Project scheduling of it projects in a remote, distributed environment

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Scheduling and resource allocation have been recognized as critical aspects of project management for over half a century. This is one of the most intellectually demanding functions of the executive.

The Critical Path Method (CPM) and Program Evaluation and Review Technique (PERT) are the two most widely used methods for project scheduling.

Developed in the late 1950s by James E. Kelley and Morgan R. Walker of Remington Rand Corporation, the Critical Path Method (CPM) is a project modeling technique designed to improve scheduling and resource allocation in complex engineering and construction projects. CPM is employed to identify the most critical tasks, calculate the minimum project duration, and effectively manage task interdependencies. The method focuses on the critical path, which represents the sequence of tasks that directly impacts the overall project timeline.

While CPM focuses on the deterministic time estimates for tasks (single time estimate), PERT is used when task durations are uncertain and uses probabilistic time estimates (optimistic, pessimistic, and most likely).

CPM and PERT assume deterministic activity durations and unlimited resources, which may not be realistic in dynamic, resource-constrained environments like software development and R&D.

Consequently, only a fifth of IT projects are managed using traditional project management methodologies [1].

Furthermore, modern IT companies frequently operate in remote, globally distributed environments, requiring managers to consider additional constraints such as time zone differences, varying skill sets across locations, and more. These complexities are driving the adoption of increasingly flexible approaches to project scheduling.

In recent years, various research efforts have been conducted to address the listed constraints, often referred to in the literature as the Resource-Constrained Project Scheduling Problem (RCPSP). RCPSP has been proven to be an NP-hard problem [2]. NP-hard problems are notoriously difficult to solve optimally, especially as project complexity increases. Critical Chain Method (CCM) is one of the most known RCPSP strategies.

The Critical Chain Method (CCM) is a project management methodology, developed by Goldratt[3], that builds upon the Critical Path Method (CPM) but incorporates several key heuristics to address resource constraints and uncertainties. CCM seeks to resolve common project challenges such as inefficient multitasking,

delayed completion, and budget overruns.

Other popular approaches to RCPSP use cutting-edge techniques like advanced programming algorithms [4] and neural networks [5].

Employing modern RCPSP scheduling techniques by IT teams can enhance project management efficiency, leading to a reduction in project duration.

Key words: project scheduling; remote environment; Critical Path Method; Resource-Constrained Project Scheduling Problem; Critical Chain Method.

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