Impact of integration management on construction project management performance

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Received 2 January 2017; received in revised form 13 September 2017; accepted 17 September 2017

Abstract

Construction project performance relies on different dimensions of project management. Among those, integration management is of paramount importance since effective project management starts with the integration of processes and people within a construction project. This study investigates the influence of various components of integration management on construction project management performance and quantifies the relationship between those components and integration management. The proposed components of integration management are the development of a project charter, knowledge integration, process integration, staff integration, supply chain integration, and integration of changes; whereas the dimensions of project management performance are time, cost, quality, safety, and client satisfaction. A questionnaire was designed and administered to construction professionals and data from 121 projects was analyzed using structural equation modeling. The data was analyzed by using software, called SPSS AMOS. The findings of the research indicate that integration management has a strong impact on project management performance. The study contributes to the project management body of knowledge in that it develops a conceptual framework consisting of specific components for integration management, reveals the impact of integration management on performance, and proposes several tools and strategies for enabling effective integration along the project life cycle. Industry practitioners may benefit from the framework developed by considering the components proposed and following strategies recommended for construction phases.

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Keywords: Integration management; Project management performance; Construction projects

1. Introduction

Integration refers to coordination among processes. Integration management is one of the most important elements of project management, which encompasses all aspects of a project. Project integration management ensures the successful coordination among project activities. Asif et al. (2010) mention integration as a deliberate process of developing a governance structure, which makes the management of key stakeholder requirements more systematic. Eisner et al. (1993) define integration management as the major element of systems engineering. They propose a concept, called “integration engineering”, where they list requirements, interfaces, interoperability, impacts, testing, software verification and validation, and architecture development as the main elements. Moreover, they refer to integration management, where they define the main elements as scheduling, budgeting and costing, configuration management, and documentation. These components build the basis for systems engineering.

Project integration ensures the proper coordination among project activities. Therefore, the impact of integration management on project success should be well understood so that project managers might benefit from the positive aspects of properly coordinated project activities. A major portion of existing research studies (Tatum, 1990; Halfawy and Froese, 2007; Ozorhon et al., 2014; Berteaux and Javernick-Will, 2015; Ospina-Alvarado et al., 2016) has previously demonstrated the critical role of effective integration in project management research.

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The Project Management Body of Knowledge Guide (PMBoK) lists the ten main knowledge areas essential to project management and four additional areas in its Construction Extension. Among those, project integration management is listed as the first knowledge area, which involves combination, unification, and coordination processes of project management (PMI, 2013). Because of the essential function of integration in project management, this study develops a comprehensive framework which aims at illustrating the strong link between integration and project management performance, which was not previously investigated. Within this perspective, the study proposes construction-specific components for integration management and measures project management performance by means of different project success indicators. Moreover, a questionnaire was designed based on the developed framework and administered to construction professionals in Turkey.

The research investigates the hypothesized relationship between integration management and project management performance and aims at measuring project management performance according to the proposed indicators. To analyze the validity and the reliability of the proposed measures for the framework, structural equation modeling (SEM) was used. The main contribution of this study is to guide construction practitioners to adopt proposed measures for integration and benefit from the strategies for integration in order to experience higher success rates.

2. Research background

PMI defined a total of 14 areas: the project integration, scope, time, cost, quality, human resource, communications, risk, procurement, stakeholder, safety, environmental, financial, and claim management. A portion of studies measured performance by these knowledge areas or revealed the impact of individual knowledge areas on performance. The knowledge areas proposed by PMI have been used in numerous research studies. Various studies have focused on enhancing risk (Hwang et al., 2014), innovation (Toole et al., 2010), and technology and integration management (O’Connor and Young, 2004) capabilities of construction firms.

Chou et al. (2013) conducted research on the project management knowledge of construction professionals. In Chou’s study, a model was proposed where the effects of project scope, time, quality, human resource, communication, risk, and procurement management on the project success and interrelations among the knowledge areas were investigated. Fageha and Aibinu (2013) indicated that effective scope management has a direct impact on project outcome.

The impact of effective time management on enhanced project performance was highlighted in several studies (Gayatri and Saurabh, 2013; Ngach and Das, 2014). In Salazar-Aramayo et al.’s (2013) study, cost was listed among the most important attributes of the project management model that they have developed. Ali et al. (2013) emphasized that quality of work done is among the most important attributes of project performance measurement. Popaïton and Siengthai (2014) mentioned that project performance and knowledge absorptive capacity of project teams are highly affected by project human resource management practices. Badir et al. (2012) stated that communication is one of the key components of improved performance. Hwang et al. (2014) revealed that effective risk management leads to improved project performance. Eriksson and Westerberg (2011) indicated that collaborative procurement practices have a positive influence on construction project performance. Stakeholder benefits and satisfaction were demonstrated to be crucial for project success (Takim and Akintoye, 2002; Rad, 2003; Bassioni et al., 2004) Moreover, Kagioglou et al. (2001) emphasized that stakeholder satisfaction is directly associated with performance management in construction.

Cheng et al. (2012) investigated the effect of safety management practices on project performance in the construction industry. Montabon et al.’s (2007) study revealed that there is a strong link between the effectiveness of project environmental management and business performance. Akanni et al. (2015) stated that financial attributes are highly effective on project performance. Vidogah and Ndekgrie (1997) demonstrated that effectiveness of claim management is essential in terms of successful completion of project, which in turn leads to enhanced project performance. Jastaniah (1997) also indicated that successful handling of claims is one of the most important components of enhanced performance.

Tatum (1990) described potential competitive advantages of integrated facility engineering such as offering new products in new markets, developing distinctive competence, reducing project schedule, and decreasing life-cycle cost. He emphasized the critical role of integration in competing against forces for change and concluded that success is achieved when addressing forces for change through successful integration of processes. Halfway and Froese (2007) presented a multitier component-based framework aiming to facilitate the implementation of modular and distributed integrated project systems for supporting multidisciplinary project processes through the project cycle. The main focus of the research was to emphasize the required functionality and approach to developed integrated project systems. Within this context, a framework was developed to define methods that have potential to improve the availability, consistency, and integration of project information and processes.

Ozorhon et al. (2014) focused on the components of the innovation process. They defined the barriers of innovation including resistance to change, inexperience, and unavailability of advanced products and they proposed integration of project participants and effective leadership as one of the solutions to enhance the rate of innovation adoption. However, the paper references one case study selected from the United Kingdom, so the conclusions made could lead to diverse statements with different case studies. Berteaux and Javernick-Will (2015) indicated that project based organizations in the architecture, engineering, and construction (AEC) industry must integrate knowledge and processes adapting to local environments. They investigated the challenges of local adaptation and organizational integration processes by relating to project performance. They concluded that projects having high integration result in richer information exchange than projects having low integration. However, the research has a small sample size and organizational performance was not included in the study, which is one of the limitations of the research.
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