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Determination of weights in decision making

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ABSTRACT

The determination of weights consists a decisive part of decision making and decision analysis, since it introduces the decision maker's perception and preference over the importance and value of the decision problem's criteria or the alternatives, respectively. There have been developed several theoretical models and methodological approaches, which depend on the management of the multiple dimentions and parameters of the weighting process, such as the subjectivity and the uncertainty. The current principles and processes for the determination of attribute weights suggest a categorisation of the basic weighting methods, while the most advanced methods adopt the latest approaches for the expression and the analysis of the decision data. This elaboration on the the classification of the current weighting methods led to the identification of the motives which influence the development of new methods and involve both the process and the decision makers.The determination of attribute weights articulates the preference formation for the criteria and the alternatives of a decision making problem. The preference derives from the personality and the cognitive style and is expressed through the behavioral attitude, influenced by the given condition of the decision making environment. Risk is considered the most important condition for the preference formation, while ambiguity can also determine the behavioral attitude and preference. As many theoretical approaches have suggested, the main problem of the preference prediction lies in the mathematical modeling of risk or ambiguity aversion. The present dissertation employs the psychometric function in order to capture the preference reversal, as a response to the change of a stimulus, specifically to the change probability of gain.The dissertation's purpose is the experimental investigation of the behavioral preferences' impact on the weight determination process. Hence, an experiment was executed in order to investigate the relation of subjects' behavioral profiles with the elicitation technique, the weighting scale and the framing of the alternatives. The specific research addressed to a selected sample of decision makers in the field of the construction industry. The results demonstrate that both the weighting method and the weighting scale influence the preference formation. Additionally to the evolution of weight determination research, this fact could promote the development of more effective elicitation models.

KEYWORDS

decision making, attribute weight, weighting method, behavioral preference, psychometric function