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Decision Support For Multi-Criteria Project Portfolio Evaluation*

Izabela Tomczuk-Piróg [a] Peter Nielsen[b], Kenn Steger-Jensen[c]

[a,b,c] *Department of Production, Aalborg University*

Abstract

Decision makers, when choosing the right project portfolio, face the problem of making an optimal decision that meets an organization's objectives and priorities in uncertain situations, under a given set of constraints with various sources of knowledge. The complexity of the problem implies a necessity to decompose it into sub-problems. Task decomposition into sub-problems facilitates formulating a problem as Fuzzy Constraint Satisfaction Problem (FCSP). The fuzzy model of project portfolio evaluation can be implemented by using constraints programming (CP) techniques as a decision support system used by production managers. In that context our goal is to provide a CP-based approach facilitating both fast generation of project portfolio variant and a multi criterion evaluation of choice decision on the basis of expert's knowledge, included directly in the decision system.

Key words: Project management and scheduling, multi-criteria evaluation, decision support systems, constraint programming

1 Introduction

An important part of the management of a company is to choose which customer orders to accept. Decision makers as a consequence face the problem of making optimal decisions on order acceptance and planning, that meets an organisation's objectives and priorities in an uncertain situation (knowledge is often ill or semi-structured). The basis of enterprises' activity is work orders, frequently analysed as projects [26]. Taking on new production projects requires task planning in the production system. The tasks deal with establishing final production schedules, planning of positions (machinery) and determining surplus necessary for the execution of the plans. However, most attention in the literature has been devoted to scheduling within individual projects rather than coordinated decision across multiple projects [6]. In recent years, focus has come to be on the Resource-Constrained Project Scheduling Problem (RCPSP). RCPSP is a general scheduling problem which involves scheduling of project activities subjected to temporal and resource constraints, to minimize the total project duration. Two different approaches have been taken in solving Resource-Constrained Project Scheduling Problems. The first approach includes exact algorithms, which produce optimum solutions. Among the procedures developed by researchers for this class are procedures presented by Demeulemeester and Herroelen [9], Brucker et al. [3], Mingozzi et al. [17] and Sprecher [23]. The second approach is comprised of algorithms that have no guarantee of producing optimum solutions. These are heuristic algorithms and among many studies on heuristics are those performed by Kolisch [13], Ozdamar and Ulusoy [20], Mori and Tseng [18], Hartmann [10], Tormos and Lova [27].

* This paper was not presented at any other revue. Corresponding author Izabela Tomczuk-Piróg. Tel. 0045 99 40 99 40, Fax 0045 98 15 30 30.
Email address: izabela@production.aau.dk