CHALLENGES AND BARRIERS OF BUILDING INFORMATION MODELLING (BIM) IMPLEMENTATION IN CONSTRUCTION INDUSTRY

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I hereby declare that I have checked this project and in my opinion, this project is adequate in terms of scope and quality for the award of the Bachelor Degree of Civil Engineering

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I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

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CHALLENGES AND BARRIERS OF BUILDING INFORMATION MODELLING (BIM) IMPLEMENTATION IN CONSTRUCTION INDUSTRY

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Thesis submitted in fulfillment of the requirements for the award of the Bachelor Degree in Civil Engineering

Faculty of Civil Engineering and Earth Resources
UNIVERSITI MALAYSIA PAHANG

JUNE 2018
To my beloved parents, Hamzah Ahmad and Rodiah Abd Majid.
ACKNOWLEDGEMENTS

Alhamdullilah and thanks to God, I have successfully completed this project. Although I had faced many challenges to complete this project, there are many useful knowledges and experiences I achieved when doing this project.

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ABSTRAK

ABSTRACT

Building Information Modelling (BIM) is an intelligent model-based process that provides insight for creating and managing building and infrastructure projects faster, more economically and with less environmental impact. It also represents the process of development and use of a computer generated model to simulate the planning, design, construction and operation of a facility. BIM is defined as a modelling technology and associated set of processes to produce, communicate, and analyse building models throughout the entire project's lifecycle. Although there is bound of benefits that gained from the BIM application, the local construction industry still reluctant to deploy the technology in delivery its services. The objectives of the study is to identify the types of challenges from relevant literature review related to BIM, to design the questionnaire on the challenges and barriers during the implementation of BIM and to analyse the effect of challenges to the outcome of BIM. The survey questionnaires were distributed in the construction field, consultant firm and architecture firm within Klang Valley. The method of data collection is by questionnaire and also simple interview. The main conclusion drawn from the study are cost, lack of collaborative work processes and modelling standards and fragmented nature are the most largest challenges and barriers in the implementation of BIM in construction industry.
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<tr>
<td>AEC</td>
<td>Architecture, Engineering, Construction</td>
</tr>
<tr>
<td>AGC</td>
<td>Associated General Constructors</td>
</tr>
<tr>
<td>AI</td>
<td>Average Index</td>
</tr>
<tr>
<td>AIA</td>
<td>American Institute of Architects</td>
</tr>
<tr>
<td>BAS</td>
<td>Building Automation System</td>
</tr>
<tr>
<td>BCSs</td>
<td>Biosafety Cabinets</td>
</tr>
<tr>
<td>BIM</td>
<td>Building Information Modelling</td>
</tr>
<tr>
<td>CAD</td>
<td>Computer Aided Design</td>
</tr>
<tr>
<td>CADD</td>
<td>Computer Aided Drafting and Design</td>
</tr>
<tr>
<td>CAM</td>
<td>Computer Aided Manufacturing</td>
</tr>
<tr>
<td>CIDB</td>
<td>Construction Industry Development Board</td>
</tr>
<tr>
<td>CMM</td>
<td>Capability Maturity Model</td>
</tr>
<tr>
<td>CNC</td>
<td>Computer Numerical Control</td>
</tr>
<tr>
<td>COBie</td>
<td>Construction Operations Building Information Exchange</td>
</tr>
<tr>
<td>CPM</td>
<td>Critical Path Method</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and Communication Technology</td>
</tr>
<tr>
<td>IPD</td>
<td>Integrated Project Delivery</td>
</tr>
<tr>
<td>IT</td>
<td>IT Information Technology</td>
</tr>
<tr>
<td>MEP</td>
<td>Mechanical, Electrical, Plumbing</td>
</tr>
<tr>
<td>NBIMS</td>
<td>National Building Information Modelling Standards</td>
</tr>
<tr>
<td>O&amp;M</td>
<td>Operation &amp; Maintenance</td>
</tr>
<tr>
<td>PrM</td>
<td>Production Manager</td>
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<tr>
<td>Acronym</td>
<td>Description</td>
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<tr>
<td>RFID</td>
<td>Radio Frequency Identification</td>
</tr>
<tr>
<td>ROI</td>
<td>Return on Investment</td>
</tr>
<tr>
<td>2D</td>
<td>Two Dimensional: x,y</td>
</tr>
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<td>Three Dimensional: x,y,z</td>
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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Building Information Modelling (BIM) is an intelligent model-based process that provides insight for creating and managing building and infrastructure projects faster, more economically and with less environmental impact. It also represents the process of development and use of a computer generated model to simulate the planning, design, construction and operation of a facility (Arayici, 2009).

The Building Information Model is primarily a three dimensional digital representation of a building and its intrinsic characteristics. It is made of intelligent building components which includes data attributes and parametric rules for each object. For instance, a door of certain material and dimension is parametrically related and hosted by a wall. Furthermore, BIM provides consistent and coordinated views and representations of the digital model including reliable data for each view.

This saves a lot of designer's time since each view is coordinated through the built-in intelligence of the model. According to the National BIM Standard, Building Information Model is "a digital representation of physical and functional characteristics of a facility and a shared knowledge resource for information about a facility forming a reliable basis for decisions during its lifecycle; defined as existing from earliest conception to demolition".

Construction industry is moving rapidly toward modernization. Information Communication Technology (ICT) has played the significant roles in this
transformation. The use of ICT permeates various industries and is seen as a major driver for improvement in performance and cost efficiency (Arayici, 2009).

However, the performance of ICT towards the industry is still underprivileged. It might be due to the different types of software used by the participants of the industry, the amount of the redundant information and the manual transfer of information (McGraw-Hill, 2008).

To solve this problem, Building Information Modelling (BIM) has been introduced to the industry. BIM is suitable to support the simulation of a construction project in a virtual environment, with the advantage of taking place in silico through the use of a proper software package (Jardim-Goncalves, 2010). Although the adoption of BIM is expanding within the industry and it have been beneficial to several parties. Yet, there is still some space for improvements.

Even though the concept of BIM has been widely implemented, but people still failed to explore how a BIM can really talk to a construction project in a real time manner (McGraw-Hill, 2008).

1.2 PROBLEM STATEMENT

The productivity and economic benefits of BIM to AEC industry are widely acknowledges and increasingly well understood. Further, the technology to implement BIM is readily available and rapidly maturing. Yet, the adoption of BIM is much slower than anticipated (Jung, Y., & Joo, M, 2011).

The researchers and practitioners have to develop suitable solutions to overcome these challenges and other associated risks. There are two main reasons; technical and managerial that cause BIM adoption is much slower than anticipated (Kacprzyk, Z, 2014).

The major drawback of technical and managerial challenges needs to be identify, synthesize and discuss. It is expected that the use of BIM will continue to
increase in the AEC industry. Despite that, there are some barriers when dealing with the BIM. As Datuk Seri Prof Judin Abdul Karim said "It is not a problem of knowledge and information on the usage of ICT; it is always about the cost." Although there is awareness of using the ICT but the cost of investment prohibited companies from adopting the technology. Big companies can afford ICT investment while most of the small companies find its adoption unaffordable (Kiviniemi, A, 2013).

Therefore, this research will identified the barriers when dealing with the widespread of BIM adoption which not only in the monetary term but also others related issues such as legal issues, data storage capacities, availability of real-time information and et cetera.

1.3 RESEARCH OBJECTIVES

The following is the research objectives that guide me throughout the study:

1.3.1 To identify the types of challenges from relevant literature review related to BIM.

1.3.2 To design the questionnaire on the challenges and barriers during the implementation of BIM.

1.3.3 To analyse the effect of challenges to the outcome of BIM.

1.4 SCOPE OF STUDY

This study focused on the participants of the construction industry generally consists of Consultants, Engineers and Contractors. The respondents will complete the questionnaire and give their opinions towards the challenges of Building Information Modelling (BIM) in project implementation and also project related issues. In addition, the study will focus on the construction industry, consultant firm and architecture firm located within Klang Valley area.
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Kiviniemi, A. (2013) “Public clients as the driver for open BIM adoption-how and why UK government wants to change the construction industry?” *Conference at Clareon Hotel Airlanda airport, Open BIM. 2013-04-22*.


