ABSTRACT

Obstacles can occur on a project causing nonconformance in terms of time and cost. A Power Plant in Indonesia is being constructed and the project was still underway, when a delay was anticipated. In this case, the construction progress was only 13.1% on day-92, while it should have been completed around 26.4% to finish within 184 days.

This thesis purpose is to identify and analyze the delay causes, by applying Critical Path Method (CPM) and Project Evaluation Review Technique (PERT) methods. Data concerning project activities and three estimation times were collected from internal reports and semi-structured interviews, as follows: optimistic, most likely, and pessimistic durations. A project schedule and the critical path were computed by using Microsoft-Excel and Microsoft-Project software to operationalize PERT/CPM methods. These results were analyzed using of s-curve, network diagram and probability calculation, to anticipate the due date achievement level. The delay causes were collected by subsequent interview and treated by the Fishbone Analysis, which enabled the following categorization of failures: labor, machine, material, environment and method. These provided support for managers to take action. Finally, a discussion concerning the traditional methods of Project Management, i.e., Design-Bid-Build, suggests that Building Information Modelling (BIM) could generate better synchronization among stakeholders, by eliminating the major source of delays. Also, the Life Cycle Assessment was found necessary to decrease carbon dioxide emissions, so the building could achieve more sustainable performances. Moreover, integrating BIM, Building Energy Modelling and LC Energy Analysis was suggested to improve project sustainability.

Keywords: Construction Project Management; Schedule; Delay Causes; Building Information Modelling (BIM); Life Cycle Assessment (LCA)

INTISARI

Hambatan dapat terjadi pada suatu proyek sehingga menyebabkan ketidaksesuaian waktu dan biaya. Sebuah proyek pembangunan pembangkit listrik di Indonesia masih dibangun dan diperkirakan dapat tertunda penyelesaiannya. Dalam kasus ini, progres konstruksi masih berjalan 13,1% pada hari ke-92, sedangkan seharusnya selesai 26,4% agar keseluruhan proyek selesai dalam waktu 184 hari.

Tesis ini bertujuan untuk mengidentifikasi dan menganalisis penyebab keterlambatan, dengan menerapkan *Critical Path Method* (CPM) dan *Project Evaluation Review Technique* (PERT). Jadwal proyek dan jalur kritis dihitung dengan menggunakan perangkat lunak Microsoft-Excel dan Microsoft-Project untuk mengoperasionalkan metode PERT / CPM. Hasil tersebut dianalisis dengan menggunakan kurva-s, diagram jaringan dan perhitungan probabilitas untuk mengantisipasi tanggal jatuh tempo. Penyebab keterlambatan dikumpulkan pada wawancara selanjutnya dan dilakukan Analisis *Fishbone*, yang memungkinkan pengelompokan faktor kegagalan sebagai berikut: tenaga kerja, mesin, material, lingkungan dan metode. Terakhir, diskusi mengenai metode tradisional Manajemen Proyek yaitu, *Design-Bid-Build*, menunjukkan bahwa *Building Information Modeling* (BIM) dapat menghasilkan sinkronisasi lebih baik terhadap para pemangku kepentingan, dengan cara menghilangkan hambatan utama penundaan. Selain itu, *Life Cycle Assessment* diperlukan untuk mengurangi emisi karbon dioksida, sehingga bangunan dapat mencapai kinerja yang lebih berkelanjutan. Selain itu, pengintegrasian BIM*, Building Energy Modelling,* dan *Life Cycle Energy Analysis* disarankan untuk meningkatkan keberlanjutan pada proyek.

Kata kunci: Proyek Manajemen Konstruksi, Jadwal, Penyebab Keterlambatan, *Building Information Modelling (BIM); Life Cycle Assessment (LCA)*