

Sustainability Assessment of European Countries through the Use of Multiple Criteria Decision-Making and Econometric Techniques

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Abstract

Sustainability is commonly defined as “meeting the needs of the present without compromising the ability of future generations to meet their own needs”. The 2030 Agenda for Sustainable Development is a United Nations program that represents a global commitment to achieve economic growth, social inclusion, and environmental sustainability in all countries. Commonly, sustainability is evaluated according to three basic dimensions: social, economic, and environmental. Ideally, the best sustainability situation of a territory would be attained when maximizing the benefits in the economic, social and environmental dimensions, but there is a natural conflict among these three dimensions, since when one is improved, some of the other need to be sacrificed. This makes it clear the multiple criteria decision-making nature of sustainability.

In this work, we propose to study the sustainability performance of European Countries by applying a methodology that combines both multiple criteria decision-making techniques and econometrics. Using individual sustainability development indicators for the European countries available in the EUROSTAT database (from 2010-2019), we first build composite indicators to assess the economic, social and environmental dimensions of the territories. These composite indicators are build using the Multiple Reference Point Weak and Strong Composite Indicators methodology, which is a technique based on the reference point preferential scheme commonly used in the multiobjective optimization field. According to the information obtained, secondly we perform an econometric analysis to regress the composite indicators only considering those individual indicators that are somehow controllable by policy makers. The main motivation is to know how a modification of these controllable individual indicators could affect the overall sustainability development of the territories.

Finally, we focus on the Spanish case, whose sustainability situation can be improved, as this country does not reach the best possible values of the composite indicators of the three dimensions. However, to make a decision about how to improve its situation, further information is needed in order to know the extent of the possible improvement, the trade-offs existing among the dimensions, and how this improvement could be attained.

Therefore, we build a multiobjective optimization problem based on the econometric analysis previously performed, which is aimed at identifying the most desired compromise among the three sustainability dimensions to enhance the sustainability situation of Spain. Using preference-based multiobjective optimization techniques, we solve the problem using different preference information to analyse the possible improvements that could be achieved under different scenarios.