A System Dynamics Modeling Framework in the Multi-Project Management for Managed IT Service Providers

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Abstract. Managed IT Service Providers offer companies, especially small and medium businesses, with a cost-effective operating solution with low overhead, high efficiency, and high flexibility. As a result, the popularity and market for Managed Service Providers (MSPs) are expanding rapidly due to rising demands, yet the high volume of incoming requests creates a challenge for MSPs to keep pace. This challenge arises from two factors: the inability of MSPs to rapidly expand their workforce to align with the exponential increase in demand, and the inadequacy of traditional project management techniques in adapting to the dynamic nature of the IT service environment. To address this challenge, we developed a novel project management framework utilizing system dynamics modeling to effectively allocate resources across multiple IT service projects. An MSP delivers comprehensive IT services and support, from infrastructure buildout to network security, with participation from multiple teams, including network, cloud, server, and end-user device support. Those service projects with varying requirements and deadlines from different customers are executed concurrently in a nonlinear manner. The proposed framework employs causal loop diagrams to illustrate team collaboration and task interdependence. It also uses stock-flow diagrams to monitor project advancement and resource allocation. A system dynamic simulation model was developed to evaluate different coordination mechanisms. We tested the framework in a mid-sized MSP with four engineering teams and mutiple ongoing biotech IT service projects. Results showed that it offers project managers valuable insights for optimizing resource allocation, balancing cost and schedule, and ensuring timely delivery of high-quality results.

Keywords. System Dynamics (SD)，Managed Service Provider, Managed Service, IT Service Delivery, Resource Allocatio

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