

BARRIERS IN THE MATHEMATICAL MODELLING OF DECISION-MAKING

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ABSTRACT: Decision-making is becoming increasingly complex as the number of stakeholders rises, the number of decision-makers rises as well, the implications to consider are various and far-reaching, risks and uncertainties abound and the regulatory framework is growing increasingly complex. Decision-making is caught between the need to thoroughly document and substantiate a choice in front of oneself and others, on one hand, and the potential traps that increase in number and impact as the complexity of the decision-making process increases, on the other hand. The present paper sought to present critically the main types of downfalls that a decision-making model may face at the level of an individual decision-maker. Our approach was to put into relation some of the most notable contributions from various perspectives in order to obtain an integrated overview of the challenges faced by decision sciences in formulating a both thorough and life-like decision-making model. We identified with this occasion three main potential weaknesses in formal decision modeling: unquantifiable factors, such as feelings or morals, excessive formalism and simplification of models that make them vulnerable to paradoxes, and finally cognitive biases that deviate models from an objective path. Though scientific literature on each of these topics abounds, it is time to integrate it and set the basis for comprehensive and multi-perspective modeling of decisions.

Key words: decision, decision-making, decision theory, game theory, economic modeling

JEL Codes: C18, C51, C70, D70, D80, D90