# **Shortcomings of P6 in Case of Complex Projects**

# Deepika Dayalan

#### deepikadayalan5@gmail.com

# Abstract

Primavera P6 is one of the most suitable software for construction and engineering projects. Nevertheless, for the more complex project, the following are the disadvantages of P6. Therefore, this paper aims to describe the challenges of applying Primavera P6 in a project environment. They include managing dynamic schedules, resources, interfaces with other systems and processes, and adapting to new paradigms in managing projects. Hence, the analysis will give project managers the mechanism of knowing when P6 may require other tools or methods to provide the best result in complex projects.

Keywords: Primavera P6, Resource Optimization, System Integration, Construction Management, Project Management Tools

#### Introduction

Mega projects are complex because they are unstructured, involve a number of stakeholders, and have operating conditions that are sometimes volatile. Primavera P6 is project management software developed by Oracle and is one of the most common software in the construction, engineering, and infrastructure business. Thus, in a more complex environment, P6 has some drawbacks as an ordinary tool for scheduling projects and allocating resources [1]. These deficits affecthow the schedule is created, the resources are employed, the control of risks, and the essential collaborative processes in large projects. This is so because P6 has a more formal and systematic way of working and does not allow for flexibility in the case of complex and unpredictable projects [3]. These limitations are reviewed in this paper, and the impact of such limitations on the results of complicated projects is explained.

# Literature Review

There have been advancements in project management software in the past decades, and the most used software currently in large project industries is the Primavera P6. Thus, the following benefits of using P6 over other similar applications, such as Microsoft Project, have been identified: P6 is especially valuable in cases where a project contains many activities and resources [1]. However, it is also revealed that P6's complexity increases the difficulty of learning P6 and presents problemsutilizing all of the program's capabilities. P6 is used in construction projects for scheduling, and while conducting this research, some limitations were observed, including delay analysis and risk factors. A study that sought to use statistical analysis to determine the construction delay factors with the help of P6 data concluded that the data model of the software poses a disadvantage in the identification and analysis of the delay factors [2]. These outcomes suggest that while P6 can show delays, it does not help identify the root causes of project delays.

There is a growing interest in the idea of the CPS as a source of competitive advantage in the literature on project management. Research shows that elastic thinking, a key capacity for solving challenging tasks, entails tools for collective inquiring, evaluating scenarios, and strategizing flexibly [4]. Conventional project management software such as P6 lacks the flexibility required for solving problems, which isevident in complex projects. Research on applying optimization techniques in conjunction with project management tools for construction scheduling for sustainable construction has shown limitations on how P6 incorporates

optimization algorithms, especially for multi-objective problems often encountered in sustainable construction projects [6].

The new scheduling practices, such as the modular heuristic scheduling for the co-activity clash and resource contention, are some of the arguments that support the notion that P6 is constrained by the current algorithms [7]. These computational methods need to be incorporated in P6 and demonstrate the shortcomings of the software in handling the resource management issues. In significantsafety-critical industries where there is an effort to introduce agility in project management, it has been noticed that conventional tools like P6 cannot address the balance between agility and compliance [8]. These environments are not well supported by P6's architecture, which the solution was not designed to assist.

#### **Problem Statement**

There are several disadvantages associated with Primavera P6, which are based on the fact that this software has been developed for deterministic scheduling and centralized control, which is inappropriate in the contemporary environment. Certain of them can be enumerated: It cannot work with uncertainty and iterative work according to the schedule logic; it has a weak resource leveling feature that does not take into account the dependencies of resources; it cannot interface with other specific tools that are necessary for different stages of complex projects; RMC cannot support new approaches, for example, agile and hybrid methods. However, P6 comes with several complications that make it difficult to use; this implies that different teams may use it differently, which could impact the quality of data collected, which is crucial for decision-making [1]. These are even worsened with the growth of the size of the projects because of delays in the project, interference of resources, poor communication, and unsatisfactory performance of the project.

#### Solution

To eliminate the mentioned limitations that affect the use of P6 in complex project environments, systematic and organizational changes must be made, and new tools and features must be incorporated into the software. One way is to integrate other software that addresses the specific needs of P6, such as probabilistic scheduling software, analytics software for decision-making, and software for multidisciplinary teams [4]. There are ways to perform integration procedures in which P6 remains the central system while other software applications address specific complex processes of the project.

Training and knowledge management are the other major solution elements. It is therefore recommended that specialized knowledge of P6 configuration for complex projects be attained and communities of practice be created to share best practices for workarounds for some of the limitations of P6 [5]. This approach acknowledges that most P6 deficiencies arise from implementation issues, not the tool's flaws.Technical solutions also involve the creation of new extensions and scripts that can improve P6's functionalities to meet the needs of a particular project. For instance, developing interfaces for data exchange between P6 and optimization tools can help overcome some resource optimization challenges [7]. However, it is also possible to build specific P6 custom dashboards and reports that provide valuable insights into project dynamics despite the software's weak visualization capabilities.

# Uses

Nevertheless, P6 is still valuable for complex project scenarios when appropriately used and complemented where needed. In big construction projects, P6 is still used to create the initial schedule, monitor and report on project performance about contractual obligations, and keep records [3]. Its reporting capabilities are adequate to convey information to the stakeholders. It also helps maintain a record of the project implementation, which is helpful in business sectors bound by legal requirements. In large projects, resource

management can be set by P6 at the initial stage, while other tools are used to manage resource constraints and dependencies [7]. This complementary approach builds on the core competency of P6 in resource assignment while at the same time addressing some of the weaknesses of the software in complex optimization.

In portfolio management contexts, P6 is used to gather schedule data from different projects, while more advanced portfolio planning and analysis are done using other tools [5]. This approach preserves schedule integrity while allowing portfolio-level decisions that cannot be made within P6 natively.For risk management in complex projects, the P6 contains the basic schedule that can be exported to the other tools for the Monte Carlo and other sensitivity analyses [2]. Although P6 lacks probabilistic functionality, it sets out the deterministic framework on which enhanced risk assessment can be based.

# Impact

P6 has some limitations when used in complex project environments, including the following about project and organizational success. Research also reveals that organizations that rely on P6 for managing complex projects experience more schedule delay and cost increment than companies that employ other tools and techniques [2]. These gaps are especially significant and increase with the project complexity, which means that the disadvantages of using P6 are especially severe at higher project complexity. These usability issues of P6 in complex environments are as follows: The quality of data entered into P6 and the decisions made based on the data are affected by the usability challenges of P6. In a study done by [3], it has been noted that when it comes to complex P6 schedules, the schedules are usually imprecise and sometimes inconsistent and include constraints that are not plausible. These data quality problems are then carried forward to the reporting systems, and organizations may make strategic decisions based on wrong information.

However, some limitations to the P6 optimization of resources are worthy of note. The algorithms used for resource leveling are not very advanced, implying that the software will not be very efficient when used in conditions involving many projects [7]. Notably, many organizations use P6 and other optimization tools toincrease resource utilization and project productivity. Another disadvantage of P6 is the lack of enough collaboration and communication in a complex project environment. The technical characteristics of P6 mean that information generated by the system is difficult to share, resulting in poorly communicated or integrated information across the functions [4]. This is particularly the case where the project entails several stakeholders, most of whom may not have adequate knowledge of the technological part.

# Conclusion

Even though Primavera P6 is still popular at this time, several problems are more profound when the project is large-scale. The software's rigidity, non-adaptive nature, integration issues, and interface may pose difficulty in handling large and complex projects with many dependencies and changing stakeholders. The consequences include the following: It causes poor quality of schedules, resources, decisions, and the project in general. To avoid such problems, it is possible to apply supplementary tools, modify the process, train the personnel, adjust the technique, and set accurate requirements. This is because the P6 software offers good schedule management and reporting features to complement the areas that need improvement in delivering complex projects.

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