Book of Abstracts

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Selection of Circular Economy Indicators through a Large-scale Comprehensive Minimum Cost Consensus Model

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Since the publication of the first report on the Circular Economy (CE) in 2013, there has been a surge of interest in the topic from both society and the business community. This has resulted in the development of a substantial body of academic literature aimed at establishing principles that can serve as a theoretical foundation for the CE concept. Governments are seeking to understand how organizations are transitioning to the new production model. However, despite the efforts of researchers and companies to create effective measurement systems, it remains challenging to determine which aspects to measure and how intensely an organization is implementing the CE model. The existing measurement proposals rely on costly and time-consuming methodologies that combine different approaches [1]. To address this issue, we propose a comprehensive consensus model for large-scale group decision-making, which minimizes costs and adjusts experts' initial preferences to obtain accurate measurements of indicators on which all parties can agree. According to the agreement achieved and different rules, the indicators can be accepted or rejected. In this sense, the use of fuzzy thresholds in the acceptance/rejection rules can provide a more flexible selection process. Our research aims not only to provide a fast, useful, and accurate method for measuring CE but also to demonstrate its benefits and effectiveness by comparing its performance to a real-world case in the building industry.

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Similarities between General Type-2 Fuzzy Sets

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Fuzzy sets were first established by Zadeh[3] in 1965. In 1975, he also proposed the concept of type-n fuzzy sets[4], where the membership function is a type(n-1) fuzzy set. Interval type-2 fuzzy sets (IT2FSs)[2] are a particular case of type-2 fuzzy sets where the secondary membership function is equal to 1 in a subset of the domain and 0 otherwise. There are several examples of interval type-2 fuzzy sets that the majority of the authors did not take into account[1].

Nowadays, it is quite common to employ similarity measures where the most common measures employ a real-valued function, where 0 indicates complete dissimilarity and 1 indicates identical.

In our paper, we examined the literature for similarity measures for IT2FSs and discovered that most of them have certain shortcomings, mainly that they do not work properly for non convex secondary membership functions. In this work, we will present some counter-examples and propose a new similarity based on Jaccard's similarity which allows handling non convex secondary membership functions.

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