

**"MODELLING WITH MCDSS:
WHAT ABOUT ETHICS?"**

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MODELLING WITH MCDSS:

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ABSTRACT

Modelling the preferences of a decision maker requires that: 1) all the criteria and attributes relevant for making a choice be thoroughly considered, 2) the available alternatives be listed and ranked with respect to each criterion, and 3) the various rankings be combined to yield a global evaluation of the alternatives. The decision maker, even when he/she uses sophisticated decision aids, is often found to have difficulty with these requirements.

In this paper we argue that the decision maker's hesitation might be due to a lack of understanding of the role each criterion should play in the global judgment. A careful look at ethics - as the discipline that considers the justifications people offer for the principles and values they hold -, in conjunction with the development and usage of multiple criteria decision support systems (MCDSS), would then help enlightening the decision maker.

Keywords and expressions:

Ethics; Judgment; Modelling; Multiple Criteria Decision Making.

1. Introduction

"Le décideur attend généralement de l'aide à la décision qu'elle l'éclaire sur la manière la plus "juste" de faire intervenir les critères dans le choix d'une stratégie."

[Roy, 1985, p. 402]

Over the last decade, there has been an increasing interest in building and using multiple criteria decision support systems (MCDSS) to solve a variety of practical problems. One reason for this development is the greater availability of sophisticated, yet affordable, hardware and "user-friendly" software. A wide spectrum of managerial decisions can now be supported through systematic generation and evaluation of alternatives and criteria.

Despite their performance, multiple criteria decision support systems are often met with skepticism. The diffusion of this technology on a wide basis remains relatively slow, and one cannot blame it only on a natural resistance to novelty. The fact is that existing MCDSS may be well suited for listing decision criteria and storing information about alternatives, but they still provide insufficient means for helping decision makers to structure their goals and values. In this respect most MCDSS rather constitute a rigid tool that sometimes leaves decision makers rather confused.

In this paper we reflect on how to make multiple criteria decision support systems more helpful for structuring values. The next section describes the current state of MCDSS. The third

section highlights some features of actual MCDSS that should be improved. Section 4 contains a brief presentation of how MCDSS may benefit by explicitly considering ethics - as the discipline that deals with the justifications people offer for the principles and values they hold. Section 5 summarizes the paper and indicates avenues for future research.

2. State of the art in MCDSS

First MCDSS were designed and implemented as "stand-alone" systems, each consisting of a mathematical algorithm (corresponding to a given decision model), a rudimentary user interface supporting the human-computer dialogue, and a data file of the application at hand. They fell short, however, of fulfilling several generally recognized requirements, such as ease of use, response to changes in the user, task, or environment, and support of learning by the decision maker or information sharing among data files and decision models. (Bonczek et al., 1981; Sprague and Carlson, 1982)

Subsequent implementations of MCDSS tried to alleviate some of these shortcomings. The main improvements dealt with the management of data. They were due to technological advances in the database field and the commercial availability of corresponding software packages. (For more details, see Jelassi, 1987)

As there was a growing awareness of the crucial importance of the user interface in information systems in general and in DSS applications in particular (Pennet, 1983), the management of

user/computer dialogue is another area where significant progress was made. A greater understanding of the behavioral aspects of human/computer interactions helped formulating more effective approaches to computer-supported decision making (Schneiderman, 1980; Byrer and Jelassi, 1990). Also, innovations in hardware and software (e.g. "mouse", touch screens, light pens, color graphics, hypermedia/hypertext technologies) made the development of "friendlier" user interfaces possible.

Finally, numerous DSS studies have focused on model management. Model management aims at building, within the DSS framework, a handy supply of decision models (MCDM, simulation, time series, etc.). Dictionaries would provide information about the stored models (e.g. model name, required data inputs, possible outputs, techniques used, allowed linkages, etc.). Special software would handle a "model base" - the analogue of a database. To be satisfactory, however, model management still awaits further breakthroughs (see, for example, Blanning, 1986; Dolk, 1986; Liang, 1985).

3. Explaining the users' hesitation

Decision makers usually have difficulty finding a suitable rule for their multi-criteria decision problem. So, given the present status of model management, several MCDSS focus on a particular class of MCDM rules. In this class, numerical weights are assigned to criteria and rankings along each criterion (i.e. local rankings) are expressed on a numerical scale, each alterna-

tive receives a number of points equal to the weighted sum of its local ranks, and the alternative(s) receiving the highest number of points is (are) selected. Such rules have several advantages:

- 1) They are simple and familiar for decision makers,
- 2) Since they let decision makers select the weights, they are interactive and they take advantage of the information available in particular contexts.

Such aggregation rules, however, are very sensitive to the weights. But for a given decision maker, these "are always subject to considerable fluctuations from one day to the next, even from one hour to the next!" (Arrow and Raynaud, 1986, p. 14) By measuring the consistency of the assessed weights, one may hope to stabilize them. But the existing consistency checks, in addition to being sometimes controversial, overlook the fact that the decision maker's attitude may evolve over time while the assessed weights at each period remain perfectly consistent.¹

The translation of local rankings into a numerical scale is also arguable. Someone who uses an MCDSS is usually expected to

¹ Consistency is a legitimate norm for decision making, but decision analysts and MCDM researchers should not focus exclusively on it. As (Sen, 1987, p. 69) argues: "Recent empirical studies of behaviour under uncertainty have brought out what has appeared to be systematic inconsistencies in the evaluation of risk and in the comparative assessment of alternative decisions. Many of these results have been interpreted, perhaps with some justice, as simple 'mistakes' in perception or reasoning. Even if that view is fully accepted, the prevalence of such behaviour indicates the case for making room for departures from the usual requirement of 'rationality' in understanding actual behaviour. But it is also arguable that some of these so-called 'mistakes', in fact, only reflect a different view of the decision problem, in contrast with that formalized in the standard literature." [emphasis added]

provide local rankings in an ordinal fashion. However, when a decision maker says that, with respect to criterion α , she prefers item A to item B, some MCDSS "conclude" that, thanks to criterion α , item A brings the decision maker x units of satisfaction more than item B. First, this automatic interpretation of the decision maker's input might not be logically correct (see Debreu, 1983). Second, it entails comparisons and trade-offs between local rankings, and this feeds back the decision maker with a (classical) utilitarian picture of her preferences (Harsanyi, 1979) which might be inaccurate and misleading.

Even if the local rankings are taken as they are stated by the decision maker, i.e. as ordinal rankings, there might still be problems. Imagine that a criterion represents a type of voter, that a numerical weight on a criterion corresponds to the number of voters of this type, and that a local ranking is the preference profile of a voter. Then, the above aggregation rules are formally identical to majority voting. Hence, they share the advantages, but also the well-known drawbacks of majority voting: i.e. a frequent failure in finding an outstanding alternative, and a consequent sensitivity of the decision to the order in which pairwise comparisons are made at the elicitation phase. (Arrow and Raynaud, 1986)

These remarks may explain some of the difficulties that MCDSS users often encounter. Decision makers would perhaps better accept MCDSS if they were given the possibility to construct their own rules for global ranking. The challenge for MCDSS

developers is then to provide decision makers with more perspective or support in choosing a way to combine their various criteria.

4. From doubt to resolution

In order for MCDSS to better meet users' expectations, focus must be put on the so-called "agency aspect" of decision makers, "recognizing and respecting ...[their] ability to form goals, commitments, values, etc." (Sen, 1987) This leads to considering ethics and moral reasoning.

The term ethics has two meanings (Sherwin, 1983). In a popular sense ethics refers to a set of moral standards or values to guide behavior. In a more fundamental sense, ethics is the discipline that considers the justifications people provide for the principles and values they hold. This latter meaning of ethics matches the philosophy of decision support systems.

Ethics could contribute to MCDSS in the following ways:

- 1) It could provide a frame for the dialogue between the user and the system concerning global and local rankings. Ethics has been studied for centuries. There is now an accessible language of ethics, a well-known body of ethical concepts, a wealth of cases, examples, and metaphors, that could stimulate the decision maker's thinking about multi-criteria decisions.
- 2) Favoring the development of a coherent, integrated dialogue management in MCDSS, ethics could help the decision

maker formulate precise requirements for a global ranking.

- 3) Given the decision maker's requirements, ethics could finally help suggest appropriate aggregation rules for multi-criteria decision making.

Imagine, for example, a decision maker using an MCDSS that offers the features listed above. After interacting with the system, he/she could conclude that his/her local rankings can be compared to some extent, but that they must be taken as ordinal rankings. The MCDSS could then recommend using aggregation rules that fulfill the maximin principle² (see Sen, 1970).

We claim that features 1 and 2 listed above could be provided by the current MCDSS technology. Offering the third feature, however, would require further developments of model management and expert systems in the multi-criteria decision making context. Knowledge about aggregation rules should be acquired from MCDM experts and built in the system (Jelassi and Ozeroy, 1989). An "intelligent" system should then advise the decision maker on the most appropriate aggregation technique or rule to use, thereby supporting him/her in the modelling phase of multi-criteria decision making.

² The maximin principle stipulates that one should try to maximize along the least satisfied criterion. It is often considered as the cornerstone of "justice as fairness" (see Rawls, 1971).

4. Concluding remarks

"Some sense of the individuals that may lie behind an abstraction must always be recognized."

[Arrow, 1973, p. 28]

This paper first overviewed the state of the art and potential of Multiple Criteria Decision Support Systems. A special focus was given to modelling decision makers' preferences and the associated difficulties encountered by the system users. Some MCDSS provide inadequate support for combining the criteria used to evaluate the available alternatives. They arbitrarily impose on the decision maker a type of aggregation rule - a weighted average - that, although simple, may be inaccurate and misleading. These MCDSS must instead recognize the ability of the user to make global judgments. Through appropriate support, the decision maker should be lead to find a suitable rule for aggregating local rankings. Ethics - as the field that considers the justification people bring for the judgments they hold - could underlie such decision support. Database and expert systems techniques may be used here as the underpinning technologies that store and provide, when needed, appropriate ethical knowledge for guiding the decision maker in his/her interaction with the MCDSS.

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