

Analysis of Project Profitability and Schedule Overruns Using System Dynamics, A Case Study of Trigeneration System

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Abstract

Combined heat and power systems also known as trigeneration and cogeneration systems are capable of providing electricity, heating and cooling powers using one fuel simultaneously. Natural gas, biogas and landfill gas can also be used as fuel for these systems. Natural gas is the most popular power source that is used in trigeneration systems and common fuel in the Turkish market due to its accessibility and sustainability. Trigeneration system projects are complex and require interdisciplinary engineering study and coordination. An active and effective project management is requirement because of high initial investment costs.

In general, one can say that a project is successful if requirements are met on schedule within budget and delivers a good return on investment. In today's competitive market failures such as project delays or excessive budget use are not uncommon but costly. Though management of risk associated with these failures are the main concern of a successful project manager.

In traditional project management, whole project consists of independent processes where no interaction exists. However, as projects get complicated and larger this assumption needs to be reconsidered. System dynamics approach can be an alternative solution by its ability in understanding interactions and its feedback structures.

In this research, the factors that affect budget and timeliness of trigeneration system projects is analyzed using system dynamics. Alternative scenarios are developed and reduction of gap between planned and realized budget and schedule target are examined. It is showed that developed model can be used by project managers as a decision support system.

Keywords

System Dynamics
Trigeneration
Project Management

Biographies

Ali Firat Elci was born in Erzurum in 1989. He is graduated from Yıldız Technical University, İstanbul in 2011 with B.Sc in electrical engineering. Following his graduation, he worked as electrical engineer for various construction and engineering companies in different sectors such as railway transportation, oil&gas and energy. During this period he completed his M.Sc education without thesis in engineering management at İstanbul Technical University, İstanbul in 2017. He is working at Borusan CAT as project and electrical design engineer since 2017. He is continuing his master's degree in Engineering Management at Arel University in Istanbul

Volkan Cakir was born in Balikesir in 1970. Following his graduation from Turkish Air Force Academy Istanbul with B.Sc. in electronics engineering with the rank of lieutenant in 1992, he worked as logistics officer for 20 years. He is retired with the rank of lieutenant colonel in 2012. During this period, he obtained his M.Sc. in industrial engineering from Middle East Technical University, Ankara in 2001 and Ph.D. in engineering management at the Old Dominion University, Norfolk, Virginia in 2011. Between 2001-2011, he served as a Lecturer in the Turkish Air Force Academy. Following his retirement in 2012, he started working as assistant professor at the Department of Industrial Engineering in Istanbul Arel University. His main research areas are simulation, statistical quality control, system dynamics, operations management and risk analysis. He is currently the head of the same department and vice director of the Institute of Sciences.