Awareness among Construction Management Students towards the Implementation of Building Information Modelling (BIM) in Malaysian Construction Industry

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Abstract: **Building Information Modelling (BIM) is a software that associated with Information Technology (IT) to produce, communicate and analyse information digitally for a construction process life cycle. Implementation of BIM in Malaysian construction industry involves cost, skills, and expertise. Recent studies show that the adoption of BIM in Malaysian construction industry is very low. Hence, the aim of this study is to identify the level of awareness among construction management students from higher education institutes that resulted in implementation in the construction companies. The data were collected through survey questionnaire to obtain a better view on the level of BIM awareness among students from Johor higher education institutes. A total of 160 questionnaires were distributed and 80 complete sets received back were analysed and presented in the form of tables and figures. Findings of the study showed that majority of the students had little awareness towards the implementation of BIM in Malaysia. Most of them were aware of this technology through workshop program that carried out by their universities.**

Keywords: **Building Information Modelling (BIM), Information Technology (IT), Implementation, Awareness, Construction Management student, Malaysian construction industry.**

I. INTRODUCTION

A new era in the construction industry which is the introduction of Building Information Modelling (BIM) is rarely used in the local construction around Malaysia. It is one of the digitalised technology that related to the design and process of building (Baba, 2010). Building Information Modelling (BIM) is not only a software. It is also a three dimensional of building design which can be used to organise and visualise of the real construction project (Memon et al., 2014). Partridge et al., (2007) said BIM is more than just a transformation from paper based design towards an electronic design. BIM has implemented about 30 years ago in the manufacturing and aerospace industries (Robins, 2011). When related to the construction industry, BIM was introduced for more than 15 years ago. The concept of BIM has been introduced by Professor Charles M. Eastman since 1970 (Forbes and Ahmed, 2011). The first country in the world that implements BIM in the construction industry was United State of America (NIBS, 2007).

In order to manage the construction project life cycle, implementation of BIM in the construction projects had been used by several professional fields such as engineering, architecture and construction or facility management (Latiffi et al., 2016). Implementation of BIM in this three major industries are getting wider especially in the United Kingdom (UK) and the United States (US). However, the usage of BIM technology in the local industry is still low (Mamter, 2014). Several

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problems can be related to the low adoption of BIM in Malaysian construction industry. According to Thurairajah and Goucher (2013), problem arises in the implementation of BIM in the construction industry is through lack of knowledge or understanding and how to implement it within various professional disciplines. Application of BIM can take place on every stage of construction process which is from planning phase until the operation phase. There are two major factors that cause the slow implementation of BIM in Malaysian construction industry. These two factors are human itself and technical barriers which can be divided into the internal and external barrier (Memon et al., 2014). Therefore, this paper seeks to investigate about the awareness among construction management students towards the implementation of BIM in Malaysian construction industry.

II. OBJECTIVES

The objectives of this research are:

1. To identify the level of awareness among construction management students towards the implementation of Building Information Modelling (BIM) in Malaysian construction industry.

2. To identify the platform of knowing the existence of Building Information Modelling (BIM) by Malaysian construction management students.

III. LITERATURE REVIEW

Based on the literature review from the past research, none of the research about the awareness of BIM among higher education institutes was conducted in the state of Johor, Malaysia. Thus, this research was conducted in order to identify the awareness among construction management students towards the implementation of Building Information Modelling (BIM) in Malaysian construction industry and the platform of knowing the existence of (BIM). According to Ali (2013), Building Information Modelling (BIM) is being promoted through several seminars or conference for the past few years. Among the seminars are QS International Convention, BIM Conference and Exhibition, QS Principal's dialogue and BIM workshops which were organised by different types of organisation such as CIDB, BQSM, RISM and software vendors. BIM is actually the intersection of two critical ideas which is keeping the critical design information in the numeric form to make it easier to update and share and to create real-time, consistent relationships between numeric design data with innovative parametric building modelling technology. This can save money and time as well as increase project productivity and quality (Autodesk, 2003).

In terms of cost estimating, BIM supports 5D which is 4D plus cost of a project. It helps in generating the Bills of Quantity (BQ) by integrates design with estimating, scheduling and costing (Muzvimwe, 2011). Implementation of BIM helps the construction participants to predict and visualise any future problems before the construction take place. This could lead to improving the quality of projects as well as saving the time and cost (Latiffi et al., 2016). The application of BIM has grown from a tool to design in three dimensions until a tool or software that is used for model analysis, clash detection, whole project conceptualization and product selection (Weygant, 2011). The function of clash detection is whenever there is more than one component spotted at the same point in the drawing, the clash detection will highlight the situation. For example, if the beam was placed on the part of air conditioning unit, the clash detection will highlight the situation for the structural designer's attention (Memon et al., 2014).

From the past research that carried out by Dean (2007), he concluded that BIM should be taught as a subject to the construction management students in the university. Based on his questionnaire survey on general contractors and ACS construction management students in Southeast, he found that BIM is compulsory for the construction management programs. There were several reasons behind this conclusion. Approximately 70% of the construction industry participants mentioned that they are considering to use BIM technology in their companies. Employment of candidates with BIM skills will be an advantage over candidates who lack of this knowledge were agreed by approximately 75% of survey participants. In another research that carried out by Woo (2006), found out that well prepared BIM course would provide sufficient knowledge for the Architectural, Engineering and Construction (AEC) students to be successful in the construction industry.

A Building Information Modelling is a newer computerised software which related to the Information Technology (IT) is eligible to create up to six-dimensional models. This computerised software can greatly increase the productivity of AEC industry. Hence, the task of this industry is to adopt and apply technologies in order to get better quality and productivity of the industry (Hasan, 2012). A lot of benefits that can be offered by BIM to the Malaysian construction industry especially in enhancing the level of communication between several parties in the construction projects (Zahrizan et al., 2013). According to Khanzode and Fisher (2000) and Azhar et al., (2008), errors occurred with inconsistent and uncoordinated project documents can be minimised through the application of BIM because BIM software is capable of providing information which is related to the building physical or functional characteristics.

Besides that, visualization is one of the benefits through the implementation of BIM in construction projects. According to Kymmell (2008) and Taylor and Bernstein (2008), they believe through visualisation, the parties in the construction could get a better understanding of what they are going to build by a detailed 3D view. There are several factors or barriers as well that related to the low adoption of BIM in the construction industry. Based on Griffith et al., (1999), O'Brien (2000) and Whyte et al., (2002), lack of technical expertise rather than social issue are one of the reasons that can contribute to the failure to implement new information technology (IT) in the construction industry. However, Ruikar et al., (2005) and Rojas and Locsin (2007) believe that the major factor for the low adoption in the industry is people itself rather than information technology (IT).

Based on the research that carried out by Mamter et al., (2014), she found out that all of the respondents were aware of the usage of BIM in the Malaysian construction industry. Her research was particularly done among two higher education institutes in Malaysia which were University Technology MARA (UiTM) and University Technology Petronas (UTP). The participated respondents were Architectural, Engineering and Construction (AEC) students. From her research as well, she found out that majority of the respondents aware of BIM technology through their core module or syllabus. Some of the respondents knew about this technology through internet but the amount or percentages are the lowest compared to other sources.

IV. METHODOLOGY

The research was conducted through the survey questionnaire in order to identify the level of awareness among construction management students towards the implementation of Building Information Modelling (BIM) in Malaysian construction industry. Besides, this research was conducted in order to identify the platform of knowing the existence of BIM technology among students. Two higher education institutes were chosen in the state of Johor, Malaysia in order to conduct the research. These two higher institutes were University Tun Hussein Onn Malaysia (UTHM) and University Technology Malaysia (UTM).

As shown in Table I, a total of 160 questionnaires were distributed through student's university email, social media and by hand as well to the students in this two institutes. From 160 sets of questionnaires, 80 were distributed to the construction management students in UTHM while the rest 80 sets of questionnaires were distributed to the UTM construction management students. From 80 sets of distributed questionnaires, 50 complete sets of responses were received back from UTHM and 30 sets received from UTM. The percentage of response rate was 50% from the overall sets of 160 questionnaires.

Table I: Respondent's Response Rate

Respondent's Institute	Distributed Questionnaires	Responses Returned	Percentage of Responses
UTHM	80	50	62.50%
UTM	80	30	37.50%
TOTAL	**160**	**80**	**50.00%**

V. DATA ANALYSIS AND DISCUSSION

Table II: Awareness among Construction Management Students

Respondent's Higher Education Institute	Frequency				Total Respondents (N)
	A Lot	**Fair**	**Little**	**Too Little**	
UTHM	10	15	21	4	50
UTM	5	7	15	3	30
TOTAL	**15**	**22**	**36**	**7**	**80**

Table III: Percentage of Response Rate

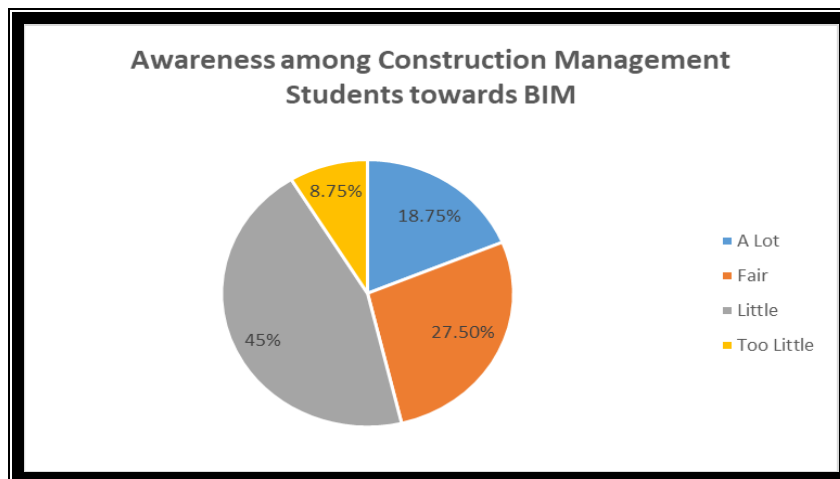| Category	Frequency	Percentage (%)
A Lot	15	18.75
Fair	22	27.50
Little	36	45.00
Too Little	7	8.75
TOTAL	**80**	**100.00**

Figure I: Awareness among Construction Management Students towards BIM

Figure I showed the percentage of response rate among the construction management students from UTHM and UTM. As indicated in the figure above, 45% of the respondents had little awareness towards the implementation of Building Information Modelling (BIM) in Malaysian construction industry. Followed by 27% of respondents had fair awareness on the BIM, 19% of the respondents had a lot awareness regarding the implementation of BIM and 9% of the respondents had too little awareness about BIM in Malaysian construction industry. Based on the information from figure I, it showed that all the survey respondents were aware of the implementation of BIM in Malaysian construction industry even though majority of the respondents only had little awareness.

Table IV: Platform of Knowing the Existence of BIM

Respondent's Higher Education Institute	Frequency				Total Respondents (N)
	Internet	**Workshop**	**Core Modules**	**Colleagues**	
UTHM	10	23	12	5	50
UTM	3	12	8	7	30
TOTAL	**13**	**35**	**20**	**12**	**80**

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Table V: Percentage of Response Rate

Platform	Frequency	Percentage (%)
Internet	13	16.25
Workshop	35	43.75
Core Modules	20	25.00
Colleagues	12	15.00
TOTAL	**80**	**100.00**
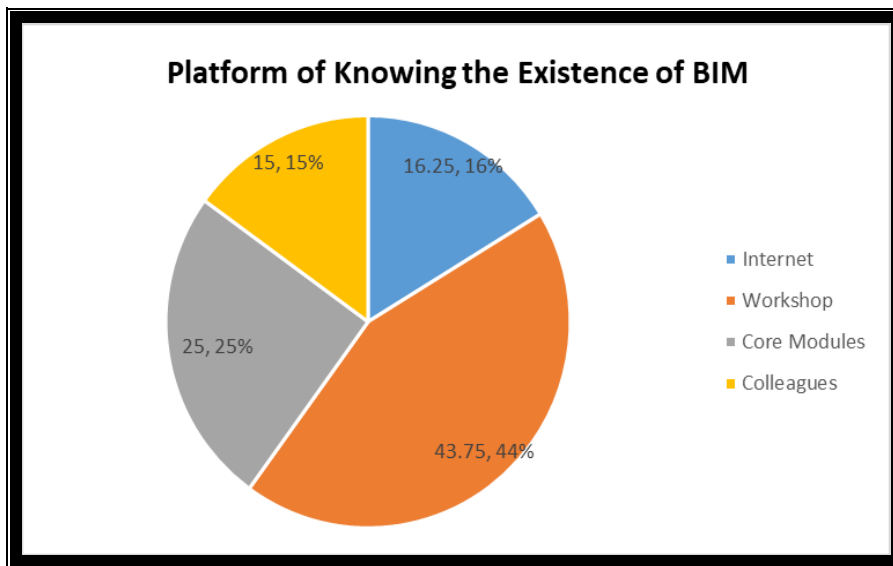
Figure II: Platform of knowing the existence of BIM

Figure II showed the percentage of response rate for the platform of knowing the existence of BIM among UTHM and UTM construction management students. As indicated in the figure above, 44% of respondents knew the existence of BIM through the workshop programs that carried out by their university. Followed by 16% of respondents knew the existence of BIM in the construction industry through the internet, 25% of respondents knew through their core modules taught in the classroom and 15% of respondents through their colleagues. From the survey, it can be concluded that majority of the respondents knew the existence of BIM through workshop programs.

VI. CONCLUSION

In conclusion, the objectives of this study are to identify the level of awareness among construction management students towards the implementation of Building Information Modelling (BIM) in Malaysian construction industry and to identify the platform of knowing the existence of Building Information Modelling (BIM) by Malaysian construction management students. From the findings of the study, it can be concluded that majority of the students were aware of the usage of this technology in the Malaysian construction industry. Majority of the respondents were aware of this technology through the workshop programs that carried out by their universities. Through the programs, they learned about skills, techniques and ideas of BIM implementation. This study can be further in terms of awareness among construction players such as contractors, project managers and supervisors in the industry.

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