

The concept of sustainability has globally been an increasingly important research topic in the recent years. In 1980s the term “sustainability” started being widely used in sense of human sustainability on the planet (Imperatives 1987). The sustainable development meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainability assessment seeks to monitor and evaluate the extent to which various aspects of a given organization, industry or system meets key goals of sustainable development at various levels: global, national, sector-wide and company-level. The goal of this process is always the same – to follow up, monitor and improve the performance of the given system or organization

The existing methods have proven their usability in various forms of sustainability. A vast range of MCDA-based measures and indices based on multi-criteria decision analysis methods was created. However, an important aspect in a reliable sustainability assessment with MCDA methods is the proper modeling of criteria compensation. The strong sustainability paradigm considers the complementarity of criteria but not interchangeability. Methods with high criteria compensation support only a weak sustainability paradigm. This problem occurs to a higher or lower level in the existing MCDA methods.

It should be noticed that most of the available sustainability assessment models are based on a stable set of assessed alternatives. The main drawback of such an approach is the loss of a significant part of information and the analytical capabilities of the original MCDA models. Researchers in sustainability problems have recognized it. In such a situation, for a reliable sustainability assessment, a more detailed analysis of data variability for different periods of time is recommended.

The aim of the planned research is to create a new MCDA method for sustainability assessment. The method besides being based on the MCDA methodology foundations will be focused on solving the following issues: embracing the strong sustainability paradigm, allowing to incorporate in the evaluation process the dynamics, allow evaluating sustainability in cases characterized by data uncertainty and partial lack of data. An effort should be made to provide more objective assessments by reducing the involvement of human factor and partially replacing the decision-maker role in the process by selection or invention of a method for automatic selection of objective weights of evaluation criteria.

The work plan outline includes:

- Development of a temporal approach taking into account the variability of results over time and its integration with MCDA methods
- Development of an approach to reduce the linear compensation of criteria in MCDA methods
- Integration of the temporal approach and reduction of the linear compensation of criteria into a single model
- Study of the impact of the application of other MCDA methods on the results obtained with their use in combination with the proposed temporal and linear-compensation reduction approaches
- Study of the impact of uncertainty in the input data provided in various fuzzy forms (fuzzy set numbers, fuzzy numbers) and in interval forms on the results obtained using the newly proposed models.

