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Does lean & agile project management help coping with project complexity?

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Abstract

Still, projects in the construction sector are delivered with time delays and cost overruns. One of the reasons for poor performance was assigned to project complexity. A combination of lean construction and agile project management are hypothesized as a possible solution to cope with project complexity. In this paper we aim to understand if the implicit usage of lean and agile help coping with complexity. The research was done by means of correlation analysis on data gathered from a structured questionnaire (67 responses). In total, 51 significant correlations among 255 possible relations were found. To reduce the number of variables, factor analysis was performed. Correlation analysis on the defined factors showed 8 significant correlations among 25 relations. Several lean and agile elements were shown to significantly correlate to either reducing complexity or managing complexity. It was therefore concluded that these are promising to cope with complexity and improve project performance, which is to be confirmed in subsequent research.

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1. Introduction

Poor performance, such as time delays and cost overruns, are not uncommon in construction projects and the reasons behind these problems have attracted the attention of construction practitioners and researchers (Mansfield,

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Ugwu, & Doran, 1994; Meng, 2012). Project complexity is claimed as one of the causes of cost overruns leading to poor performance and consequently project failure (Kaming, Olomolaiye, Holt, & Harris, 1997). Studies show that causes of poor performance can be divided into external causes and internal causes (Meng, 2012). External causes, which are usually beyond the control of project teams, may include adverse weather conditions, unforeseen site conditions, market fluctuation, and regularly changes while internal causes of poor performance may be generated by the client, the designer, the contractor, the consultant and various suppliers who provide labour, materials and equipment (Assaf & Al-Hejji, 2006). Hertogh and Westerveld also stress the influence of different interests of stakeholders and the way stakeholders interact (Hertogh & Westerveld, 2010). It can be argued that both external and internal causes happen because of project dynamics. Among all these efforts to find the reasons of poor performance, some scholars shed light on “the way that projects are being managed” as an important fact which could affect project performance and the successful delivery of the project (Gil & Tether, 2011; Olsson, 2006). Hertogh and Westerveld stated that the performance of megaprojects is influenced by their management (Hertogh & Westerveld, 2010). In a very recent study in 2014, Davis claims that based on the literature, project management is immature as a research field although project management processes must be in place for a project to be successful (Davis, 2014).

Apart from the importance of project management in general, differentiation in size, uniqueness and complexity of projects put emphasis on the necessity of tailored management methods. Increasingly it is argued that nowadays a pure project management approach (the traditional project management approach) is no longer effective (Hertogh & Westerveld, 2010; Priemus & van Wee, 2013). Nevertheless, most of the current project management methodologies still seem to underestimate the influence of the dynamic environment (ibid).

Based on above mentioned findings, the hypothesis of this research is that new management methodologies, Lean management and Agile project management, can help coping with complexity. This paper explores the implicit usage of these methodologies and its influence on project complexity based on a literature review and a survey.

2. Literature review

This section provides the theoretical framework. First complex systems and project complexity are discussed, followed by the needs for improvements in project management and lean and agile project management.

2.1. Complex systems and project complexity

Projects over time have become more complex (Baccarini, 1996; Harvett, 2013; Hillson & Simon, 2007; Philbin, 2008; Williams, 1999). Van Marrewijk et al. (2008) state that large infrastructure projects are characterized as uncertain, complex, politically-sensitive and known for the involvement of large number of stakeholders (van Marrewijk, Clegg, Pitsis, & Veenswijk, 2008).

There are much efforts into defining complex systems and project complexity. Aritua et al. (2009) believe the studies on complexity is not necessarily a new challenge, but an old challenge that is being increasingly recognized in order to improving performance and understanding of management. An early definition of project complexity in construction industry was provided by Baccarini (1996). Also Hertogh and Westerveld (2010) recognize these dynamic effects. They proposed different management styles, dependent on the specific complexity in a project. Regarding complexity, Bosch-Rekvelde (2011) developed the TOE (Technical, Organizational, and External) framework to assess the complexity of engineering projects using 47 elements (Bosch-Rekvelde, 2011). This framework was used as the base for complexity assessment in this research.

2.2. Needs for improvements in project management

Project management as we know it today, or conventional project management, emerged in the 1950s in the defense and aerospace sectors. These sectors in this timeframe can be characterized as little flexible and complex (Morris, 1997). Starting in the 1990s and still growing is the awareness of the changing and dynamic project environment (Bosch-Rekvelde, 2011). It is recognized that the complex and changing context of a project makes it impossible to make reliable predictions, and instead of predicting and correspondingly avoiding changes, changes

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