

An algorithmic review of the technological progress and milestones in resource-constrained project planning

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ABSTRACT

Engineering, procurement, and construction projects are time-intensive and subject to resource constraints. Modern project planning software requires optimization algorithms to schedule tasks while considering resource availability. A comprehensive review of the optimization algorithms used in project planning has not yet been conducted. This study seeks to bridge the gap through an algorithmic review of the Resource-constrained Project Scheduling Problems (RCPSPs) literature and investigates the following research questions: What are the milestones on the main development trajectory of optimization algorithms for solving RCPSPs? How might this influence future advancements in the field? To answer these questions, the Main Path Analysis (MPA) method is employed to review the development trajectory and milestones from over 1100 project scheduling articles published between 1980 and 2024. Cluster Analysis (CA) complements the investigations by identifying the prevalent research themes, mathematical features, and solution algorithms. Recommendations for future research directions, supported by the systematic review, conclude the study. This review provides a reference for project management researchers focused on industrial applications of project scheduling problems.

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