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BIBLIOMETRIC ANALYSIS ON THE OPTIMIZATION OF OFFSHORE RENEWABLE ENERGY PORTFOLIOS USING MIXTURE DESIGN AND MONTE CARLO SIMULATION

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ABSTRACT

Given the urgency to address global climate change, decarbonizing energy systems has become crucial, requiring a shift from fossil fuels to renewable sources such as wind, solar, and biofuels. Offshore renewable energy, especially through wind farms and floating solar platforms, plays a vital role in this transition by contributing to decarbonization, economic growth, and marine ecosystem preservation. However, optimizing portfolios of offshore renewable energy technologies to maximize efficiency and sustainability poses significant challenges due to the complexities and uncertainties of energy systems. This study addresses these challenges by conducting a bibliometric mapping analysis of academic research on applying Mixture Design and Monte Carlo Simulation for optimizing offshore renewable energy portfolios. Analyzing documents from the Scopus and Web of Science databases up to December 2023, this research maps trends in the literature, identifies key publications, authors, and institutions, and explores collaboration networks. The analysis used the Bibliometrix package in R for data processing, Python for visualizations, and VOSviewer for generating co-occurrence and collaboration network maps. The results reveal significant growth in the literature on portfolio optimization, with 6,341 unique documents analyzed. This growth includes a surge in publication output over the past five years, accounting for 41.35% of total publications, and notable international collaboration, particularly among China, the United States, and Germany. While Asian countries contribute significantly (39.9% of the documents), European and American countries also play important roles. However, despite Brazil's notable collaboration, it remains less prominent in terms of total publications and citations. The analysis also highlights a scarcity of studies combining Mixture Design and Monte Carlo Simulation, with only two publications found in the context of offshore renewable energies. This gap indicates the need for more research integrating these methodologies to optimize renewable energy portfolios, presenting a significant opportunity for Brazil to advance in this field. Expanding research efforts in these areas could enhance Brazil's contribution to global renewable energy technologies and support achieving the Sustainable Development Goals (SDGs).

KEYWORDS. Bibliometric analysis. Portfolio optimization. Offshore renewable energy.

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