

A Two-Stage Dea Model of Super Sbm and Malmquist for Analyzing Innovation and Energy Sustainability Efficiency of Asian Countries

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ABSTRACT

The relationship between innovation and energy sustainability is deeply interconnected, as innovation plays a crucial role in achieving long-term solutions for energy challenges. Innovation involves the introduction of new concepts, products, or techniques that drive economic progress and enhance quality of life. On the other hand, energy sustainability focuses on ensuring the availability of cost-effective and reliable energy resources while mitigating environmental impacts. In Asia, the most populous and diverse region in the world, the correlation between innovation and energy sustainability holds significant importance. The region faces the complex task of balancing rapid economic growth and urbanization with the imperative to adopt sustainable energy practices. To assess performance and identify best practices, two key global indicators, namely the Global Innovation Index (GII) and the Energy Trilemma Index (ETI), can provide valuable benchmarks. This study aims to evaluate the efficiency of innovation and energy sustainability among 32 Asian countries using a two-stage Data Envelopment Analysis (DEA) model that incorporates the Super Slacks-based Measure (Super SBM) and Malmquist approaches. Additionally, hierarchical cluster analysis will be applied to group these countries based on their efficiency scores. By examining efficiency levels, influential factors, and the impact of the innovation-energy sustainability relationship on economic growth, this research can assist policymakers in making informed decisions. Furthermore, this study seeks to contribute to the existing body of knowledge by conducting a comprehensive investigation into the relationship between innovation and energy sustainability in the Asian region.

Keywords: efficiency; innovation; energy; GII; ETI; sustainability; DEA; Super SBM; Malmquist; clustering; Asia