A Model for decision making (DM) in territory management: social implications

Introduction

Land management is often a challenge because many factors must be considered in order to take the best possible decision when a problem has to be faced. It is a delicate issue because equilibrium between nature and societal demands need to be sought. It means that the preservation of the territory is tied to the relation and influences of humans in it. Thus, in our view, the concept of territory includes both parts without distinction. Decisions are very often taken without the assistance of knowledge-based systems that guarantee the best objective decision amongst a set of possible choices. On the other hand, systems designed to do such tasks are scarce and normally ignored in the decision-making process.

Objectives

The aim of this research is to elaborate a model on which a knowledge organization system for decision making can be constructed. In this instance, it is a theoretical approach, though with the intention of being applied it in a real setting in subsequent research.

Methodology

In order to build the proposed system, it is very important to have a deep, exhaustive knowledge of the topic at hand. Therefore, a given methodology for territory description and representation will be followed, which will subsequently enable the construction of a knowledge organization system (KOS) that can assist in the process of decision making regarding territory. Territory is a transdisciplinary issue whose study requires a methodological approach that can address such complexity potentially including its societal relationships. Due to this complexity, an eclectic methodology composed of four methods has been developed in order to create a model for a system for decision making regarding territory: 1) The transdisciplinary method of research, according to Nowotny (2006) and Gibbons (2002). This affects how topic is focused and studied, the way in which the transdisciplinary combination of research and action is created and the means of getting a transdisciplinary representation of the knowledge of the territory that will be the foundation for structuring the alternatives for decision making. 2) The use of the Analytical Hierarchical Process (AHP) (Saaty 1980) during the process; this enables a hierarchical order of alternatives for decision making. It has been a fundamental approach because it allows the possible alternatives for a decision
to be articulated. It is a mechanism that enables the choice of best option to be made by pointing to the best possible alternatives in a given decision, based on knowledge organization (KO) of the territory and its context. It can be understood as a technique about preferences with hierarchical aggregation that allows multi-criteria, multi-environment and multi-actor solutions to be found, as well as highlighting the uncertainty inherent in any decision process. It was also used in the selection of specialists in the transdisciplinary group. 3) The construction of the transdisciplinary working group, which was to be established according to the concepts of transversality and participation, including societal actors (Font and Subirats 2000). This includes four possibilities that represent the combination of science, technology and society very well: academics, experts in territory (selected by AHP), computer scientists, information scientists (staff hired) and societal representatives (random selections from census of the territory). 4) A method enabling an understanding of the territory by using knowledge organization of the landscapes that compose it. It is based on the Integrated Evaluation Procedure (Gómez and Riesco 2010), supported by a knowledge base (KB).

Results

After applying the above-mentioned methodology, we arrived at the following main results: 1) To form a transdisciplinary working group, made up of four sets of people:

<table>
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<tr>
<th>Groups</th>
<th>Tasks</th>
<th>Required Competencies</th>
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<tbody>
<tr>
<td>Societal representatives</td>
<td>To carry out the analysis of the territory (methodology). To contribute to the assessment of the alternatives related to the criteria and objectives arising from the analysis. To contribute experiences and feelings about the territory.</td>
<td>A random selection from the census as stated in the methodology.</td>
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<tr>
<td>Academics Experts</td>
<td>To carry out the analysis of the territory (methodology). To contribute to the assessment of the alternatives related to the criteria and objectives arising from the analysis. To explain the scientific knowledge and to articulate communication within the group.</td>
<td>Geographers, sociologists, economists, lawyers, urban planners, archeologists, art historians, engineers.</td>
</tr>
<tr>
<td>Computer Sci’s, and Tech’s</td>
<td>To support the production of knowledge arising from analysis of the territory. To construct and develop a knowledge base of the system. To perform a geo-referential study of the area connected to the knowledge base.</td>
<td>GIS technicians. Experts in knowledge computation.</td>
</tr>
<tr>
<td>Inform. Sci’s, and Comm. Specialists</td>
<td>To take care of the coordination, information resources, communications and construction of the information system.</td>
<td>Scientific communication professionals, experts in knowledge organization.</td>
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The elements of the group should be working as a team, and find a common language based on mutual learning. Thus, it is possible to transfer knowledge in the group.
allowing the production of new knowledge in order to arrive at a decision-making solution. 2) We arrive at the design of a model for constructing a knowledge organization system (KOS) for decision making (Figure 1).

Figure 1: Model on which the system for decision making is based

Based on a KB as a KOS territory. Once the scene of a given DM is raised and landscapes are identified, the system will propose criteria and objectives. Judged using AHP, it finally comes up with a range of alternatives to be taken the decision.

Conclusions
1) A model for the design and construction of a system for DM on territory has been reached. 2) The configuration of a transdisciplinary group could be made by identifying its components and tasks. 3) The foundation of the research on the transdisciplinary method has been proved very effective and has responded to the aims of this study.

References
