Heuristic scheduling of capital constrained projects.

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Abstract

The movement to product and process development projects that involve joint ventures among strategic partners, as well as the increasing prevalence of projects within organizations has led to increased implementation of project scheduling methods. It is frequently the case that a capital constraint is placed on a project, thus limiting the number and value of activities that can be scheduled to occur simultaneously. However, the quantity of capital available to schedule activities can increase as additional cash is received as progress payments for completed activities. Since the project manager'so objective is to maximize project Net Present Value (NPV), it is important for the manager to develop a schedule that balances the early receipt of progress payments (which improve NPV and increase the capital balance available), with the delay of particularly large expenditures. Due to the intractability of optimal methods, the use of heuristic methods is required to solve problems of practical size. This paper presents the first test of heuristic methods for solving this problem. We use information from a relaxed optimization guided model that employs information from the unconstrained

relaxed optimization-guided model that employs information from the unconstrained NPV-optimal problem in heuristic procedure for solving the capital constrained problem. An experimental design is employed to test the heuristics that includes multiple factor levels for a number of project characteristics, including capital utilization, frequency of progress payments, and project network structure. The results indicate very good relative performance for the optimization-guided procedures as compared to two benchmark heuristics.

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