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“Need for Speed”: framework for measuring construction project pace – case of road project

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Abstract

The construction industry relies on time-to-delivery to gain competitive advantages and increase profit margins. The aim of this paper is to develop a framework for measuring construction project speed. This will be done by identifying a range of key performance indicators (KPIs). This identification of KPIs helps set a benchmark for measuring the speed of a construction project. In this paper, a conceptual framework is presented to reflect the idea behind the use of performance measurement in measuring the speed of construction projects, and then a performance measurement system tailored to a real case of a road construction project.

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Keywords: Project Speed; Construction project; Time to delivery; Performance measurement; Key performance indicators

1. Introduction

Performance measurement has been subject to a considerable amount of research and attention over the past decades. The introduction of non-financial measures has triggered much of this research; with the increase of competitive environment measuring performance has become crucial to business success (Bassioni, Price, & Hassan, 2004). The aim of this paper is to develop a framework for measuring and monitoring construction project speed at

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the operational level of the execution phase and demonstrate how it can be employed to assess the speed performance of a road construction project. This includes a review of recent literature, derivation of generic KPIs, and a practical example of how this framework operates. It is imperative to note that the paper concentrates on performance measurement for the purpose of internal management of the contractor in charge of the execution of the project and not for the evaluation by other stakeholders. Furthermore, a performance measurement framework is a general theoretical framework developed in research that can act as the basis for a company's performance measurement system, while a performance measurement system refers to the measurement system implemented by a company (Bassioni et al., 2004). Likewise, this paper will consider both a performance measurement framework and a performance measurement system in road construction projects.

2. Methodology

In order to determine the set of perceived key performance indicators for project speed, a tangible example is described in Section 4. The model helps us to superpose the scenario on a construction project and attempt to understand and apply the concept of speed on it. Once the KPIs are identified, a review of a real case of a road construction project is carried out. A literature review conducted on performance measurement in construction projects and on the concept of project speed and time vs. scope relationship in construction projects. Although many authors have written about the velocity in software development projects, nothing, to the best of our knowledge, has been said about the speed as a measurable concept in project management and how this can be measured in construction projects. We have used a road construction case to illustrate the concept. The described concept has not yet been tested or verified. The case is a road construction project; the road project is a highway that is under construction and located in Norway. In this case, the paper does not consider the construction of bridges and tunnels.

3. Theoretical Framework

A construction project is mostly initiated by the needs of the client in order to satisfy the client's requirements in terms of time, cost and quality (Lam, Chan, & Chan, 2007; Y. J. T. Zidane, Stordal, Johansen, & Van Raalte, 2015). In the construction industry, there is a tendency to measure performance in terms of time and cost (Forbes, Ahmed, & Barcala, 2002; Y. Zidane, Rolstadås, Johansen, Ekambaram, & Sriram, 2015). In 1998, a governmental report in UK had boosted organizations to move toward best practice (Department of the Environment & the Regions, 1998; Murray, Murray, & Langford, 2003; Sarhan & Fox, 2013). As a result, the UK working groups on KPIs identified a set of non-financial parameters for benchmarking projects (Dawood, Sikka, Marasini, & Dean, 2006; Sarhan & Fox, 2013; Takim & Akintoye, 2002). Regardless of the KPI agenda, there are some problems identified in the KPIs. For instance, none of the measures mentioned could identify the performance of suppliers in a project environment (Sarhan & Fox, 2013; Takim & Akintoye, 2002).

Projects behind schedule are an indicator of poor productivity and bad project performance (Chidambaram, Narayanan, & Idrus, 2012). Any delay in a project can lead to cost overruns (Sambasivan & Soon, 2007). When projects are behind schedule, they are either extended or accelerated and, therefore, incur additional cost (Chidambaram et al., 2012). Delivering projects behind schedule is an inherent risk in construction and should be treated in a similar fashion as other risks. It can be managed, shared, minimized or accepted, but must not be ignored (Asnaashari, Knight, Hurst, & Farahani, 2009). Delivering behind schedule is very costly and even a small advance in delay recovery may have substantial impact on the return of investment (ROI) of involved parties in the project, and it is important to address delay causes (Faridi & El - Sayegh, 2006; Khoshgoftar, Bakar, & Osman, 2010; Y. Zidane et al., 2015). The best way to deal with the waste of time in project delivery is to identify causes that may lead to this (Pourrostam & Ismail, 2011; Yang, Chu, & Huang, 2013). Bubshait and Almohawis (1994) defined time as the degree to which the general conditions promote the completion of a project within the allocated duration. Naoum (1994), then Chan (1996) measured this criterion by time overrun and construction time, respectively. (Lam et al., 2007; Songer & Molenaar, 1997) and Bassioni et al. (2004) considered "on schedule" as one success criterion. Time can be managed as well as delay and speed, which was shown in much research done on concurrent engineering (Midler, 2012). Thus, the necessity of developing a framework based on generic KPIs to measure and monitor the project speed performance to be on schedule or even ahead of it. Chan and Chan (2004) state that the

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