

Rodrigo A. Estévez, Felipe H. Alamos, Terry Walshe and Stefan Gelcich, 2017, Accounting for uncertainty in value judgements when applying multi-attribute value theory, *Environmental Modeling & Assessment*, DOI 10.1007/s10666-017-9555-5.

Abstract In environmental decisions, analysts commonly face substantial uncertainties around stakeholders' values judgments. Multi-Attribute Value Theory (MAVT), a family of multi-criteria decision analysis techniques, is applied in participative settings to articulate stakeholders' values in decision-making. In MAVT, value judgments represent the intensity of individuals' preferences in a set of objectives, which are operationalized as scaling factors or weights. Different sets of weights may express variation in people's preferences or value judgments. Unfortunately, there are still important methodological gaps regarding how to incorporate uncertainty and the substantial variation commonly encountered in stakeholders preferences. This article presents a model of uncertainty that encompasses the dispersion of value judgments in MAVT. To achieve this goal, we draw on info-gap theory, which provides a mathematically grounded method for exploring sensitivity to preference weights when there are relatively high levels of uncertainties. We experimentally tested the uncertainty model in an environmental decision problem. We found that MAVT can use info-gap analysis to deal with multiple value judgments, avoiding exclusive reliance on nominal expected values to inform decisions. We explored a mechanism to explicitly consider the trade-offs between the performance of alternatives and the level of uncertainty that in any specified context a decision maker is willing to accept. Findings emphasize the potential of MAVT to support environmental management decisions, particularly in situations where multiple stakeholders and their contested value judgments have to be considered simultaneously to explore uncertainties around value trade-offs.

Keywords Multi-criteria decision analysis (MCDA), Sensitivity analysis, Info-gap, Trade-offs, Expected values