

The theory of DRSA for assessing urban transformation scenarios

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Abstract

Territorial transformation project and, more generally, spatial plans are evaluation subjects and their consequences have to be considered and managed. In this context, different and conflicting objectives have to be taken into account, referring also to social, cultural and symbolic aspects (*Roscelli, 2005*). This leads to consider urban and territorial transformations processes as “weak” or unstructured problems since they are characterized by multiple actors, many and often conflicting values and views and a wealth of possible outcomes and high uncertainty (*Prigogine, 1997; Simon, 1969*).

The paper aims at investigating an innovative approach to address such complex topic, where the necessity of decision support tools permitting to consider simultaneously the different aspects of the problem is becoming more and more apparent.

In particular, the work proposes the use of the Dominance-based Rough Sets Approach (DRSA, *Greco et al., 2001*). The DRSA is a very recent implementation of the Rough Sets philosophy (*Pawlak, 1982*), which concerns the possibility of extending this theory to Multicriteria Decision Analysis by providing the model with preference-ordered aspects of the problem. The DRSA allows preferences models from exemplary decisions provided by the Decision Maker to be inferred, as well as the inconsistency of those exemplary decisions to be taken into account. Moreover, the analysis provides a preference model expressed in terms of easily understandable “if ... then” decision rules.

The work takes place in a more general research context where the use of the DRSA methodology in decisions-aiding processes concerning urban and territorial projects is considered. In particular, we present an application to the decision making process related to the development of the Municipal Plan of the city of Volta Mantovana (Italy). Mention should be made to the fact that the general problem has been already investigated through the use of the Analytic Network Process (*Bottero et al., 2010*). In this paper, different areas of the territory are analysed and compared by means of the DRSA on the basis of their response to several objectives that have been identified by the population through a participate planning process, such as tourism enhancement, soil consumption, economic valorisation etc. In the result of this approach the most performing areas will be put in evidence and explained through a set of specific decision rules. From the point of view of Multiple Criteria Decision Making, the results of the application show that the DRSA offers a useful tool for reasoning about the data involved in the decision problem at hand and that it is suitable to elicitate the DMs’ preferences and to support them by explaining and justifying the final choice.

Keywords: Dominance-based Rough Set Approach; Multiple Criteria Decision Making; urban and territorial transformations; sustainable development, ex-post evaluation