Drivers for innovation in production management

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DRIVERS FOR INNOVATION IN PRODUCTION MANAGEMENT

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ABSTRACT

The aim of this paper is to examine the effectiveness of innovative programmes in construction. The term 'best practice' is commonly used in industry in to describe and disseminate cases where high levels of performance have been achieved. Several terminologies are used to describe this phenomenon, the best practice being the most widely used term. Best practices usually stimulate a desire in other companies to achieve similar levels of performance or gains that have been obtained by those best practice companies. This desire for better performance commonly triggers an innovation adoption programme by other companies. However, there are two kinds of drivers to innovation adoption: one is usually started by normative pressures applied by customers, suppliers, regulators or senior management. This type of adoption is called push-driven. On the other hand, there is a pull-driven innovation adoption decision, which is triggered strictly by an internal need associated with a performance gap. Based on this background this paper explores the generation, development and adoption of innovative programmes by industry.

KEY WORDS

Best practice, drivers, innovation, production management.

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INTRODUCTION

The term 'best practice' is commonly used in industry in order to describe and disseminate cases where high levels of performance have been achieved. Several terminologies are used to describe this phenomenon, with 'best practice' being the most common term. Best practice became popular with Schonberger's (1996) work in World Class Manufacturing. In his work a set of companies considered to exhibit superior performance from the average were cited as World Class. These World Class companies were used as a benchmark to compare performance with other companies. Those companies with lower levels of performance were encouraged to adopt the World Class management practices (Leseure et al. 2004). The International Vehicle Motor Programme generated a prominent benchmarking system for the car manufacturing industry, resulting in the 'lean manufacturing' concept (Womack et al. 1990). The Lean Construction interest group was born from this idea. Observing the gains of the Toyota Production System (TPS) from applying 'lean production' techniques a group of construction researchers founded the 'International Group for Lean Construction' in 1993, aimed at obtaining the same gains as the manufacturing industry by transporting the TPS philosophy to construction.

Based on this background this paper explores the generation, development and adoption of innovative programmes by practice, regardless of whether they are based on best practices or not. These topics are far from new and they have been discussed by other researchers in previous IGLC conferences (Marosszeky and Karim 1997; Hirota and Formoso 2001; Mitropoulos and Howell 2001; Koskela et al. 2003; Simonsen et al. 2004). Thus, the objectives of this paper are: firstly, to discuss the nomenclature that exists around the term best practice, and secondly, to present how companies react to innovation and consider approaches to the adoption of an innovative programme. In conclusion, suggestions are given regarding how production management in construction should treat innovative processes.

NOMENCLATURE

Regarding nomenclature, the term 'best practice' itself is a subject of debate. It has been criticized by some authors as not being the most appropriate term to represent high levels of performance. It is because a process, no matter how efficient it is, is always passive for improvement; which leads to the idea of 'better' practices instead of 'best' practices. 'Appropriate Practices' is a softer term that has been used to describe good management practices, such as: procedures, ideas, value, and tools. Being more flexible, appropriate practices are able to be used with more generic and dynamic variables.

From the authors' point of view, the most suitable term is 'promising practices' because innovation involves performance and continuous improvement. Furthermore, a promising practice leaves clear the idea that a good practice usually can not necessarily be applied universally, that is why it is promising.

Another related notion, to be introduced here, is theory-based practices. These are distinguished from other practices by having a firm theoretical foundation and explanation. One common problem with best practice is the failure to realize that they actually are theory-based.

WHY ARE CONSTRUCTION COMPANIES RELUCTANT TO ADOPT NEW IDEAS?

Two case studies carried out in UK construction companies demonstrated that managers are not always vigilant for opportunities of improvement due to the inertia of the system or even because the routine of repetitive processes generating satisfactory levels of delivery/incomings (profit). Similar behaviours were also pinpointed by Mitropoulos & Howell (2001).

Further evidence of this is given in the Third UK Community Innovation Survey (DTI 2004). In comparison to 11 other industries, construction was classified as the worst performing industry in five of its six categories of innovation, as illustrated on Table 1.

Table 1: Percentage of UK Construction Companies Exhibiting Innovative Activities

Innovative Activity	Construction	All Industries
Product Innovation	6%	18%
Process Innovation	6%	15%
Long Term Activity	3%	9%
Co-operation	7%	8%
Innovation Expenditure	27%	36%

Winch (2003) contends that this is in part due to a misunderstanding of the nature of construction in comparison with other industries and that the real picture is not as bad as these raw statistics suggest, but nevertheless the industry is still seen as underperforming. A second perspective is given by Turner and Keegan (2000) who argue that for project based companies innovation can in fact be dangerous. Companies that hold this view are likely to avoid the introduction of innovation if this is perceived as carrying a risk:

'Only when faced with huge challenges, ... , are project based firms yielding to the need to loosen up on resources and allow creativity and innovation the space, time and expertise needed to flourish.' (Turner and Keegan, 2000)

This comment can be viewed clearly in the context of the hierarchy of motivational needs developed by Sexton & Barrett (2003), which illustrates a three stage model as follows:

1) Survival: Small construction firms concentrate foremost on project-based innovation focusing on survival

2) Stability: Once stability is attained firms can look towards consolidating and stabilizing their market

3) Development: The exploitation of stability to develop and/or grow

Koskela and Vrijhoef (2001) argue that the lean production template still has not been successfully introduced in construction. Justifying this argument, the authors pinpoint that the main cause of this mismatch between the 'new' principles and peculiarities of construction arises because of the inability to abstract the theoretical core of this production template and apply it to the situation of construction.

Innovation initiatives in construction are usually triggered by new materials and/or equipment launched into the market. Innovations driven by management action, trying to improve the construction process, are still much too few and should be given more consideration. One reason given for this is that construction does not have a specific method to measure performance, leaving construction managers without many options to see their project's efficiency onsite. An explanation for this is that construction does not have as solid data as the manufacturing industry; in addition construction data fluctuates substantially. This fluctuation is normally justified due to the fact that construction projects are considered one-of-a-kind; i.e. they differ according with size, type, budget, contract, company culture, etc.

In practice, construction companies need to see some empirical evidences of gains, achieved by other companies, before they assume any kind of innovation implementation action. When the attention turns to their processes improvement, construction industry is usually more interested in measure project delays rather than efficiency of the production system by itself. This view allied to a cost-focused management, instead a value-focused, also results in implementation of bad innovative programs.

DRIVERS FOR ADOPTION OF AN INNOVATION PROGRAMME

A general innovation adoption process, as represented in Figure 1, consists of a cycle of implementation stages and activities. The implementation cycle consist of six stages: identification, evaluation, commitment, detailed preparation, actual use, and post-use evaluation (Slaughter 2000). Usually implementation processes may proceed through each of the stages. However, in certain cases the evaluation stage may reveal new criteria which need to be reconsidered in the identification stage and these two stages may cycle through a few repetitions.

Figure 1: Innovation adoption process (Slaughter 2000).

In considering the innovation process illustrated it is useful to consider the point made by Cohen and Levinthal (1989) that the impact of the implementation is wider than the particular innovation itself. They found that research and development not only generates new information, but also enhances the firm's absorptive capacity - its ability to assimilate and exploit existing information.

It is common to find in the industry innovative adoption that departs from a 'best practice' observation. However, together with the term 'best practice' comes the benchmarking; that is, an approach of establishing operation targets and productivity programs based on industry 'best practices' which would lead to superior performance. Benchmarking encourages incorporating those practices into companies with lower performance indicators (Camp, 1989). On the other hand, Lillrank (1995) argues that copying is suitable just for techniques with low organizational context, and the core innovative idea should be abstracted and then recreated in an application that fits the company reality. Womack (2003), a well-known 'lean author', positions himself on benchmarking, saying: 'To hell with your competitors - compete against perfection by identifying all activities that are muda (waste) and eliminating them'.

As 'best practice' and benchmarking are not always universally applicable, regardless of context, it is common to find cases of failures. Companies should therefore ask themselves a core question before any adoption decision: Why does my company need an innovation programme? Following on from this there are two ways that drive an innovative adoption decision: push and pull[4] . A push-driven innovation adoption decision is usually triggered by normative pressures applied by customers, suppliers or regulators. On the other hand, a pull-driven innovation adoption decision is triggered strictly by an internal need associated with a performance gap. In the Figure 2 some potential drivers are represented.

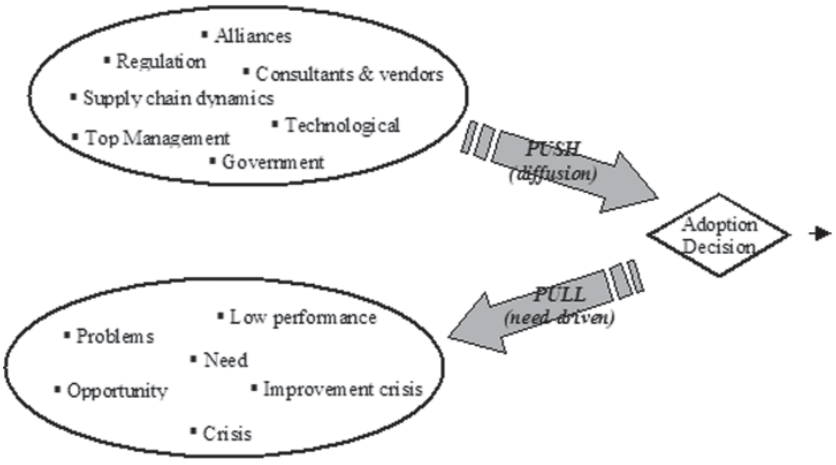

Figure 2: Adoption drivers (adapted from Leseure et al., 2004).

[4] Push and pull terms here are different from those used in production management.

In research carried out by Leseure et al. (2004) adoption drivers are described as follows:

- A number of research projects make the hypothesis that need is a driver necessary for success. These projects usually confirm that a strong identified need results in more successful adoption of promising practices.

- A number of research studies are concerned with the potentially harmful effects and the high rate of failures of adoptions projects when adoption is driven by institutional pressures. These studies conclude that 'pushed' adoptions seldom result in performance improvements, a conclusion which usually reinforces negative perceptions of promising practices as management fashions or fads.

Nevertheless, both drivers - push and pull - can exist simultaneously or alternate. Thus, even in pull situations, top management backing is usually necessary, and a situation where there are consultants and vendors from whom one can buy services and software facilitates the pull situation likewise. Indeed it is likely that organisations with a greater absorptive capacity (Cohen & Levinthal, 1989) and enhanced motivational needs (Sexton & Barrett, 2003) are likely to be able to pull a larger range of innovations than the majority of companies who exist in a reactive mode in the manner described by Turner & Keegan (2000).

The bigger success of pull-driven adoptions can be explained by the involvement and commitment of all stakeholders with the process, usually once an adoption action departs from a need. However, before implementing a continuous improvement programme that the lean construction philosophy relies on, it is necessary to learn. For a company to be a 'learning organization' there are three critical issues (Garvin 1993). First, is the question of meaning: a well-grounded, easy-to-apply definition of a learning organization. Second, comes management: clearer operational guidelines for practice. Finally, better tools for measurement can assess an organization's rate and level of learning. Garvin (1993) also defines learning organizations as skilled at five main activities: systematic problem solving, experimentation with new approaches, learning from past experience, learning from the best practices of others, and transferring knowledge quickly and efficiently throughout the organization. However, improvement performance opportunities are not always easily identified. Thus, production management in construction requires a tool to measure performance and pull innovation.

Bringing together the themes of the preceding description we can say that implementation of an innovation will lead to not only the solution of the problem at hand, but also to an increased 'absorptive capacity for the organisation to learn' (Cohen, Levinthal, 1989). In the longer term this is likely to lead to an organisation developing its motivational needs to adopt innovations (Sexton & Barrett, 2003). This combination of an organisation with increased learning ability and motivation to adopt innovation will increase the theoretical understanding of the organisation. Taken together, this combination of factors will mean that such a company will have the ability and desire to pull a much larger range of innovations than the majority of construction companies that are only likely to consciously attempt to adopt innovation in the face of a dramatic business imperative as described by Turner & Keegan (2000). Against this background and in terms of pull implementation 'small wins' can be seen as a good direction to adopt an innovative programme. Small wins redefine a larger problem in a set of smaller problems, then stakeholders can identify a series of controllable opportunities of modest size that produce visible results that can be assembled into wider solutions (Weick, 1984; Vrijhoef et al., 2001). Figure 3 attempts to show these connections.

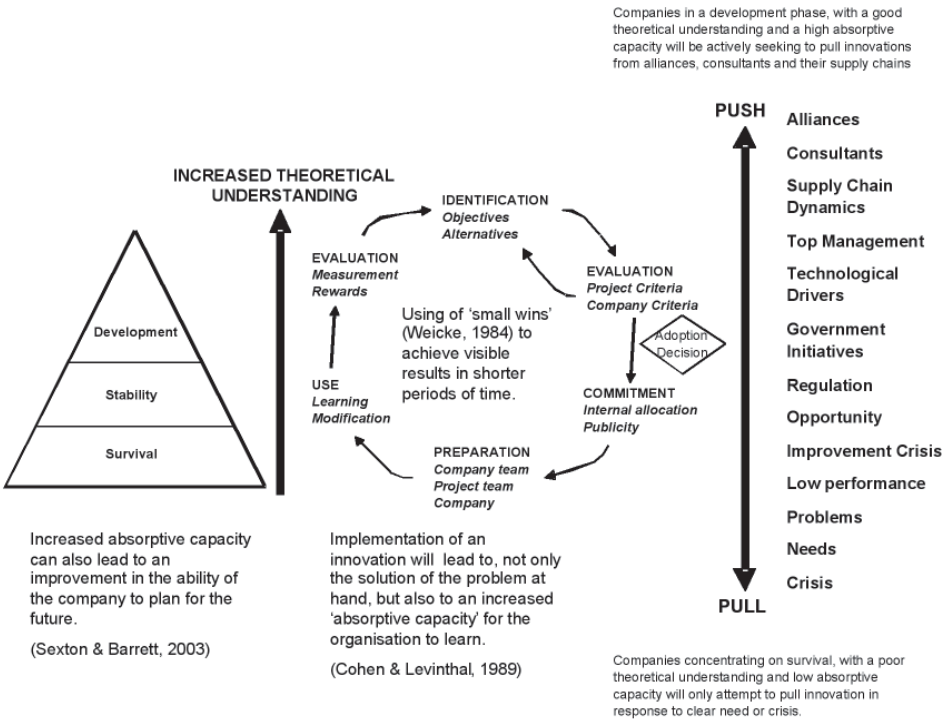

Figure 3: Drivers for innovation.

CONCLUSIONS

As mentioned by Mitropoulos and Howell (2001), result-based programs are a barrier for Lean Construction philosophy entries in an organization. To transpose these barriers, innovation should be coupled with a company's necessity to understand the circumstances within which it is used, when it is used, and why. Regarding benchmarking, it should be used as a tool instead of an innovation driver. Notions of learning and knowledge sharing have much to contribute towards achieving organizational performance. Thus, implementation of a learning organization policy and small wins are also strongly recommended.

Although pull-driven has demonstrated to be more efficient for implementation, creating a pull situation in relation to production management is not easy as the relative performance or, opportunities for improving performance are not readily visible. The construction industry needs a diagnostic tool in order to improve performance. It is essential to have accurate and representative measurements reflecting current practice, trends and productivity as well as understanding on the causes of underperformance. Once we have this information and knowledge on hand it is possible to pull innovation and continuous improvement programmes

much easier into construction processes.

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