

The advancement of technology and construction industry construction essay



2. 1 Introduction

The construction industry recently dominated many changes due to the advancement of technology, the industry needs to work collaboratively and pool knowledge in order to capture innovation. It's a common dilemma in the construction industry: how to 'capture' knowledge and transfer it from one job to another, where there will be innovation among the talented personnel. Constructing Excellence, though, has come up with an innovative 'ground-up' way of boosting R&D and innovation. The construction process of today is in need of improvement. When comparing the construction process of today with the aspects that are considered necessary for the innovation process, it is clear that there are problems in the sector that to various extents hinder innovations.

According to Kristian Widen the construction sector is blamed to be over conservative and low on innovation. Many different types of actions have been initiated depending on what is believed to be the problem. Generally Innovation in construction can be studied from many different perspectives. Traditionally, innovation in general has been studied from either an innovation systems perspective or from the single innovative company. Simplified, innovation systems research deals with how the different companies, government and other institutions relate to each other in the innovation superstructure, while research on the company often deals with its innovation capabilities, strategies etc. These different ways of looking into innovation have taken place in the construction sector as well over the years. There have been a number of studies covering, for example, how national research policies support construction innovation and how projects

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should be organized. The construction industry is generally driven by single projects that require the creation of a team to do the work and the subsequent dissolution of that team once the job is completed. This can both enable and constrain innovation. It enables innovation by ensuring great flexibility and fast adoption of new ideas and technology, but it can also constrain innovation as much knowledge gained through the process of a project is lost as the business moves on to the next project. Developing a strategy for learning within your organization can help overcome the potential problems of lost knowledge. Documenting lessons learned and best practices after every project can be a useful way to avoid previous mistakes and learn from experience.

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2. 2 Review of the literature

2. 2. 1 Construction Innovation

The need for innovation in the construction industry has long been stressed from both within and outside the industry. Changes in global markets, increased customer expectations, and government pressure have all led to innovation becoming a key focus for the construction sector. To echo this, a recent government report claims that “ Innovation needs to be at the heart of the construction industry’s efforts to improve productivity and develop new capabilities, business and markets”.

Innovation in construction is considered to be ‘ the act of introducing and using new ideas, technologies, products and/or processes aimed at solving problems, viewing things differently, improving efficiency and effectiveness,

or enhancing standards of living' (The Civil Engineering Research Foundation (CERF), 2000, p. 2). It is increasingly recognized that innovation is not an orderly or neat process, but a process that is disorganized, controversial, and uneven that competes with the day-to-day business and everyday constraints of your business. Therefore, a conscious strategy to manage innovation is crucial in order to spot opportunities and convert these into growth.

Generally there is no clear definition of the concept innovation. Many different varieties and also different models exist. For instance " Innovation is the process through which firms seek to acquire and build upon their distinctive technological competence, understood as the set of resources a firm possesses and the way in which these are transformed by innovative capabilities" (Dodgson and Bessant, 1990, p 38). Similarly its also defined innovation as " Innovation means the application of new knowledge to industry, and includes new products, new processes, and social and organizational change" (Firth and Mellor, 1999, p. 199), " It is when an act, as an idea, begins to impact on its environment" (Atkin, 1999, p. 4). " A technological product innovation is the implementation/commercialization of a product with improved characteristics such as to deliver objectively new or improved services to the customer. A technological process innovation is the implementation/adoption of new a significantly improved production or delivery methods. It may involve changes in equipment, human resources, working methods or a combination of these." OECD, 1997, paragraph 24)

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Construction Innovation

The construction innovations occur in different ways in the organizations, where some times we see they are common models take place in the organizations, while some times innovations occur in different models. Most business drivers to the need for the construction industry to put stronger focus on innovation, and one of the best series documents illustrates the recent attention that has been paid to this subject(Gann and Slater, 1998; Slaughter, 1998; Winch, 1998, Aktin, 1999; Gann et al., 2000; Koskela and Vrijhoef, 2001). Drucker defined innovation as the effort to create purposeful, focused change in an enterprise’s or social potential. Others also defined innovation as innovation is defined as ‘ generation, acceptance and implementation of new ideas, processes, products or services’ (Thompson, 1965) or the ‘ successful implementation of creative ideas within an organization’ (Amabile et al., 1996).

According to the previous studies there are five models suggested by Slaughter, namely incremental, modular, architectural, system and radical innovations, by using these models of innovations companies can plan their implementation activities with respect to timing of commitment, coordination among project tea, special resources, and level of supervisory activity. The definition provided by Slaughter (1998) is broadly accepted by participants <https://assignbuster.com/the-advancement-of-technology-and-construction-industry-construction-essay/>

and academics. She defines innovation as follows: Innovation is the actual use of a nontrivial change and improvement in a process, product, or system that is novel to the institution developing the change. Innovation in the construction industry can take many forms. Slaughter (1998) characterizes such innovation according to whether it is 'incremental' (small, and based on existing experience and knowledge), 'radical' (a breakthrough in science or technology), 'modular' (a change in concept within a component only), 'architectural' (a change in links to other components or systems), or 'system' (multiple, integrated Innovations). Apart from that, it's increasingly accepted that construction innovation encompasses a wide range of participants within a 'product system' (see, for example, Marceau et al., 1999). The construction industry is being increasingly challenged to successfully innovate in order to satisfy better the aspirations and need of society and clients and improve competitiveness (Latham 1994; DETR, 1998). It's also very important to consider the existing literature on the broad topic of construction innovation drivers and their operation in a variety of countries (see Blayse and Manley 2004), with the contributions of four authors standing out: Seaden (e. g., 1996), Winch (e. g., 1998), Slaughter (e. g., 1998; 2000) and Gann (e. g., 2001). These authors appear to most effectively mobilize expertise based on both the construction industry literature and the innovation literature. However, despite the significant contributions of these authors, there remains an opportunity to contribute to the literature by exploring construction innovation benefits, using Malaysia construction industry as case. Construction innovation as a field of study has generated a number of useful critiques of the industry's performance, the

higher the levels of innovation in the construction industry, the greater the likelihood that it will increase its contribution to economic growth.

The innovation processes always takes place but with out notice and the companies in the construction industry are interested innovative technologies in order to be competitive in today's market. In order to be clear with the above mentioned models, firstly we must understand the differences between innovation and invention, invention is a detailed design or model of a process or product that can clearly be distinguished as novel compared to existing arts. Innovation, on the other hand, is the actual use nontrivial change and improvement in the process, product, or system that is novel to the institution developing the change (freeman 1989).

Generally the innovations has its benefits to the construction industry, commonly the innovations increase economic growth (Schumpeter 1934), apart from that the innovations also increase the productivity and efficiency (Schmookler 1952), innovation can also be associated with market growth, through the provision of new or improved products and services and reductions of cost of production. On the other hand construction-related innovations can also have significant social benefits (Seaden 1996).

There are many attempts to define innovation within the industry, and one of the most comprehensive definitions was given by Ling (2003) and could be considered as the most comprehensive within the construction industry context. He defined innovation as an implementation of new idea to a construction project with the intention of deriving additional benefits, although there might be some associated risks and uncertainties. The new

idea may be refer to new design, technology, material component, or construction method used in a project. (Asad et al., 2005).

Models of Innovation

Incremental and Radical innovations

Incremental innovation is a small change, based upon current knowledge and experience. In contrast, a radical innovation is a breakthrough in science or technology that often changes the character and nature of an industry. While incremental innovations occur constantly, radical innovations are rare and unpredictable in their appearance and in their impacts. A radical innovation creates a new way of understanding a phenomenon and formulating approaches through which to solve problems (Nelson and Winter 1977; Dosi 1982).

Modular and Architectural Innovations

According to the previous studies, there is distinction between modular and architectural innovations, for instance the modular innovation entails a significant change in concept within a component, leaves the links to other components and systems unchanged, while Architectural innovation involves a small change within a components and systems (Henderson and Clark 1990). On the other hand Modular innovations may be developed within an organization and implemented with a minimum of negotiation with parties involved in the development or selection of other components; where as architectural innovations require change and modification in the set of interacting components and systems (Afuah and Bahram 1995).

System Innovation

System Innovation is also very important among the models of innovations, it's identified through their integration of multiple independent innovations that must work together to perform new functions or improve the facility performance as a whole. For this kind of innovations the linkage are explicitly among the innovations, as well as entailing changes in the links to other components and systems (Cainarca et al . 1989).

The previous papers highlighted that the construction innovation offers the potential for significant company, industry, and societal benefits. As the demand rises for increasingly complex facilities, and the traditional sources of construction materials and labor shrinks, most construction related companies are looking for design and technology innovations to improve their products and services, and decrease their costs.

The five models of construction innovations suggested by Slaughter are basis for construction companies to plan and carry out activities to effectively use specific construction innovations. The above models are based upon current theories in management and economics, but are modified to reflect the special conditions associated with constructed facilities.