

## ■ MB-38

Monday, 10:30-12:00 - Q012

### Urban and Territorial Planning in MCDA 1

Stream: Multiple Criteria Decision Aid

Invited session

Chair: *Isabella Lami*

Chair: *Francesca Abastante*

Chair: *Marta Bottero*

#### 1 - "Sense" and "essence" as contents of the multidimensional decision making processes in the landscape units' recovery

*Salvatore Giuffrida, Maria Rosa Trovato*

The landscape of the Sicilian mountainous inland is marked by old towns once controlling large agricultural land areas, and conferring them a recognisable landscape significance. This societal, economic and urban shape, is nowadays a "legacy interrupted" due to the radical transformation of the economic relationships between the traditional societal economic classes, as well as to the technological progress, which eroded the link between natural structures and cultural superstructures. Nowadays, the landscape values still to be found in these territories should be assumed as the raw material for landscape policies trying to invert the impairment of such unity, but specific decision making tools need to be developed and performed to support these policies. This contribution try to identify some fundamentals of the notion of landscape, able to overcome the superficial approach based on the mere individual and hedonic perception, on the side of "consumers", and on the judgement of technicians, according to the constructivist approach, on the side of the DM. These fundamentals concern two concepts, "sense" and "essence", respectively coming from the structuralist and the phenomenological approach, and related to the relationship between "truth" and "value". Accordingly, a multidimensional decision making pattern is outlined combining the phenomenologic concepts of "immanent perception", and the semiotic concept of "semantic chain"

#### 2 - Evaluation of the resilience of complex territorial systems by using MCDA: an application to the Douro Valley (Portugal)

*Vanessa Assumma, Marta Bottero, Júlia Maria Lourenço, Roberto Monaco, Daniel Souto Rodrigues, Ana Jacinta Soares*

The present work focuses on the development of an integrated evaluation framework with the aim to assess the resilience of an environmental system. This framework analyses the environmental system by employing a set of territorial resilience indicators in the framework of a Multicriteria Decision Analysis (MCDA), and by integrating a Lotka Volterra mathematical model of cooperative type. The system of territorial resilience indicators is able to identify the most valuable and the most critical areas that need intervention in terms of enhancement and conservation. The mathematical model is a Network Environment Model (NEM) that aims to simulate future territorial scenarios when the connectivity between the landscape units under investigation is taken into account. This integrated evaluation framework is here applied to one of the most important European wine regions located in Northern Portugal: the Douro Valley. Such framework may be considered a useful support for technicians and decision-makers in the field of regional development and planning to interpret complex territorial dynamics and so defining more sustainable territorial policies and actions.

#### 3 - A Spatial multiple criteria decision aiding approach to enhance cultural heritage in fragile vulnerable contexts

*Catherine Dezio, Marta Dell'Ovo, Maria Cristina Giambro, Paolo Pileri, Alessandra Oppio*

The introduction of the concept of sustainable development in the field of cultural heritage preservation has stressed the importance of a holistic approach. Achieving a balance among cultural significance reten-

tion and economic development is a challenging policy and design territorial issue, even more in fragile and vulnerable contexts with limited resources, low return expectations and a huge tangible and intangible cultural heritage. Given such a complexity, decisions require to be based on robust methodologies in order to address choices toward a balanced trade-off between conflictual goals. In this perspective, Spatial Multicriteria Decision Aiding methodologies can support decision makers along all the steps of the process, moving from intelligence to design and, finally, to choice phase. Within this approach, we have focused on the intelligence phase with the purpose of defining a multidimensional analytical framework aimed at mapping cultural heritage with a special attention to the territorial features. The proposed framework points out the challenge of structuring a decision problem related to cultural heritage widespread along slow mobility routes. The pilot case study is represented by an on-going cycle route that crosses Northern Italy transversely. The results obtained are value maps that provide recommendations for the definition of potential regeneration strategies to be transferred to similar territorial contexts.

#### 4 - Multiple criteria decision analysis to compare hypotheses of adaptive reuse for an iconic historical building

*Beatrice Mecca, Isabella Lami, Francesca Abastante, Salvatore Corrente, Salvatore Greco*

The paper analyses six hypotheses of adaptive reuse of an iconic historical building in Italy (called "Borsa Valori") to identify the preferred alternative of requalification, by using the conjunction of Multiple Criteria Hierarchy Process (MCHP), ELECTRE III, imprecise SRF method and Stochastic Multicriteria Acceptability Analysis (SMAA) (Corrente et al. 2017). The MCHP takes into account the hierarchical structure of criteria on which the alternatives are evaluated; ELECTRE III, taking into account three types of interaction effects between criteria (strengthening, weakening and antagonistic effects), produces a partial ranking of the alternatives at hand; the imprecise SRF method permits to take into account uncertain preference information provided by the DM, while the SMAA methodology permits to provide robust recommendation, in terms of rankings and relations of preference, indifference and incomparability between the project alternatives, at each level of the hierarchy. The debate around the requalification of the "Borsa Valori", conducted in the last two years, has been huge for several reasons: the building is perceived as an historical "monument" by the citizens; it shows extraordinary architectural and typological values with a high reputation at the national level; it involves public and private interests. Despite simulated, the decision process has been conducted interfacing with experts involved in the real ongoing discussion.

## ■ MB-39

Monday, 10:30-12:00 - Q014

### Resource constrained project scheduling

Stream: Project Management and Scheduling

Invited session

Chair: *Norbert Trautmann*

Chair: *Jürgen Zimmermann*

#### 1 - A branch-and-bound procedure for the resource-constrained project scheduling problem with partially renewable resources and time windows

*Kai Watermeyer, Jürgen Zimmermann*

The resource-constrained project scheduling problem with partially renewable resources which is denoted by RCPSP/ $\pi$  has received relatively less attention by the research community to this day. For the RCPSP/ $\pi$  the capacity of each resource is given for an arbitrary subset of time periods of the planning horizon whereby each activity with a demand for this resource only consumes it if the activity is executed during these periods. The partially renewable resources make it for instance possible to model problems in the area of complex labor regulations. Our work focuses on the development of a branch-and-bound