IDENTIFYING THE BARRIERS IN THE DEVELOPMENT OF BUILDING INFORMATION MODELING IN CONSTRUCTION ENGINEERING AND MANAGEMENT OF EDUCATIONAL SYSTEMS

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Dedicated to

My beloved mother & my dear uncle Naser Bonabi.

Thanks for the never ending love and support.

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ABSTRACT

After the introduction of Building Information Modeling to construction industry in 1987, today industry are being faced with a demand for tools and a trained professionals capable of implementing it. Recently, the new idea of having a comprehensive 3D intelligent model with the ability of being extended to a 4D, 5D, 6D and 7D model has caught a lot of attention and forced the construction companies to move toward adopting the new knowledge and implementing it in their projects. However, there are deficiencies associated with the integration of this new technology which is basically due to the lack of well-trained individuals in the field. These deficiencies are basically relates to the scarcity of construction engineering programs within the universities with a dedicated course in Building Information Modeling. Although the utilization of BIM has been recently developed in some universities curriculums, this adoption has been overlooked in roughly all Malaysians' institutions curriculums. As a result, this research is aimed to identify obstacles regarding the use of BIM in educational system. The scope of this research is limited to academicians including both lecturers and students of the faculties of civil and Build Environment at University Technology of Malaysia. The results have indicated that, although, majority of students are aware about advantages of BIM technology at construction stages, they are not capable to use related software. By doing further research some barriers identified and recommendations stated. From this research that is undertaken, it is practicable to conclude that the usage of building information modeling in academic systems is effective in increasing students' ability in working fields in future. Besides, with eliminating the identified barriers, the utilization of BIM in academic fields would be accelerated.

ABSTRAK

Selepas pengenalan Permodelan Maklumat Bangunan dalam industri pembinaan pada tahun 1987, permintaan terhadap teknologi baru dan profesional terlatih yang mampu melaksanakannya sering meningkat pada masa kini. Baru-baru ini, idea baru yang mempunyai model komprehensif nD pintar yang mana keupayaannya dilanjutkan kepada model 4D, 5D, 6D and 7D telah menarik banyak perhatian dan memaksa syarikat-syarikat pembinaan untuk bergerak ke arah penggunaan pengetahuan yang baru ini dan melaksanakannya dalam projek-projek mereka. Walau bagaimanapun, terdapat kelemahan dalam perlaksanaan integrasi teknologi baru ini. Pada asasnya ia disebabkan oleh kekurangan individu yang terlatih dalam bidang ini. Kelemahan ini pada dasarnya berkaitan dengan kekurangan program kejuruteraan pembinaan di universiti dengan kursus yang khusus dalam Permodelan Maklumat Bangunan. Walaupun baru-baru ini penggunaan BIM telah dilaksanakan di beberapa kurikulum universiti, penyerapan terhadap perkara ini pada amnya masih diabaikan dalam kurikulum institusi di negara Malaysia. Oleh itu, kajian ini bertujuan untuk mengenal pasti halangan-halangan dalam penggunaan BIM dalam sistem pendidikan. Skop kajian ini adalah terhad kepada ahli akademik iaitu pensyarah dan pelajar dari fakulti Kejuruteraan Awam dan fakulti Alam Bina dari Universiti Teknologi Malaysia. Keputusan kajian ini telah menunjukkan bahawa, walaupun, majoriti pelajar mengetahui kelebihan teknologi BIM di peringkat pembinaan, mereka masih tidak mampu untuk menggunakan perisian yang berkaitan dengannya. Dengan melakukan penyelidikan lanjut, beberapa halangan telah dikenal pasti dan cadangan-cadangan untuk mengatasinya telah dinyatakan. Kesimpulannya, penggunaan pemodelan maklumat bangunan dalam sistem akademik adalah berkesan untuk meningkatkan keupayaan pelajar dalam bidang kerja pada masa yang akan datang. Selain itu, dengan menghapuskan halangan yang dikenal pasti dalam kajian ini, penggunaan BIM dalam bidang akademik boleh dipercepatkan.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Building Information Modeling (BIM) is a process involving the generation and management of digital representations of physical and functional characteristics of places. Building Information Models (BIMs) are files which can be exchanged or networked to support decision-making about a space. Current BIM software is used by individuals, businesses and government agencies who plan, design, construct, operate and maintain diverse physical infrastructures, from water, wastewater, electricity, gas, refuse and communication utilities to roads, bridges and ports, from houses, apartments, schools and shops to offices, factories, warehouses and prisons, etc.

The concept of BIM has existed since the 1970s. The term Building Information Model first appeared in a 1992 paper by G.A. van Nederveen and F. P. Tolman. However, the terms Building Information Model and Building Information Modeling (including the acronym "BIM") had not been popularly used until 10 years later when Autodesk released the white paper entitled "Building Information Modeling".Jerry Laiserin helped popularize and standardize the term as a common name for the digital representation of the building process as then offered under differing terminology by Graphisoft as "Virtual Building", Bentley Systems as "Integrated Project Models", and by Autodesk or Vectorworks as "Building Information Modeling" to facilitate exchange and interoperability of information in standardizing digital format.

Building Information Modeling (BIM) is a process of creating an intelligent virtual model which integrates the project data from design to construction and operation. This facilitates project documentation, project quantification and estimation. Also BIM models enhance the process of communicating the progress of construction to stakeholders; facilitate integrated project delivery, coordination, and clash detection by visualizing the different phases of project development.

The use of building information modeling (BIM) has exploded in the construction industry over the last decades. With this growth has emerged a realization that BIM has to affect every course taught in construction engineering and management (CEM). Although BIM is becoming pervasive in the industry, it seems that on the whole, BIM adoption in construction education were lags behind to what the industry has adopted.

1.2 Problem Statement

Like many CEM skills, proficient and effective use of BIM technology is gained through years of education, training, and practice. CEM programs need to find a way to incorporate BIM technology to their curricula so that students can become familiar with this technology and its processes before entering the construction workforce.

Although the utilization of BIM has been recently developed in some universities curriculums, this adoption has been overlooked in roughly all Malaysians' institutions curriculums. As a result, this research is aimed to identify obstacles regarding the usage of BIM in educational system.

1.3 Aim and Objectives

The major goal of this research is to develop the state of BIM adoption in the academic centers of Malaysia. . To achieve the aim of this study the following objectives have been organized as follow:

- To identify the understanding level of trainee of construction Practitioners (student) regarding the BIM based –technology.
- To assess the obstacles of BIM implementation in the educational system (institution) based on students/lecturers feedback.
- To recommend for overcoming the current impediments of BIM adoption by the principal of construction Practitioner (lecturer).

1.4 Research Questions

The research questions for this thesis are:

- How amount postgraduate students are familiar with BIM technology?
- What obstacles affect on implementation of BIM at educational system?
- Which kind of approaches can be carried out to reduce barriers in front of developing BIM implementation at educational systems?

1.5 Scope of Study

The scope of this study in order to achieve the mentioned objectives is to focus on investigate the barriers, and subsequently suggestions regarding the usage of BIM in educational system. This research is concerned only with programs which are offered to postgraduates in the field of construction Engineering and

management. The tool of gathering data were the questionnaires which were distributed among civil and build environment faculty's students and lecturers of University Technology of Malaysia located in Johor Bahru. This faculties have been chosen because it has numerous types of academic fields related to BIM and Construction management courses. Additionally, the requisite information relating to the study is gathered from previous books, thesis, and journals and through discussing with experts and companies around the vicinity of the university.

With regard to the findings of objective 1, while the majority of students are aware of advantageous involved in the implementation of BIM, their reluctancy to utilize it, is observed. As such, objective 2 is taken the different factors involved in students' unwillingness toward the utilization of BIM in to account. From the results obtained, majority of students agree with the obstacles identified (based on the previous studies conducted); however, from the lecturers' perspectives, some of factors itemized for lecturers, are not considered as barriers.

5.3 Analyzing the third objective of the study (To recommend for overcoming the current impediments of BIM adoption by principal of construction Practisioneer (lecturer))

Objective three of this research is aimed to achieve beneficial solution with the aim of eliminating the barriers of BIM adaption. The results have indicated that all the solutions (obtained from the past research carried out) are confirmed to be true by the lecturers. Furthermore, some lecturers have recommended some suggestions in order to enhance the usage of BIM among academicians.

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