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THE READINESS OF BUILDING INFORMATION MODELING (BIM) APPLICATION IN QUANTITY SURVEYING FIRM FOR QUALITY IMPROVEMENT

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Abstract:
Building Information Modelling (BIM) is a detailed process of designing and building in construction industry collaboratively by using one integrated system generated by computer rather than separating the work by distinguishing the drawings. On another hand, it provides a large amount of benefit in terms of cost saving and time, much better accuracy in estimation and reducing arithmetical error and any amendment due to loss of information. The main principle of this research is to investigate the readiness of BIM application in Quantity surveying firms for quality improvement especially in current practices. The objectives are to find out the importance of BIM in the construction industry, to investigate the challenges faces by quantity surveying firms in the implementation of BIM and to suggest a suitable solution for quality improvement to Quantity surveying firms. The data collection was conducted by using the quantitative method, which is using a questionnaire. The scope narrowed down to Quantity surveying firms that registered in the Board of quantity Surveyors Malaysia (BQSM) at Northern Region of Peninsular Malaysia only. The findings of the study are expected that Quantity surveying firms had difficulties in implement BIM because of lack capability in using BIM software. This is because of the complexity of software itself such as Cubicost by Glodon. Findings also indicate that difficulties of collaboration in implementing BIM software caused the firm to decline in using the software. Moreover, the implementation of BIM software also needed to join in by all parties that involved in the project such as architect and engineer. Hopefully, with this Research, the Quantity surveying firm will get clear exposure on the BIM application and use it in their current practices.

Keywords*:* Building Information Modelling; Quantity Surveying Firm; Quality Improvement

1.0 INTRODUCTION

Building Information Modelling or known as BIM, it becomes popular in the construction field for over 20 years. In 1962, American engineer and inventor knew Douglas Engelbart said in his paper Augmenting Human Intellect on the prediction of architect vision is the data entry by architects such as series of specification, slab floor, concrete walls in excavation and roofing, he revised thing on the computer screen and these entries become larger and detailed, data is interconnected and interlink between each other and they represent the actual design itself (Quirk, 2012). This shows that the Eglebart dreams really happen several years later as he suggests object-based design, parametric manipulation and relational databases now called as BIM. Nowadays BIM is a detailed process of designing and building in construction industry collaboratively by using one integrated system generated by computer rather than separate the work by separate drawings (Babbie, 2009). On another hand, it provides a large amount of benefit in term of cost saving and time, much better accuracy in estimation and reducing arithmetical error and any amendment due to loss of information. Moreover, for the past decade, BIM has proven that not only give benefit during pre-contract phase but as well as improve efficiency throughout the life-cycle building (The Editor, 2015). This study focus on Quantity surveying firms since the implementation of BIM is difficult because of the problem in communication, coordination as well as management since

stakeholders of the project located in a discrete location or different geo-location especially international project (Arayici, Egbu, & Coates, 2012).

2.0 LITERATURE REVIEW

2.1 Decreasing Reworks and Leads to Zero Construction Errors

According to Kumar and Cheng (2015), many consultants were not able to determine their productivity or rework rates when running projects with no implementation of BIM. It appears to be a systemic lack of understanding among project stakeholder of the cause of the project problem and effect relationships related to field productivity rates. Research conduct by Bliss (2017) claims that about 24% of rework claims are due to lack of detail or inaccurate specs and logistics. Delays in getting the latest and accurate information to the field results in more RFIs and less accurate work. By using BIM application can provide a single, cloud-based repository for all project documentation, making real-time communication, collaboration and document exchange possible between the stakeholder. With the implementation of the right BIM software, documents, and communications can also be managed on smartphones and tablet, making it easy for staff to be continuously in the loop with the office. This will ensure and Improves understanding of difficult project conditions, Creates the ability to engage and collaborate with remotely located team members and Accelerates issues resolution and RFI communications.

A large part of the staff spent hours in any design project, is the time it takes to redesign things to meet changing client needs and expectations. With BIM, this time is drastically reduced. Instead of redesign individual drawings, the central model is changed, which is then automatically reflected in all affected drawings since all drawing is in the 3D model and stored in cloud-based technology. This can be done by identifying potential problems and conflicts in the design phase, construction rework caused by design problem is drastically reduced. The building goes up right the first time, without the need to redo things, and eliminating the associated cost of those change orders (Buncio, 2017). Uncertain information about designers or lack of updates or changes in design information might lead to minor or major reworks which might heavily cut the client finances. As BIM is centralized and implemented, any updates or changes made by any stakeholders are instantly reflected leading to uniformity of information and work which leads to zero construction errors (Poirier et al., 2015).

2.2 Cost of Software and Hardware

Nowadays, utilizing 2D or 3D CAD software require a huge amount of money because every organization that bought this software need to upgrade and maintain the license. This is because the software itself contains numerous amount of bug that needs be reprogrammed by the developer. This will ensure the software capable to handle much more complex design (Arayici et al., 2012). An online search reveals that CAD software packages that available on market cheaper compared to BIM software packages. For example, Autodesk Revit cost about RM 8,500.00/year, that only for one user. To implement BIM for a small office at least need three type of software which is BIM is known as Revit, collaboration and estimating. Collaboration for Revit help project stakeholders from multiple disciplines, location, and firm to collaborate in the cloud with centralized access to Revit models.

For estimating, Autodesk Navisworks Simulate integrated with 2D and 3D quantification which is support project measurement and generate quantity workbook. All this three-software cost about RM 15,000.00/year for one user. For hardware need to be powerful enough to handle complex design, which ranged from RM4,000.00 to RM 10,000.00 custom desktop or laptop. Moreover, on-site staff also need to be trained using this software. The training cost also ranging from RM8,000.00 to RM10,000.00 depending on the course chosen. To conclude, implementing BIM suitable for a large firm that has the full potential of its capital because it requires a huge amount of investment to cover all the mentioned cost (Poirier et al., 2015).

2.3 BIM Education in a Higher Education Institution

Buncio, (2017) Stated that internal staff, external firms, incoming entry-level staff and more readily available training in BIM were required to realize the potential value of BIM (Bernstein et al., 2010). According to Bernstein et al., (2010) despite BIM training was placed among the top three targets for investment by the industry but percentages allocated to the BIM skills required still low. Henderson and Jordan, (2009) suggested that student need to be prepared with skill sets that modern construction needs to acquire such as knowledge of data management, energy and material conservation, information technology, integrated building design, business and marketing skills, project finance, systems thinking, life cycle analysis and design processes.

Before they learn about the old ways of working once they graduate and get drawn into existing practices in the industry, educators should be able to instill in undergraduates in the concepts of collaborative design and the full potential of BIM. In the past, there has been resistance among educators regarding the provision of training using computer technologies in universities (Khashe et al., 2015). This concept of creating job-ready graduates brings to the 'training vs. educating' debate. Educators currently expect students to learn it by themselves since many educators are unfamiliar with these technologies If BIM is used at all in courses as they do many other software applications (Williams et al., 2009). Students will not develop an understanding of how BIM tools enable them to work effectively with others in a collaborative environment if this default approach is used to learn BIM. Many educators still view BIM as just another CAD program that students should learn in their own time.

According to Becerik-gerber et al., (2011), some disagree that it is not the university's responsibility to produce CAD technicians and since there is no educational value in using CAD, or that CAD threatens creativity of another profession. These concerns are reasonably justified as the adoption of computers and 2D CAD has coincided with a decrease in documentation quality and productivity.

3.0 METHODOLOGY

This research is conducted by using a quantitative method which is questionnaires. The population consists of quantity surveying Firms located at Northern Region of Peninsular of Malaysia. These data were obtained from the Board of Quantity Surveyor Malaysia (BQSM) and the sampling method used for this research came the from one type of non-probability sampling method which is purposive sampling method. In this research, total sample is 28 and each sample represents one firm. The data obtained has been analyzed using frequency, mean average, pie chart, table, and bar chart.

4.0 ANALYSIS AND FINDINGS

Based on Figure 1, improving the productivity of construction industry appears as the top rank of importance of Building Information Modeling applications. However, most of the respondents also agreed that ten (10) importance of Building Information Modeling applications listed below. It clearly shows that BIM help in improving productivity since all the information will be linking up together and integrated into the cloud storage. From there, all information such building models, bill of quantities and schedules can be easily accessed and make it an effective platform for identifying, estimating and planning the different sequence of construction (Park et al., 2013).

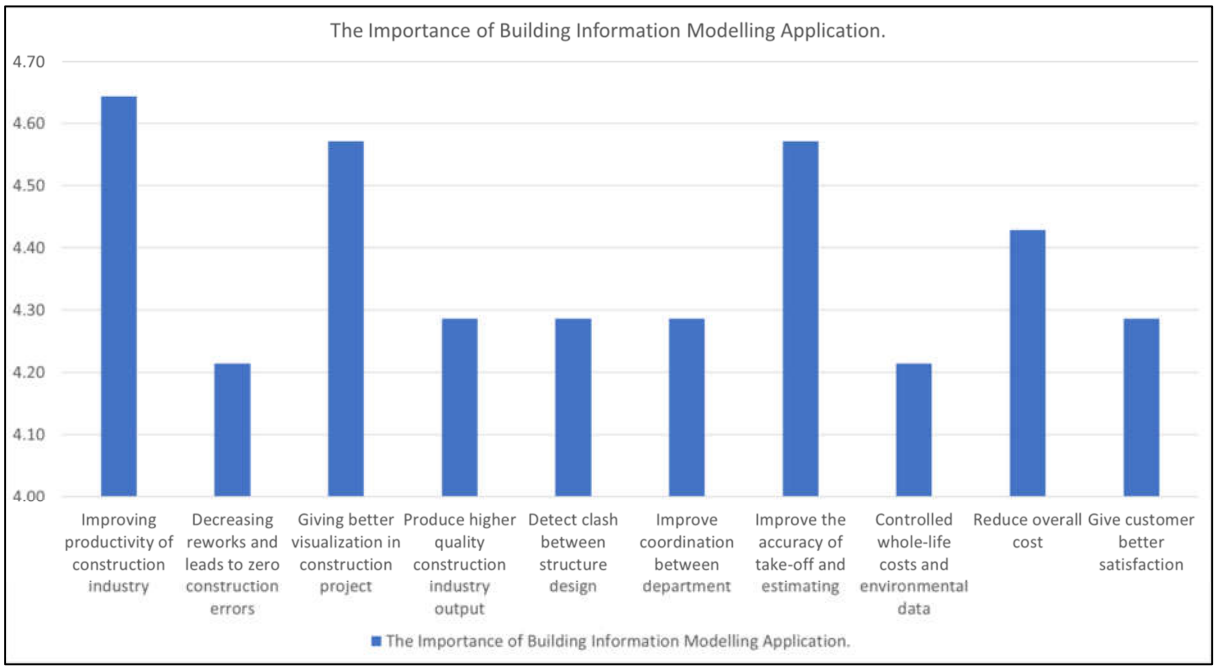

Figure 1: Importance of Building Information Modelling Application

Based on Figure 2, the high cost of technology appears as the top rank of challenges faced in the implementation of Building Information Modeling in Quantity surveying firms. This shows that consultant needs to have a large sum of the capital cost to invest in implementing this technology. This is because BIM implementation needs to equip with the high-end technology so that BIM software can run smoothly. BIM needs to be set up on a server as well as at each of the project stakeholder's office. Server act as a centralized information and cloud storage (Olsen & Taylor, 2017).

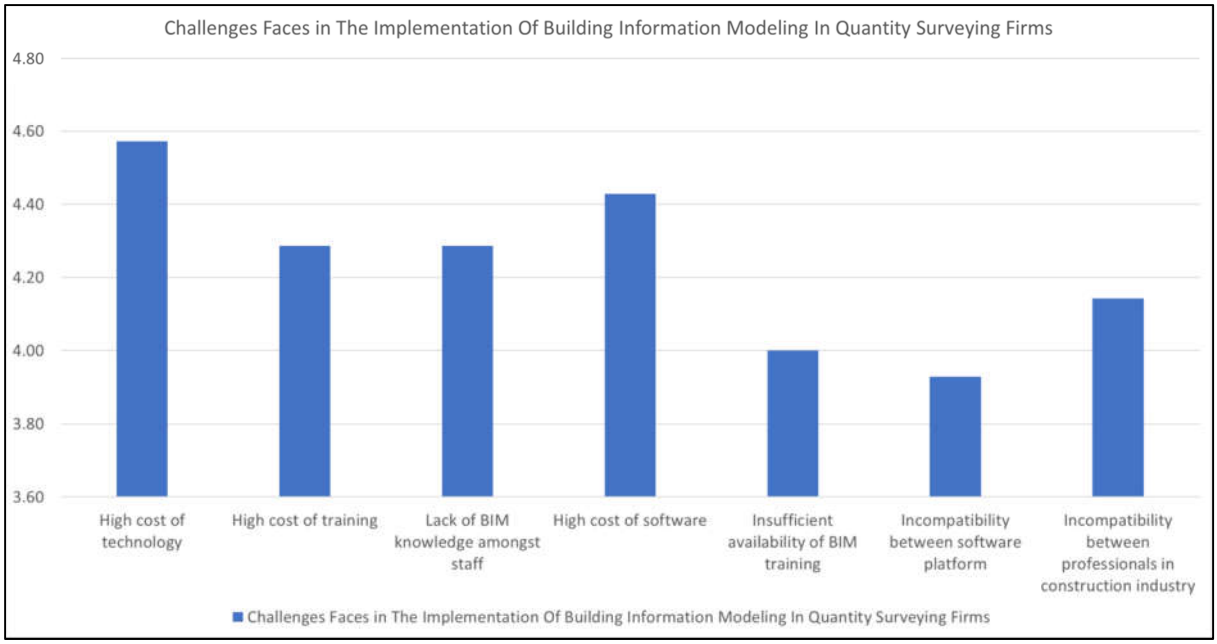

Figure 2: Challenges Faces in The Implementation of Building Information Modeling in Quantity surveying Firms

Based on Figure 3, the government provides financial support appears as the top rank in encouraging the application of Building Information Modelling in Quantity surveying firms. this shows that government plays important role in implementing BIM in Malaysian construction industry. Moreover, by having additional financial support from government can aid newly established firm that has the low initial capital to buy new hardware to support BIM implementation. This is because as discussed before, the high cost of technology become main challenge for the firm to implement BIM (eConstruct, 2017).

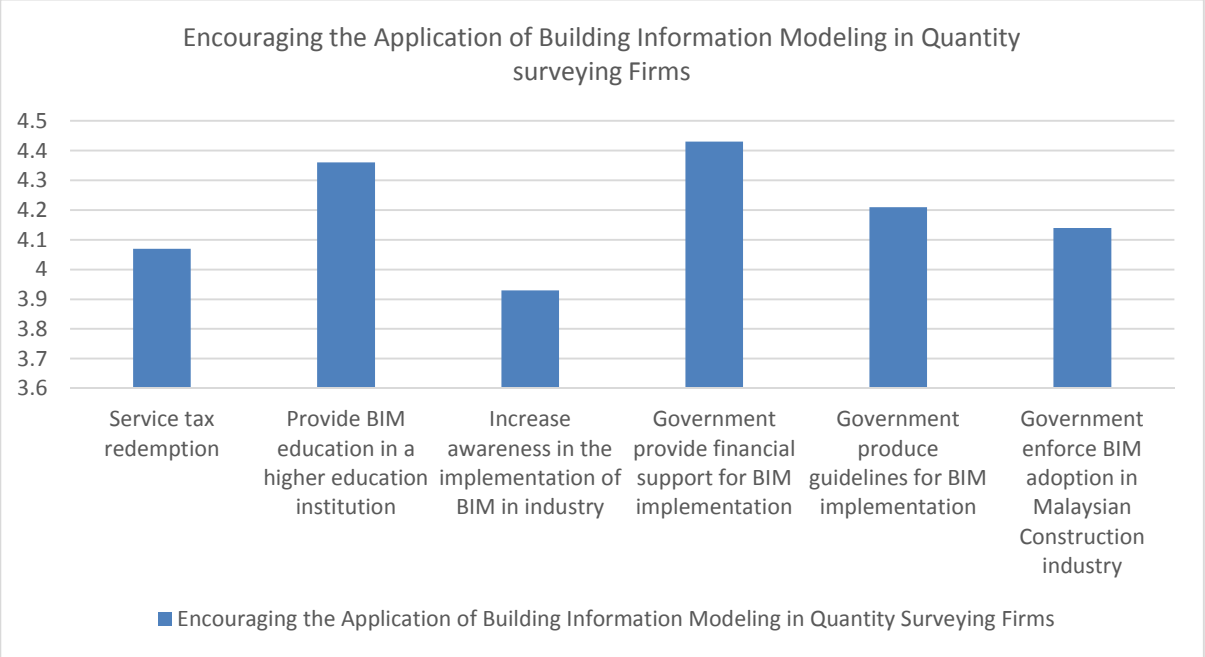

Figure 3: Encourage the application of Building Information Modelling in quantity surveying firms.

5.0 CONCLUSION

Based on the findings shown in the figure, BIM plays important role in the Malaysian construction industry. It greatly increases the productivity of project stakeholders starting from inception stage until demolition stage. However, it's not easy to implement BIM in the firm. This is because of the high cost of technology. Instead of mastering new technology that large sum of money, firms prefer sticking to the traditional method that is cheaper, easy and user-friendly that all staff and project stakeholders can use. Hence, government plays important role in providing financial support. Thus, by having financial support from government this can reduce the burden borne by them.

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