

**PROJECT PORTFOLIO SELECTION FOR GROUP DECISION MAKING
USING MULTI-CRITERIA ANALYSIS AND MATHEMATICAL
PROGRAMMING THROUGH AN ITERATIVE APPROACH**

Olena Pechak

ΣΤΟΙΧΕΙΑ ΔΙΔΑΚΤΟΡΙΚΗΣ ΔΙΑΤΡΙΒΗΣ

ΤΙΤΛΟΣ: **Λήψη αποφάσεων περιβαλλοντικής και ενεργειακής πολιτικής για την αντιμετώπιση της κλιματικής αλλαγής σε εθνικό και διεθνές επίπεδο**

Συμβουλευτική Επιτροπή:

Γ. Μαυρωτάς, Επικ. Καθηγητής Σχολής ΧΜ ΕΜΠ (επιβλέπων)

Δ. Διακουλάκη, Καθηγήτρια Σχολής ΧΜ ΕΜΠ

Ι. Φαρράς, Καθηγητής Σχολής ΗΜΜΥ ΕΜΠ

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ΕΚΤΕΤΑΜΕΝΗ ΠΕΡΙΛΗΨΗ

Project portfolio selection is a problem of selecting a subset of projects from a wider set, optimizing one or more criteria and satisfying specific constraints. Unlike in financial problems, these projects are integer variables which are not divisible. Multiple Criteria Decision Analysis and mathematical programming are most common tools for it. When selection process takes place within a group, preferences of multiple decision makers are not unique and there must be a negotiation approach taking into account all points of view. In the present work we use an appropriate version of the Iterative Trichotomic Approach (ITA) adjusted to group decision making with the focus on convergence. It can either have a predetermined number of decision rounds or until a convergence to the final portfolio is attained. Group-ITA provides a possibility to draw conclusions about the consensus on each individual project and on the final portfolio as well. The basic idea is the classification of projects into three sets: the green projects (selected by all decision makers in the “consensus” portfolio), the red projects (rejected by all decision makers from the “consensus” portfolio) and the grey projects which are selected by some (but not all) decision makers. Then a mathematical model is developed, where preferences of decision makers are expressed with appropriate weights of importance for the criteria and a Delphi-like process is designed for convergence of these preferences. New weights are calculated from round to round. Every time, the mathematical model is updated according to the new weights and solved. As the iterative process moves from round to round, the green and red sets are enriched while the grey set shrinks. The iterative process terminates when the grey set becomes empty. Final outcome is the consensus portfolio of projects, as well as the degree of consensus on each project and the consensus index for the whole portfolio according to convergence path. We develop a measure of consensus for the final portfolio according to the degree of concordance among DMs. The Consensus Index expresses the easiness to arrive at a final conclusion within a group. The more green projects we have from early rounds

the greater is the degree of concordance among DMs. This means that their preferences (expressed as weights) result in more or less the same outcome, or, in other words, the consensus is easily attained. On the contrary, if the majority of green projects is identified on last rounds, it means that we need to elaborate in the convergence process in order to agree at selected projects. In other words, the consensus is hardly attained. Besides the Consensus Index, we can extract the degree of consensus for each project according to the round that it enters or exits the final portfolio.

The method is illustrated with an example based on real data.

Keywords: Project Portfolio Selection, Multiple Criteria, Integer Programming, Group Decision Making, Consensus