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Challenges in Design and Construction of an Innovative and Sustainable Built Environment

Increased innovation through change in early design procedures

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Abstract

Increasing industrial productivity and innovation is essential to meet needs to reduce lead times and costs. However, diffusion of systemic innovations in project-based industries (PBIs), such as the infrastructure sector, has proven difficult. The Swedish Transport Administration (STA) has unique opportunity to influence the degree of innovation in the sector, due to its strong position as the largest public client of infrastructure in Sweden. Therefore, the aims of an ongoing study reported here are to identify and evaluate challenges and requirements affecting the diffusion of innovation related to this key client. This is being done by examining relevant aspects of construction infrastructure projects executed via the pre-defined design procedure currently applied by STA. The results reveal that the procedure hampers diffusion since certain activities must be performed early, is applied indiscriminately to all types of projects, and hinders inter-organizational collaboration.

Keywords: innovation; project-based industries; diffusion; challenges; case study; design procedures; early design.

1 Introduction

Like those in other industries, firms in the construction industry are exposed to increasing competition and customer demands, and hence must be innovative in order to remain competitive [1]. In Sweden, the need to increase productivity and client satisfaction in the construction industry (both building and infrastructure sectors) has spurred several government-sponsored studies [2], [3], [4]. Measures to increase the productivity of the infrastructure sector are particularly important from a societal perspective, since significant amounts of public funds are invested in a sector that are crucial for national development and economic growth [5]. Increasing the rate of innovation has been proposed as a means of boosting productivity [6]. Previous research has found that productivity is a key challenge in this sector, and that many infrastructure projects suffer from cost and schedule overruns [7], [8]. However, diffusing innovations (especially holistic systemic innovations [9]) in the infrastructure sector, is difficult.

Innovations in the infrastructure sector are diffused within construction projects rather than, as in more traditional manufacturing industries, within the organizations developing the innovations [10]. This has profound consequences for the diffusion of systemic innovations developed independently of construction projects. Hence, the development and diffusion phases are managed in different types of projects and by different stakeholders. Innovations may be developed by stakeholders, such as contractors or suppliers involved in a construction project, but the public client must, as a “system integrator”,

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