Chapter 6.6
The Applications of Building Information Modelling in Facilities Management

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ABSTRACT

Effective processes in facilities management are responsive to the quality of information flow across various levels and stages of design, procurement and construction processes. Considerable empirical evidence from industry reports shows how construction and facilities management processes could be jeopardized by some of the limitations of conventional design and procurement processes. To address these limitations, there are promising indications showing that the potential of Building Information Modelling (BIM) will trigger major improvements in both construction and facilities management systems. This study reviews some of the capabilities of BIM which may revolutionize conventional practices in facilities management processes. Specific platforms for this include, integrated analysis and simulation of project variables in virtual environments, effective communication between project stakeholders and project teams and multi-disciplinary collaboration. Others are interoperability, project visualization, value intelligence and other digital facilities management applications. In the study it is argued that BIM capabilities such as project visualization, simulation, auto-alert and value intelligence could stimulate major improvements in facilities management processes. Finally conclusions are drawn on the relationships between BIM and digital facilities management, including suggestions on areas of further studies.

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1 INTRODUCTION

Several well-known industry reports define construction as the combinations of inflow and outflow of multi-disciplinary processes (Koskela 2000), complex systems (Bertelson 2003) and risky, dynamic, uncertain and unique protocols (Flanagan et al. 1987). Despite the limitations that underlie these relative but fragmented fundamentals, construction has continued to be an industry where the mechanics of infrastructural needs trigger economic opportunities. Further to this, investment goals in the industry's processes and constructed facilities are stimulated by different kinds of motivations. Ustinovichius et al. (2007) identified some of these investment goals and the nature of risks that are associated with them. Ironically, clients often see beyond or are less concerned about intangible risks. Olatunji and Sher (2009) have suggested that clients always desire absolute feasibility of their investments; and this is done without compromising certain economic goals. Indications from literature (Egan 1998; Latham 1994) suggest that managing project feasibility and clients' economic anticipation has always been an Achilles heel for the industry. Unfortunately, fragmentation of information processes and deficient frameworks that simulate and visualize facilities' life cycle have been the most significant factors that have lead to investment goals in construction not being met.

Recent research (i.e. Atkin and Björk 2008; Liyanage and Egbu 2004) concluded that the goal of facilities management is to, facilitate processes that enable projects to achieve their design intentions, maintain them over a long period of time and service them in flexible ways to widen the economic benefits to clients and end-users (in stable, sustainable and fulfilling project life-cycles). To do this, facilities managers often need information on, design intentions for spaces, equipments and accessories, uses and material limitations, liabilities and business drivers in relation to value enhancements and clients' objectives. Therefore, for constructed facilities to have fulfilling life cycles, project information needs to be systemic, balanced, comprehensive and integrative.

According to Lee et al. (2006), '*guaranteeing how fulfilling facilities will be'* has been a daunting problem that has challenged conventional fragmented processes in manual and CAD design systems. Even in the best scenarios, a wealth of project documents containing design, construction and procurement specifications need to be transferred to facilities management professionals because these are often isolated from earlier parts of facilities lifecycle. Whilst several wealth of project documents have to change hands, -conventional approaches used for managing exchange of data- do have major risks as documents move from one stage to another.

This situation renders them vulnerable to damp, fire, theft and loss. This consequently places a major economic burden on facilities managers. Currently architectural, engineering, estimating and construction, and facilities management processes still grapple with inconsistency and loss of information from one stage of a facility's life to another. Many difficult problems that would damage the project goals and clients' interests always accumulate during a facility's post-construction life. Dean and McClendon (2007) concluded that the best way to avoid this quagmire is to include effective defragmentation of information flow in both horizontal (processes) and vertical (stages) directions of project development and facilities management systems.

Building Information Modelling (BIM) combines both digital information repository capabilities and the potential of integrated technologies to overcome the limitations of conventional design tools (Lee et al. 2006; Tse et al. 2005). It also provides platforms for stakeholders and project teams to collaborate, integrate, create and share data, effectively communicate, simulate and visualize projects in different projected circumstances. The