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The Last Planner System in China's construction industry — A SWOT analysis on implementation

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Abstract

The Last Planner System™ (LPS) is well-documented in the literature, and has sometimes been used to represent lean construction or lean project management. LPS aims to achieve reliable workflow by encouraging foremen to have a sense of ownership of the project programme and to build-in their commitment into it. This study reports on the perceptions of Chinese building professionals of the application of LPS in Chinese construction projects. It reveals that several components of LPS have already taken place in large Chinese construction firms. Further, this study employs a SWOT analysis to examine the possible strength, weakness, opportunity, and threat factors that might have an impact on implementation of LPS in construction projects in China.

Keywords: Last Planner System; Construction project; Implementation; SWOT

1. Introduction

The success of lean principles in manufacturing, and the benefits arising from its use, have led to the development of lean implementation in construction (Egan, 1998). Lean first emerged in the construction industry a few years after gaining full acceptance in Western manufacturing industries. Several authors have attempted to provide an account of the lean construction perspectives. One major contribution comes from Ballard (2000) and his colleagues on the creation of the Last Planner System (hereafter referred to as LPS). As its name indicates, in LPS the decision making is given to the "last planner" or foreman, so that he can add in details and commit to what can actually be achieved in the coming week (Ballard, 2000). More importantly, a collaborative environment of planning is fostered for the exchange of information about the progress being made on site among different trades and/or subcontractors during the planning exercise. The rapid development of this decentralized means of project planning has won recognition from practitioners all over the world. Reportedly, the implementation of LPS has been adopted in construction projects in various areas, including the US (Jesus and Leong, 2000), the UK (Johansen and Porter, 2003), South America (Fiallo and Revelo, 2002), the Middle East (Alsehaimi et al., 2009), Korea (Kim and Jang, 2005), and others. LPS has also been implemented in large and complex projects (Ballard and Tommelein, 2012) — for example oil refinery expansion (Liu et al., 2010), where it was reported that the use of LPS resulted in reductions in workflow variation, and thus helped to improve labour productivity. The other benefits of using LPS are documented elsewhere (Fernandez-Solis et al., 2012; Mossman, 2013).

Tapping into the above-mentioned benefits is certainly something that Chinese construction firms are striving for. The Chinese construction industry is currently experiencing a booming period, as the government unveils plans to invest in transportation, infrastructure, and rural development projects (ChinaDaily, 2013; Xinhua, 2008a). Driven by these ambitious plans, the Chinese

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construction market overtook the US since 2011 in terms of output (DavisLangdon, 2012). To maintain China's economic growth and to gain recognition for local officials, the government has been driving Chinese construction firms to build infrastructure projects quickly and to deliver on time (Bristow, 2007). One example is the construction of stadiums and venues for the Beijing Olympics, all of which were completed on time or ahead of schedule (PeopleDaily, 2007). As on-time project delivery is valued by clients in China, Ling et al. (2009) have advised Singapore's construction firms to focus on this and to commit to a quality schedule when they undertake projects in China. In contrast, the story is different when large Chinese construction firms operate overseas projects. Reportedly, a leading Chinese construction firm failed to deliver a mining project in Australia on time, and suffer about 3 years' completion delay and the associated cost overrun (Ng, 2013). There are problems associated with giving project delivery the highest priority. Given the pressure on delivery, projects are sometimes rushed, and quality is often compromised, leading to building flaws (Bristow, 2007). For example, the investigation into a bridge that recently collapsed in Northern China only after 10 months' operation revealed that the original plan for this bridge construction was to take 3 years (36 months), but the project had been completed within 18 months (Xinhua, 2008b) to comply with the client's requirement.

Based on the discussion above, LPS would seem to be a good candidate for project planning and control in Chinese construction firms. This paper sheds light on the application of LPS in the Chinese construction industry, with the primary aim of comparing the current practice of planning in China to LPS. This paper also attempts to understand the strength, weakness, opportunity, and threat (SWOT) factors associated with the implementation of LPS, so that strategies can be formed for better implementing LPS in the Chinese construction industry. This study is organized as follows: it reviews LPS in Section 2, including its origins, components, and recent development. Section 3 deals with the research methods and the interviews that form the basis of this paper. Section 5 examines the findings presented in Section 4 using SWOT analysis. Section 6 concludes the paper.

2. Review of literature

2.1. Origins of Last Planner System

Generally, LPS is closely associated with lean construction, and in some circumstances the term seems to be used as if it were synonymous with lean construction (Green and May, 2005). Perhaps LPS has achieved a greater degree of industrial penetration (Green and May, 2005). As illustrated in Fig. 1, LPS is perceived as one line of research, interpreting the application of lean production methods to construction (Koskela et al., 2002; Winch, 2006). Its goal is to create a reliable workflow by having the project team, including all affected firms, collaboratively create a phase plan for each segment of the work (such as the foundations). This is a social process involving discussion with site staff and also planning to ensure that work is not waiting on workers, and that workers are not waiting on work.

Alternatively, Fig. 1 shows a conceptualization of lean construction from the early work of Koskela (1992), who termed learn construction the "new production philosophy" of the construction industry. Koskela (2000) synthesized three different perspectives (transformation, flow, and value generation) on the construction process, which formed the foundation for what has now become known as lean construction. These two schools of thoughts represent the basis of lean construction. The coexistence of different interpretations of lean construction has also been observed by Green and May (2005), who have pointed out that "*lean construction can be interpreted as a set of techniques, a discourse, a 'socio-technical paradigm' or even a cultural commodity*" (p.503).

2.2. Components of the Last Planner System

LPS is now regarded as the most powerful and well-known planning and control system of all the lean construction techniques and tools (Kenley and Seppänen, 2010). According to Ballard (2000), LPS builds on the principle of systematic reactive work planning executed on the lowest possible level in the hierarchy of planners – the last planner. The underlying philosophy is to ensure that all the prerequisites needed to perform distinct construction work are in place before they are assigned to a work group (Ala-Risku and Kärkkäinen, 2006; Ballard, 2000). It uses the overall project plan as the general framework, but suggests that the daily activities of production should be managed by a more flexible approach that is cognizant of the actual progress of the project. According to Ballard (2000), there are four main categories for any executable project task, namely SHOULD, CAN, WILL, and DID (see Fig. 2):

- SHOULD: tasks that need to be performed in the near future, according to the overall project plan. What should be done actually involves a push mind-set, on the basis of which, project tasks are pushed to execution. The works that should be done to achieve staged milestones are among some of the good examples that fall in this category. These "should-be-done" work items are derived from multiple sources, including the project objective, information, client input, as well as planners' past experiences.

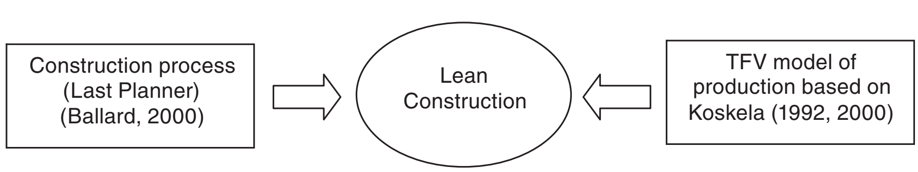

Fig. 1. Two core interpretations of lean construction.