Barriers to Achieving the Benefits of BIM

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ABSTRACT

The purpose of this paper is to study the benefits of building information modelling (BIM) and determine the barriers to achieving these benefits. The use of BIM is not yet at a level where known benefits can be realised. This study consists of a literature review of the benefits of BIM and an empirical review, where focus group interviews were used to discover barriers. The major benefits of BIM include cost savings, better information flow, shorter project timelines and better quality. The greatest barrier is the lack of practical guidelines for BIM implementation in projects. Successful BIM implementation requires technology, people and processes to be in proper shape. Earlier studies identify the theoretical requirements of BIM implementation, but practical solutions are still not at an adequate level.

Keywords: BIM Barriers, BIM Benefits, BIM Implementation Plan, Building Information Modelling, Finland, Maturity Stages, Process Improvement

INTRODUCTION

This study discusses the use of building information modelling (BIM) in the construction industry. Civil construction refers to the construction of roads, waterways, bridges, excavations, earthworks and structures other than buildings (Building Dictionary, 2012). Alternatively, architectural construction refers to the construction of buildings. Data modelling and data model transfer technology differ between civil and architectural construction.

BIM is used in various sectors, such as in the U.S. Architectural Engineering and Construction (AEC) industry. An estimation made during the Autodesk University presentations states that almost half of the U.S. AEC market uses BIM (Parve, 2012). In civil construction, the situation is not that bright. Only innovators (14%) and some early adopters have taken to using BIM. The situation in Finland is similar to that in the U.S. construction industry, where Finland is one of the leading countries in BIM implementation in architectural construction (Khosrowshahi & Arayici, 2012). According to the Finnish BIM Survey (2013), within the Finnish AEC industry, 65% of respondents use BIM. Only 2% of respondents classified their organisation as involving civil engineering.

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Several BIM definitions look at modelling from different perspectives. The use of BIM started out of the use of new software technologies for building designs. The first definitions were technology-oriented, but now, more often, the scope involves the functions offered by BIM. The acronym BIM refers to both “building information modelling” as well as “building information models”. Modelling refers to the process of creating the actual model using different modelling software. A building information model is the result of the modelling work, which includes the design, construction and maintenance of facility data and information regarding how these objects behave in different situations (AGC BIM Guide, 2006).

BIM models can be used for 3D visualisation, fabrication or shop drawings, code reviews, forensic analyses, facilities management, cost estimating and construction sequencing as well as conflict, interference and collision detection (Azhar et al., 2008). The BIM Handbook (2008) observes that BIM creates new opportunities for relationships and roles within project teams. If BIM is implemented properly, it enables design and construction processes that are more integrated, which results in a better quality with lower costs and shorter project timelines (Eastman et al., 2008). It has also been noted that even though companies might be ready to use BIM, it has not yet been applied to all projects. According to the Finnish BIM Survey (2013), one of the reasons BIM has not been used more widely is that it does not yet cover all life cycle phases of a project. This is in conflict with the notion that the benefits of BIM are accrued through collaborations between different parties in design, construction and maintenance (Ashcraft, 2008; Eastman et al., 2008), and there are factors preventing the wider use of BIM in the construction industry.

The aim of this research is to identify the barriers for achieving the benefits of BIM. The research objective is divided into two specific research questions:

RQ1: What are the benefits of BIM?
RQ2: What are the barriers to implementing BIM?

This study is qualitative in nature. At first, the benefits of BIM to clients, owners, designers and constructors were compiled from the existing literature. Then, using empirical research, the expert focus group sessions were organised to process each benefit of BIM to identify barriers to the benefits in question. In total, there were 74 experts in the area of BIM in 10 groups, which is comparable to the parameters listed in the literature. Each focus group was assigned to complete Ishigava diagrams and barrier analyses to determine why a specific benefit was not achieved. The results of the expert focus groups were then studied and classified.

BIM IN CIVIL AND ARCHITECTURAL CONSTRUCTION

Background of BIM

The history of BIM is almost four decades long. According to the BIM Handbook (2008), Chuck Eastman described in 1975 the first concept that we know now as BIM. The concept was originally called a “building description system” in an article published in the AIA Journal at Carnegie-Mellon University. The expression BIM was first used in the title of Robert Aish’s 1986 paper (BIM Handbook, 2008). The American General Contractors’ (2006) definition of BIM is one of the most often cited, which states:

*Building Information Modeling is the development and use of a computer software model to simulate the construction and operation of a facility. The resulting model a Building Information*
Utilisation of Smart Devices in the Construction Industry: An Empirical Study in the Dominican Republic
www.igi-global.com/article/utilisation-of-smart-devices-in-the-construction-industry/216886?camid=4v1a

Disease, Death, and the Body Politic: An Areal Interpolation Example for Political Epidemiology
www.igi-global.com/chapter/disease-death-body-politic/63608?camid=4v1a