

Towards an integration in sustainability assessment: the application of the Choquet integral for siting a waste incinerator

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Multiple Criteria Decision Analysis (MCDA, Figueira *et al.*, 2005) is a valuable and increasingly widely-used tool to support decision-making processes where there is a choice to be made between different options. This approach is particularly useful in the context of sustainability assessment where a complex and inter-connected range of environmental, social and economic issues must be taken into consideration and where objectives are often competing.

It has been generally agreed that when dealing with sustainability issues neither an economic reductionism nor an ecological one is possible. Since in general, economic sustainability has an ecological cost and ecological sustainability has an economic cost, an integrative framework such as multicriteria evaluation is needed for tackling sustainability issues properly (Munda, 2005). In this sense, the analysis of the possible interactions among the elements is of particular importance for assessing the sustainability of a certain transformation.

Within this context, a very important role is played by the “non-additive measurement theory”, that makes use of the Choquet integral (Choquet, 1953; Sugeno, 1974). This last represents the generalization of the weighted average method and provides a computational structure for aggregating information taking into account interactivity between criteria.

The present paper proposes a multicriteria approach that is able to support Decision Makers in the choice of the best location for a new waste incinerator plant in the Province of Torino (Italy). Three alternative sites have been compared based on different indicators that have been aggregated using the Choquet integral in order to obtain the global performance of each solution and to better highlight the tradeoffs between the aspects involved in the decision.

The aim of the analysis is to study the contribution that the Choquet integral offers in sustainability assessment of undesirable facilities location problems, paying particular attention to the use of quantitative indicators in the evaluation process. Mention should be made to the fact that the analysis takes into account the opinion of several experts in determining the importance of the different elements of the model.

The paper, which is thus based on an integrated approach able to aid the comprehension of complex phenomena, explores innovative MCDA models in the field of sustainability assessment of territorial transformations putting in evidence strengths and weaknesses of the methodological approach.

Keywords: Multiple Criteria Decision Analysis, Choquet integral, Environmental analysis, sustainability assessment, undesirable facilities location problems.