

# A performance-based approach to project assignment and performance evaluation



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## Abstract

Project assignment and performance evaluation have been addressed as two important and separate research issues in project management. This paper develops a new performance-based approach for integrating the project assignment and the performance evaluation processes in a project-based organization. An objective-oriented preference-based assignment process is developed to assign a project to a project manager. An optimal project assignment model is developed to maximize the total weighted contribution value of all new projects to the organizational objectives. An efficiency-based evaluation process is developed using data envelopment analysis to measure the relative performance efficiency of the completed projects and of the project managers. The approach provides a proactive mechanism for facilitating objective-focused management of projects. The outcomes of an empirical study conducted provide managerial insights in assigning projects to project managers and in evaluating the performance efficiency of both projects and project managers.

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## 1. Introduction

Project-based organizations perform projects for achieving their business objectives (Project Management Institute, 2004). To ensure that projects can be best performed, assigning projects to project managers has been a critical process in project management (Avots, 1969; Belassi and Tukel, 1996; Ogunlana et al., 2002; Patanakul et al., 2007; Pinto and Slevin, 1989). This project assignment problem has been well addressed essentially by matching the abilities of project managers with the requirements of projects. For example, Adams et al., (1979) use a contingency approach to rate and choose the candidate project managers in terms of their capabilities to cope with the expected demands of projects. Hauschildt et al. (2000) use questionnaire

surveys to classify project managers into five naturally occurring types in terms of their abilities to match various types of projects. Mian and Dai (1999) use the analytical hierarchy process to assign projects to project managers based on their administrative and supervisory skills, technical knowledge and personal skills. Patanakul et al. (2007) develop an integer programming model for project assignment by considering project priorities, project requirements, project managers' competencies, and organizational and personal limitations. With these assignment methods, a project can be assigned to a project manager who is likely to have the best performance on the project. The actual performance of the project manager and of the project is to be appraised by a formal evaluation process in order to examine how the stated objectives are achieved after the project is carried out.

Evaluating the performance of the completed projects will help establish benchmarks of high performance projects for cross-learning and identify inefficiencies of low performance projects for potential improvement (Cao and Hoffman, 2011; Farris et al., 2006; Stensrud and Myrtveit, 2003). Existing studies

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on project performance evaluation use different methods based on different sets of evaluation criteria and factors that affect the performance of projects. For example, in project management, earned value management is a conventional technique used to measure and report project performance from initiation to closure by integrating the project's scope, resources and schedule (Project Management Institute, 2004). In measuring the overall performance of projects, multicriteria decision making methods have been used to aggregate multiple performance measures under various application contexts (e.g. Barfod, 2012; Marques et al., 2011; Pillai et al., 2002). In evaluating the relative performance efficiency of the completed projects, data envelopment analysis (DEA) has been widely used as an effective tool by incorporating multiple input and output variables that impact the project performance (Busby and Williamson, 2000; Cao and Hoffman, 2011; Eilat et al., 2006, 2008; Farris et al., 2006; Linton and Cook, 1998; Revilla et al., 2003; Stensrud and Myrtevit, 2003; Verma and Sinha, 2002; Vitner et al., 2006).

The performance outcome of a project will be affected by the assignment outcome of the project, as different project managers will perform the same project differently and achieve the stated objectives to different degrees (Yang et al., 2011). Despite the fact that project assignment and project performance evaluation have been well addressed by existing studies, they are treated as two separate research problems in project management. To address these two research problems in an integrated manner for managing multiple projects in a project-based organization, this paper develops a new performance-based approach.

The rationale behind the conceptual development of this performance-based approach is that project managers will prefer to undertake a project that they expect to perform best and contribute most to the organizational objectives. The organization will prefer to assign a project to a project manager who is expected to perform best and contribute most to the organizational objectives. That is, the performance-based approach addresses two major issues raised by previous project assignment studies, such as Adams et al. (1979), Mian and Dai (1999), Hauschildt et al. (2000), and Patanakul et al. (2007). First, a project should be assigned to a project manager who is expected to have the best performance on the project. Second, the project assignment process should ideally help maximize the overall contribution of the projects to the organizational objectives. To this end, the performance-based approach maximizes the total expected contribution of the projects by considering the projects' expected contribution to the organizational objectives and the project managers' expected performance on the projects. To ensure that the expected performance specified by the project managers can be verified, the performance-based approach evaluates the relative performance efficiency of the project managers by considering the projects' expected contribution and the project managers' expected performance. That is, the performance-based approach uses the projects' expected contribution and the project managers' expected performance to integrate the project assignment and the performance evaluation processes.

In the subsequent sections, we first present the performance-based approach together with the key processes involved in project

assignment and performance evaluation. We then develop methods and models for implementing these key processes, illustrated with an empirical study together with their managerial insights in supporting the assignment decisions and the subsequent performance evaluation results.

## 2. The performance-based approach to project assignment and performance evaluation

Fig. 1 shows the framework of the performance-based approach with the project assignment and performance evaluation phases. The project assignment phase begins with a set of new projects to be assigned to a group of available project managers for achieving their stated objectives, which are established in alignment with the organizational objectives. An objective-oriented assessment process with the weighted-sum method (Xu and Yeh, 2012) is used to assess the expected overall contribution value of a new project to the organizational objectives, given the project's stated objectives. The achievement level of the project's stated objectives is often affected by the performance of the project manager assigned. To measure how a project manager performs the job in managing a project and in helping achieve the project's stated objectives, a performance score is used.

A preference-based scoring process is used to allow all available project managers to self-assess and specify a performance score on each new project. This specified performance score given by a project manager on a new project indicates the project manager's preference on the project relative to others, after considering her own availability (e.g. commitments to other concurrent projects) and competence (e.g. managerial practices, knowledge and experience of similar projects). This specified score is the performance score expected by the company, if the new project is assigned to the project manager. That is, the specified score given by the project manager becomes the expected performance score of the project manager for performing the project.

Given the expected overall contribution value of the new projects and the expected performance score of the available project managers, a new objective-oriented preference-based assignment process is used to assign each project to a project manager. With special constraints formulated for accommodating actual project assignment settings, an optimal project assignment model is developed to maximize the total weighted contribution value of all projects to the organizational objectives. The weighted contribution value of a project is determined by multiplying the project's expected overall contribution value by the expected performance score of the assigned project manager. That is, the expected overall contribution value of a project is weighted by the expected performance score of the assigned project manager. This reflects the fact that the overall contribution value of a project is affected by the performance of the assigned project manager. The assigned projects will be completed after the project execution process, which provides the necessary assessment information for the performance evaluation phase. The project execution process, indicated using dashed lines in Fig. 1, is not covered in this study.

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