An optimization model to allocate most suitable team members for software development projects

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Abstract

Human resource is one of the most important resource that creates value for software development projects. However, this becomes more complex when the required range of skills, knowledge, experience and expertise, increases. Many software development projects have failed due to wrong mapping of team members to expected goals. Therefore, it is vital to fill the optimal number of positions required by the most qualified employees for each project, under each designation and to find the most suitable person for each designation. Practically, there is no specific methodology or a system available to match team members to achieve the scope of a given project, as some of the requirements are subjective and the rest are objective. Therefore, the main objective of this research is to develop a model to determine the optimal number of team positions required to be filled, to contribute most to achieve the project scope, quality and meeting the deadlines. In this case, analytical network process together with application of linear programming determine the position to be filled by whom, to optimize the quality and the scope of the project. This is an effective way of selecting suitable team members while meeting the subjective and objective resource constraints to derive maximum benefits not only for the software development project, but for the company as well.

Keywords - Human resource allocation, Analytical Network Process (ANP), Integer Linear Programming (ILP), Software development project

Introduction

Software development organizations survive in a competitive market by converting developing useful and successful software products. To develop such products, organizations usually follow processes that divides development effort into several activities. Each of these activities requires personnel with specific characteristics such as skills, knowledge and experience. Therefore, software development is a people-intensive activity. The abilities possessed by developers are strongly affect the productivity and the quality of the project (Farhanglan et al., 2015). Thus, one of the most important decisions to be made by a software project manager is to find a precise mechanism to select team members for a given project while meeting the project requirements. Therefore, it is an important issue to be analyzed when software development is undertaken as a value-driven business process.

Numerous models and methodologies are used to optimize human resource allocation in software development projects (Farhanglan et al., 2015). Research in this area fall under two categories; based on subjective factors and based on objective factors (Silva & Costa, 2012). Still, the problems associated with human resource allocation to software projects remain as many projects fail due to the mismatch between project quality and goal vs capabilities of allocated team members. Further, hardly any research considers both subjective and objective factors together (Saaty et al., 2017). The main objective of this research is to overcome the problems of