transparency, participation, accountability, and the rule of law, which are associated with good governance in the literature (Aydınlı & Memiş, 2015; Baykal, 2008).

However, performance fluctuations over the years have been noted in some countries. For example, Belgium performed poorly in economic governance and the rule of law in 2020 and 2022, while countries like Germany and Finland consistently maintained their mid- to high-level performance. This demonstrates that the reliance of governance policies on long-term planning and institutional continuity is a determining factor in performance stability. It has also been observed that even small score changes in some countries can significantly impact the rankings. This demonstrates the discriminatory power of the TOPSIS method. Furthermore, these results point to the direct impact of short-term economic or political changes on governance indicators.

In the second stage of the study, a logistic regression analysis was conducted on the "success" variable (ranking in the top 5: yes/no), created based on the rankings obtained using the TOPSIS method. This analysis, which was used in accordance with the binary structure of the dependent variable, tested the impact of social welfare, economic governance, environmental sustainability, and the rule of law criteria on countries' success.

According to the analysis results, the overall significance of the model was found to be statistically significant at the $p < 0.001$ level using the Omnibus Test. A $p = 1.000$ value obtained from the Hosmer-Lemeshow goodness-of-fit test indicates that the model is in excellent agreement with the data. Furthermore, classification accuracy was calculated as 100%. At first glance, these results indicate a very strong model structure. However, such high accuracy rates and p-values suggest that the model may have a perfect separation problem. This should be evaluated with caution, as such absolute classifications are not expected in real-world social science data. An examination of the regression coefficients for the independent variables revealed that both very high positive and negative values were reached, and the p-values were statistically insignificant. Furthermore, the extreme Exp(B) values and the large standard errors clearly indicate the presence of a perfect separation problem in the model. Such problems arise when all observations of the dependent variable are almost perfectly predicted by the independent variables, significantly reducing the reliability of the coefficient estimates. The likelihood of such problems increases particularly when the sample size is limited (Hosmer & Lemeshow, 2000). Therefore, it should be noted that despite the model's high classification accuracy, its generalizability may be limited.

This study demonstrates that a multidimensional and abstract concept like governance can be assessed with measurable indicators. It contributes to the literature methodologically by combining the sequential power of the TOPSIS method with the causal analysis capabilities of logistic regression. Integrating TOPSIS scores into regression analysis has demonstrated that MCDM methods can be integrated not only as ranking tools but also into statistical interpretation processes (Erol, Sencer & Sarı, 2011). This demonstrates that decision-making in social sciences can be supported by objective and measurable tools.

The common characteristics of the Scandinavian countries, which consistently rank highly in analyses, are strong social welfare policies, long-term strategies sensitive to environmental sustainability, and an effective legal system. In light of these findings, some policy recommendations are presented below:

• Social welfare systems should be strengthened with inclusive and equitable services.

• The rule of law should be supported not only by legal regulations but also by judicial independence and accountability mechanisms.

• Environmental sustainability should go beyond short-term economic interests and be strategically addressed within the axis of climate change, renewable energy, and natural resource management.

• Economic governance should be evaluated not only by growth rates, but also by transparency, public fiscal discipline, budget management, and oversight mechanisms.

Future studies could increase methodological diversity through comparative analyses using different MCDM methods (e.g., PROMETHEE, AHP, VIKOR). Furthermore, mixed-method approaches that incorporate qualitative datasets and public perception measures are believed to contribute to a more in-depth understanding of not only the numerical but also the contextual and cultural dimensions of governance.

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