The strength of weaker MCDA methods

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Inspired by the interesting discussion in the EWG/MCDA Newsletter, we would like to contribute with some of our own thoughts of the behavioural aspects of decision-making and ideas on how to overcome some biases.

During the past ten years we have participated in a number of real-life MCDA applications, mainly in the field of public environmental decision making. In our vocabulary 'real-life application' (RLA) is close to the definition of Kasanen et al. (2000), but most of our applications would fit well into one or more of the categories B to F that Vincke proposed in the Newsletter of fall 2000. We have acted in these projects as the MCDA analysts as well as developed some new methodologies and software tools in conjunction with these applications.

To begin with, let us discuss some possible answers to the philosophical question "What is our goal in MCDA?":

- To assist in making "better decisions". Unfortunately, in general, there is no objective measure for a claim that one decision is better than another. At best, we can eliminate dominated alternatives, and try to control the decision process so that obvious mistakes and oversights are avoided.
- To assist in making decisions that the DMs (or the public) will be happier with. Even this weaker goal can be difficult to reach in RLAs because we cannot know the reference point, i.e., what the solution might have been with some other MCDA method, or without any method at all.
- To assist in making decisions that the DMs (or the public) will be satisfied with. Without a reference point, the DMs can judge qualitatively how well they think they understood the problem, how satisfied they were with the method, and how strongly they believe in having made the right decision. Such satisficing decision aids were discussed by Rauschmayer in the Newsletter of spring 2001.
- To save work and other resources in the decision-making process. Good MCDA methods can streamline or automate parts of the information processing and reduce the information requirements in decision making (e.g. ordinal vs. cardinal information, preference information-free methods). These savings can be assessed relatively easily. In this weakest goal, the decisions do not necessarily have to be subjectively or objectively "better". Of course the decision quality may improve if the saved resources can be used to deepen the analysis.

With these different possible goals in mind, we can try to evaluate how results from behavioural research should be considered in MCDA. For one thing, we think it is necessary to point out that the results from behavioural research typically emerge from only small fragments of behaviour. There is no clear understanding how these limited observations should be combined to understand the overall decision-making process.

Nevertheless, even fractional behavioural information is obviously useful. We believe that the most important function in each goal setting is to ensure that the decision-making method does not put any unreasonable demands on the DMs. Having the DMs make holistic evaluations in high-dimensional spaces may result in arbitrary answers. The DMs may refuse to express tradeoffs between criteria that are fundamentally incomparable or otherwise alien to them. Too many pairwise questions (as in large AHP models) may cause boredom and fatigue and result in increasingly inconsistent answers. Understanding how humans process information is clearly important when constructing various decision models. The DMs (and the public) are more likely to accept the method and the results if they are able to understand the decision model and find the method somehow "natural".

In the stronger goal settings, it is indeed essential to try to avoid the various behavioural biases that may have substantial influence e.g. "on the form of the value function model", as Stewart states in the Newsletter of fall 2000. He also mentions that "... all methods make use of direct or indirect weighting of the criteria". Of course, there is also a category of so-called preference information-free MCDA methods that can be used without direct or indirect weighting of the criteria. One obvious advantage of these methods is that they are less susceptible to the framing, anchoring and availability biases.

Preference information-free methods include e.g. the Hypervolume criterion method by Charnetski & Soland (1978), Overall compromise criterion method by Bana e Costa (1986), and SMAA-family of methods by Lahdelma et al. (1998, 2001). These methods operate by exploring the space of possible weights internally, and reveal what kinds of preferences favour each alternative. In particular, the SMAA-methods perform a stochastic weight space analysis, and compute how large shares of weights would make an alternative the best one (stochastic efficiency), or place it on a particular rank (SMAA-2). This descriptive information can then be used to identify the probably best alternatives, to eliminate inferior alternatives, or to find alternatives reflecting potential compromises. The DMs can either make the decision based on this information, or narrow the weight space by providing (partial) preference information. This approach is less sensitive to the different behavioural biases, because it can be used completely without or with only partial preference information.

Preference-information-free decision-making methods can also alleviate the problem of representing the preferences of non-existent decision actors, which was mentioned by Rauschmayer in the Newsletter of spring 2001. As these methods consider all possible preferences, they will also include the preferences of these missing DMs. Obviously, their interests must be represented among the set of criteria, and no formal method can ultimately guarantee this.

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