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BIM Awareness and Usage VS BIM Knowledge, Importance and Future Planning: An Analysis from Malaysian Quantity Surveyors

Noor Akmal Adillah Ismail[1], Har Einur Azrin Baharuddin[2] and Hamimah Adnan[3]

[1 2 3]Faculty of Architecture, Planning & Surveying, Universiti Teknologi MARA, 40450 Shah Alam, Selangor, Malaysia
noorakmaladillah@gmail.com

Abstract. The construction industry has been continuously affected by the inefficiencies and ineffectiveness in delivering its construction projects. However, BIM technology has been acknowledged to have numerous benefits in contributing towards project success. The BIM benefits include reduced project time and cost; enhanced team collaboration and communication; and improved project quality and performance. In quantity surveying practice, BIM applications also provide a platform towards producing more reliable cost estimates. However, its usage amongst the Malaysian Quantity Surveyors is still at infancy level. Thus, this paper aims to explore BIM implementation amongst the Quantity Surveyors in Malaysia. A questionnaire survey was conducted to gain their perspectives on BIM awareness and usage, versus the knowledge, importance and future planning of using the technology. The overall results show that the respondents have rated themselves as having moderate knowledge in BIM. For BIM could play a major role in their practice, they would apply BIM for their future planning. This study significantly offers input for BIM adoption in the Malaysian construction industry by focusing on the quantity surveying field. Subsequently, the information could be used as a reference to benchmark BIM development in Malaysia.

Keywords: Building Information Modelling (BIM), BIM awareness, BIM knowledge, Quantity Surveyors, Malaysian contruction industry

1 Introduction

Numerous issues such as project delays, reworks, inaccuracies, less team-coordination, limited information-integration, and many more leading to many project failures, have been occurred in the construction industry throughout the years. However, it has been claimed that the advanced technology of Building Information Modelling (BIM) has shifted the construction industry into a new revolution. The employment of this technology in the construction industry world wide has brought valuable merits towards more effective and efficient practices for construction projects. Amongst the identified benefits of deploying BIM applications are cost and time saving; reduced human resource; quality and performance improvement; clash detection; improved accuracy;

increased profitability; enhanced collaboration and communication; better presentation and documentation process; improved planning and design; better visualisation; and improved information.

Where BIM has been actively employed by many developed countries such as the UK, US, Europe, Australia and New Zealand [1][2], this technology implementation is still at low adoption level in most of developing countries including Malaysia [3]. It was suggested that the quantity surveying sector in Malaysia should initiate some strategies in assessing BIM influence towards its practice [4]. Hence, the objective of this study is to examine the diffusion of BIM innovation in quantity surveying practice by focusing the awareness, usage, knowledge, importance and future planning of adopting the technology amongst the Quantity Surveyors in Malaysia.

2 Literature Review

The BIM uptake in Malaysia has been managed by the Construction Industry Development Board (CIDB) [5]. The BIM implementation was literally started by the Malaysian Public Works Department (PWD) in 2007, however has been dominated by the private sectors since 2009 [6]. Thereafter in 2010, the National Cancer Institute Putrajaya was announced as the first national BIM project. Subsequently starting from 2011, BIM was actively promoted by the CIDB offering initiatives to promote the application of BIM in the Malaysian construction industry [5].

Some previous studies described the adoption of BIM technology amongst the stakeholders in the Malaysian construction industry [7]–[9]. Notably, the development of this technology also impacts the quantity surveying practice especially in establishing more accurate and reliable construction cost estimates. Even though the traditional roles of the Quantity Surveyors have been challenged through the existence of BIM [10], the BIM advantages definitely improve their flawed practice and add some more values to their current services [11].

BIM capabilities could enhance Quantity Surveyors' performance in relation to time, cost and quality by providing automated measurement [12], additionally leading to producing more reliable cost estimates. BIM could also overrule the traditional method by providing more reliable sources for quantity take-off and cost estimating processes [13]. Thus, it is worthwhile to further explore the BIM adoption level amongst the Quantity Surveyors in Malaysia. This study could lead to more research on how BIM assists the construction industry players particularly the Quantity Surveyors towards more successful construction projects.

3 Methodology

Data collection for this study employed close-ended questionnaire survey. It was conducted through online as it is considered cheaper having comparable response rates to other approaches. As this cross-sectional study also has limitation of cost and time allocated, survey by questionnaire method is more suitable rather than conducting direct

observation, yet furnishing this study with broader information similar to other comparison methods.

After pre-tested, the questionnaire was distributed to the Quantity Surveyors registered with the Royal Institution of Surveyors Malaysia (RISM). From about 1140 Quantity Surveyors listed with RISM registration, only 295 were selected randomly as study samples [14]. Ultimately, this study obtained 202 responses from the conducted survey after raw data being cleaned and screened. Considering unusable responses, the overall response rate was 68.47%. For this study, SPSS software was used to analyse the surveyed results using descriptive analysis on the respondents' background information, followed by evaluating BIM awareness, usage, knowledge, importance and planning of the respondents for using BIM application in the future.

4 Results and Discussions

As for the respondents' background information, majority of respondents (37.1%) have more than 10 years in estimating construction costs. 94.6% of surveyed respondents were from a quantity surveying background with most of them are Quantity Surveyors (83.7%) and 52.0% work with quantity surveying firms. The respondents were divided into three groups of whether they are currently using BIM, have used BIM but not for cost estimating, and have not used BIM at all. They were all either aware or not aware of the existence of BIM technology in the construction industry. Fig. 1 shows the distribution of respondents based on their BIM awareness and usage. The majority (90.6%) of the respondents are aware of BIM, while the rest (9.4%) are not aware and not using BIM at all. From the 90.6% of respondents that are aware of BIM, only 22.3% use BIM (12.9% currently using BIM in cost estimating; 9.4% have used BIM but not in cost estimating). The majority of respondents (68.3%) do not use BIM in their practice even though they are aware of the technology.

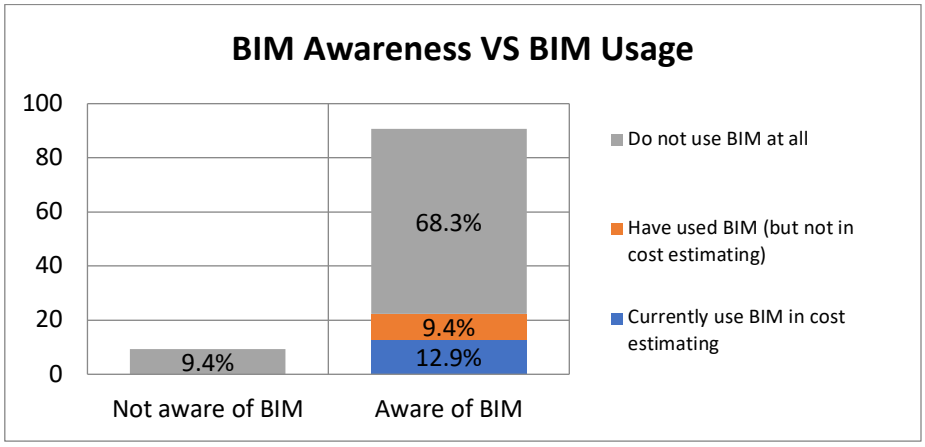


Fig. 1. BIM Awareness VS BIM Usage

BIM knowledge, its importance and future planning of its usage, were next assessed in line with the level of awareness and usage of BIM amongst the respondents as described in the following Fig. 2, Fig. 3 and Fig. 4. Fig. 2 interprets that most of the respondents who are aware and use BIM in their practice have rated themselves as somewhat knowledgeable about BIM technology (highest mark of 6 and 7 of rating scale). However, those respondents who are aware but do not use BIM considered themselves as barely knowledgeable about BIM technology (highest mark of 3 of rating scale). It becomes apparent that the BIM users are expected to have more BIM knowledge as compared to non-users, since they are practically using the technology, giving them more hands-on technical experience, rather than only learning through reading materials and so on.

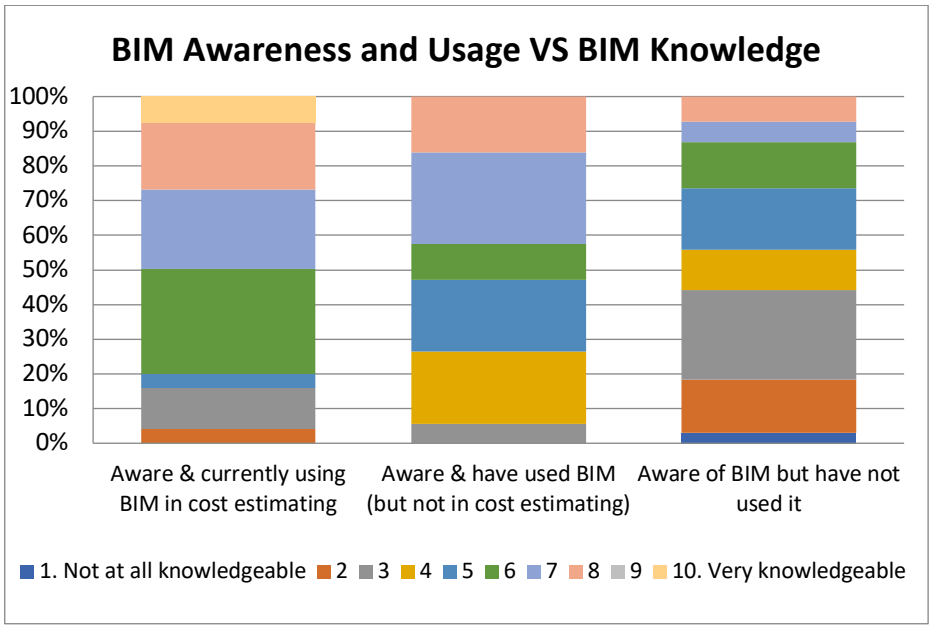
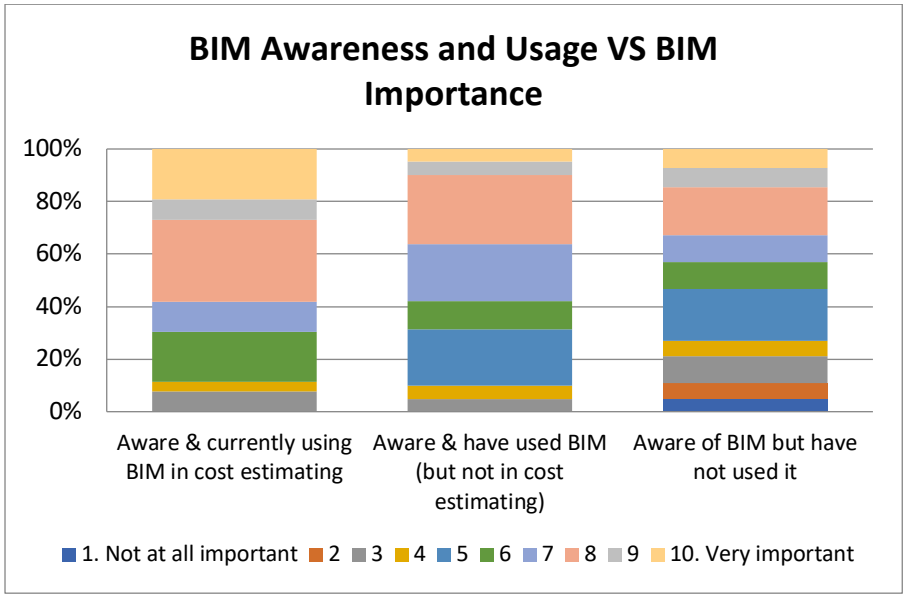


Fig. 2. BIM Awareness and Usage VS BIM Knowledge

Meanwhile, in evaluating BIM importance in their practice, the respondents that are aware and use BIM often, rated the technology as mostly important (at level 8 on the rating scale) in assisting them in their current roles. While those who are just aware but not using BIM in their practice, mostly rated the BIM technology as somewhat important (at level 5 on the rating scale). The different perception towards BIM importance between these two groups is predictable given that the actual use of BIM technology has the high possibility to improve users' performance with its many benefits, hence increases the importance level of its usage. In contrast, the limited BIM knowledge without the actual application of the technology restricts the evaluation of BIM significance in the respondents' practice, leading the non-BIM users to moderately

129 rate BIM as important. Fig. 3 depicts the results of BIM importance perceptions
130 amongst the BIM and non-BIM users.



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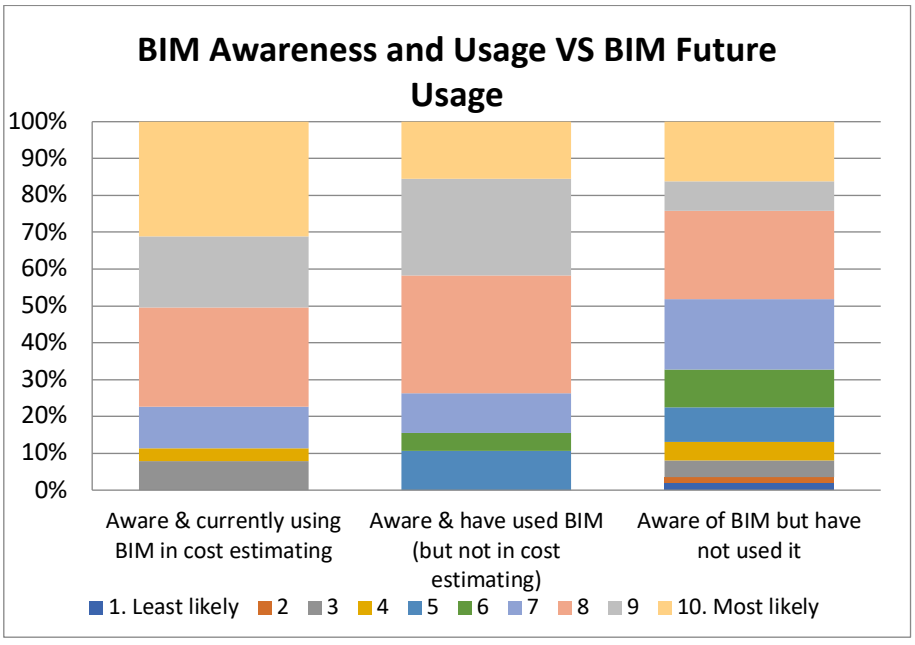
132 **Fig. 3.** BIM Awareness and Usage VS BIM Importance



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134 **Fig. 4.** BIM Awareness and Usage VS BIM Future Usage

Other than BIM knowledge and BIM importance being determined amongst respondents that are aware of BIM, they were also examined on their planning of using BIM for their future practice (refer Fig. 4). Figure 4 portrays those respondents that are aware and currently using BIM in their cost estimating practice have a very high probability of using BIM in the future. It is evident that BIM technology has significantly assisted them in establishing more reliable cost estimates, leading them to continuously use BIM for future projects. In the meantime, respondents that are aware and have used BIM but not in cost estimating are most probably planning to use BIM in their next practice. By not specifically adopting BIM technology for current cost-estimating practice, it can be said that many undiscovered benefits towards cost estimate reliability and accuracy are not yet explored by the respondents. Subsequently, this affects judgements towards the planning of BIM usage onwards. Likewise, the respondents that are aware of BIM but have not used it provide similar results of being more likely to use BIM for their future practice. Even though without any experience of using BIM technically, they might envisage BIM furnishing benefits towards their practice from various sources, such as reading materials or other experiences.

5 Conclusions

From the overall results, it can be concluded that the respondents who are aware and currently using BIM in cost estimating have fair BIM knowledge, rated BIM as influential in their current practice. They are very likely to implement BIM in their next projects, reflecting that the BIM technology they are currently adopting is beneficial for their cost-estimating practice. By that, they regarded BIM as important in developing more reliable cost estimates and are looking forward to using the technology continuously to constantly improve their cost-estimating practice.

Whilst, the respondents who are aware and have used BIM (but not in cost estimating) have fair BIM knowledge in which they considered BIM as significant in their current practice and may adopt the technology in their future projects. With BIM being employed not specifically for estimating costs, to a certain extent this has provided different perspectives towards future implementation of the technology. The respondents may possibly not have gained all the BIM benefits specifically related to their cost estimating practice, hence leading to undecided future planning for BIM utilisation.

Finally, the respondents that are aware of BIM but have not used it have limited BIM knowledge, however rated BIM as quite important towards their current practice, might adopt BIM in the future. The results indicate that despite not using any BIM applications in their projects, they credit BIM with being able to assist them to perform better to improve their current practice, therefore achieving more successful projects.

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