


Chapter 3

Assessing Circular Economy Performances of Selected Countries Using Mcdm Methods: Promethee vs. CoCoSo

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ABSTRACT

The concept of the circular economy is gaining increasing attention as a sustainable economic model aimed at minimizing resource consumption and waste generation, while promoting the sustainable economic growth of organizations. However, assessing the performance of existing circular economy initiatives requires a comprehensive evaluation and analysis of multiple criteria and indicators. This chapter explores the application of the multi-criteria decision making (MCDM) method in evaluating the performance indicators of the circular economy. It considers the importance of multi-criteria decision-making methods, presents relevant case studies, and highlights the advantages and challenges associated with their implementation. Accordingly, the aim of this research is to rank the EU27 countries based on a set of circular economy indicators using the mentioned MCDM method and to identify the alternative with the best mutual relationship of circular economy performance

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indicators. The optimal alternative after the analysis is Lithuania, a member of the EU27.

INTRODUCTION

The concept of the circular economy emerged as a sustainable solution to the problem of limited resources. The inflexibility of the currently used model, which is linear in form, i.e., the “take-make-dispose” resource consumption concept, and consequently waste generation, also influenced the need for the circular economy model (Korhonen et al., 2018), (Arruda et al., 2021), (Corvellec et al., 2022). The circular economy aims to create a regenerative and sustainable system that promotes the efficiency of used resources (material, energy, process, and human), reduces waste, and encourages the economic sustainability of an organization's business model (Schögl et al., 2020). A brief overview of the basics and key principles underlying the concept of the circular economy will be presented below.

It is necessary to highlight the transition from a linear to a circular model. The linear model, which involves the use of available resources and raw materials, production of goods, and disposal of waste, has led to significant resource consumption, immeasurable negative environmental impacts, and a global economic crisis due to inefficient processes. Recognizing the need for a sustainable approach, the concept of the circular economy has gained importance (Bonviu, 2014), (Sariatli, 2017), (Garcés-Ayerbe et al., 2019), (Rajić et al., 2019), (Rajić et al., 2021), (Rajić et al., 2022). The circular economy envisages a transition from a linear model to a closed-loop system where resources are conserved, optimally used, reused, and recycled. The concept promotes the transition to circular practices, such as product design for durability, recycling and processing, special process and product design with minimal resource use, and the use of renewable energy sources (Neves, Marques, 2022).

The circular economy is guided by key principles that form the basis of its implementation (Velenturf, Purnell, 2021), (Suárez-Eiroa, 2019). Foremost, it emphasizes the elimination of waste and pollution by product design. The circular economy stresses the importance of designing products and systems that minimize waste and pollution throughout the product's life cycle. This principle particularly emphasizes the use of sustainable materials that can be recycled, and the elimination of all used harmful substances. Another principle highlighted is the need to maintain products and materials in use. The circular economy emphasizes extending the product life cycle and maximizing the use of existing resources. This can be achieved through strategies such as repair, material renewal and/or modification, and promoting platforms for sharing, predictive maintenance of machines in production, and a strategy of circular business models that provide access to products instead

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