THE PERK OF BUILDING INFORMATION MODELLING (BIM) TOWARDS MALAYSIAN QUANTITY SURVEYORS

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ABSTRACT: *Building Information Modelling (BIM) concept is considered a new concept that should be introduced to construction practitioners as it is not widely used in the Malaysian construction industry. It is a contemporary evolving methodology that simplifies the design and construction process by using digital illustration. BIM is the preparation and process of a simulated model and structure all the way through its lifespan. The application of BIM can be utilized in every phase of construction activity starting from planning right until operation. Unluckily, the application of BIM in the Malaysian construction industry is very slow. This slow application is initiated by the individual itself and methodological difficulty, known as internal and external difficulty. Internal difficulties are initiated by the individual itself and expenditure, typically to discover contemporary tools and practices of the software. Whereas external difficulties are interrelated to the deficiency of confidence in contemporary software applications. Therefore, this study intends to evaluate the proper image of BIM applications in the Malaysian construction industry, and the benefits experienced by the usage of BIM implementation are identified particularly for Quantity Surveyors in Malaysia. 278 responded to the structured questionnaire which involve Quantity Surveyors all over Malaysia based on data retrieved from the Board of Quantity Surveyor Malaysia website. The finding showed the benefits of BIM which will be counted among Quantity Surveyors which will further enhance the awareness of the benefits of BIM to the Quantity Surveyor profession itself.*

Keywords: Building Information Modelling, Quantity Surveyor, Benefits

1. INTRODUCTION

According to the Economy of Malaysia retrieved from Wikipedia, Malaysia has a substantial construction trade of more than RM102.2 billion (US$32 billion). The greatest percentage stake was interjected by the construction of non-residential buildings which recorded 34.6 percent. This was trailed by the civil engineering sub-sector (30.6%), residential buildings (29.7%), and special trades (5.1%). Some of the project players that contributed to the construction industry are Contractors, Engineers, Designers/Architects, Quantity Surveyors, and Project Managers.

Quantity Surveyors start an influential role as qualified, trained, and proficient in dealing with glitches relating to construction expenditure, supervision, and consultation in the construction industry [3, 7]. The role of a Quantity Surveyor includes preliminary cost advice, approximate cost estimate, cost planning, Bills of Quantities, procurement/tendering process, cost control, and measurements & quantifications [7].

Building Information Modelling (BIM) influenced in improved performance of quantity surveying practice [4]. BIM is the advancement and practice of a computer software exhibit to replicate the construction and maneuver of a facility. The subsequent prototype, a Building Information Model is a data-rich, object-adapted intellectual and parametric illustration of the facility from where interpretations and data applicable to numerous users' essentials can be obtained and evaluated to produce data that be able to be exploited to make resolutions and develop the procedure of producing the facility [5, 8].

The utilization of Building Information Modelling (BIM) in the construction industry has been studied and it has proven to provide more benefits in order to improve productivity in the industry [5]. As there are several factors that are stopping BIM from being implemented as the universal tool to be widely used in the construction industry in Malaysia.

Based on the Royal Institution of Chartered Surveyors BIM survey, numerous quantity surveyors are still unconscious of what BIM is and only insignificant amounts (10%) retrieved to benefit from BIM [8]. Hence, quantity surveyors need more exposure to this new technology which will help them to keep up with the pace of other industry experts to conserve their competitiveness within the industry. Quantity surveyor consultant firms can expose their employees to new technology and adopt them into the quantity surveying practice.

Apart from that, a substantial extent of information has been issued on the challenges of BIM adoption and implementation. Hurdles such as expense, guidance, interoperability, and modifications in the whole design process are found often all over the numerous information and as such appear substantial in setting back the implementation of BIM in the industry [8, 11]. Therefore, large-scale projects with a long time frame and a high amount of contracts will be prioritized in the usage of BIM applications. Also, big firms will be more prioritized in the usage of BIM applications rather than small firms with small projects that generate small incomes.

However, the complexity of building works is putting quantity surveyors through hassles and clients turn out to be discontented with the orthodox ways of quantity surveyors' practice. It is critical for quantity surveyors to move away from uneconomical methods. Detailed quantities can be quickly extracted directly from BIM [4]. Along these lines, quantity surveyors should understand the concept of BIM and its' abilities. Quantity surveyors should also be aware of client needs which is to move on from the conventional method of quantity surveying practice to the utilization of the

BIM concept in the industry in order to increase the productivity of the industry.

There is always room for improvement in minimizing the difficulties of adopting BIM application in quantity surveying practice. The Malaysian construction industry needs to be parallel with other successful countries which have implemented the usage of technology in their industry. Quantity surveyors practice in Malaysia must expose themselves to technology in order to increase their productivity among them which will lead to better performance in the industry. Therefore, this research has been conducted to outline the benefits of BIM to the Quantity Surveyor profession.

2. QUANTITY SURVEYOR VS BUILDING INFORMATION MODELLING

By referring to the table below (Table 1.1), several authors state that quantity surveyors are highly trained professionals involved in dealing with costs in the construction industry. They act as the construction cost advisor and financial management due to their expertise in costing a construction project at all its stages [1, 8].

Apart from that, certain authors mentioned that quantity surveyors are professionally trained in analyzing both costing and practical physical construction works of a project. The outcomes will be applied in the analysis of solving the problem in irregular projects [9].

Throughout the whole construction process, quantity surveyors act as cost consultants and manage the finances of projects by ensuring that the resources of the construction industry are fully utilized [6]. As retrieved from the Royal Institution of Surveyors Malaysia's website, quantity surveyors are construction professionals who are well trained and proficient in giving advice on all traits regarding financial, construction costs, and contractual administration. They are the specialists in expenditures and management of construction projects.

Based on the authors' definitions, we can conclude that quantity surveying is related to cost, financial management, and contracts in a construction project. Quantity surveyors are well-trained professionals which have expertise in advising construction costs which makes them also known as Construction Economist or Cost Managers in the construction industry.

Table 1.1: Definition of Quantity Surveying

No.	Definition	Author, Year
1	A quantity surveyor is a professional involved with costs and contracts on construction projects.	[1]
2	Quantity surveyors have expertise in costing a building at all its stages while chartered quantity surveyors act as construction cost advisors as they are well-trained professionals.	[7]
3	Quantity Surveyors are professionally trained and have expertise in dealing with construction costs, construction management, and construction communication.	[3]
4	The Quantity Surveyor (QS) is also known as Construction Economist or Cost Manager in the construction industry. As consultants, they measure and monitor construction costs, from the feasibility stage through the completion of the construction period. They may be involved with tax depreciation plans, exchange cost estimation for safety purposes, arbitration and mediation.	
5	A quantity surveyor is well trained to be able to analyze both costing and practical physical construction works of a project and apply the outcomes of his analysis in solving problems irregular to each project.	[9]
6	Quantity surveyors ensure that the resources of the construction industry are fully utilized by managing projects financially and acting as cost consultants throughout the whole construction process.	[6]
7	Quantity surveying is related to the cost and financial management of construction projects.	[11]
8	Quantity Surveyors are construction professionals, who are competent and sufficiently trained to consult on all traits of construction costs, and financial and contractual administration. They have expertise in cost and management of construction projects, whether building, civil or heavy engineering.	[2]

Speaking on BIM, based on the table below (Table 1.2), Building Information Modelling (BIM) is an IT platform to construct simulated models that portray the physical and functional features of construction [12]. It is an innovative technique that has changed the way constructions are illustrated, designed, constructed, and functioned [16].

According to the National Building Information Model Standard (NBIMS), BIM is a digital portrayal of geometric and non-geometric construction data. It is a reliable, shared information resource on the decision of construction during its lifecycle [12]. NBIMS also stated that BIM is a digital model of physical and functional facilities of a construction. It is a resource for information regarding a construction project as a reliable basis for decisions throughout the construction project.

BIM is said to be more representative as it offers a participatory method by participation from contractors, architects, and planners in building design [13]. Accordingly, [14] has mentioned that BIM consists of more than just geometry including geographic information, light analysis, spatial relationships, quantities, and properties of building components. BIM is also associated with the process of constructing, inserting, distributing, and controlling information in an integrated model to get better designs, constructions, management, and maintenance processes [14].

Based on the authors' definitions, we can conclude that BIM is an innovative platform and method to design simulated models and display construction's geometric and non-geometric data through digital portrayal. It offers participation from architects, planners, and contractors in

order to be more representative. BIM consists of more than a digital illustration of geometry, includes physical and functional features of a construction.

Table 1.2: Definition of Building Information Modelling (BIM)

No.	Definition	Author, Year
1	BIM is an innovative tool and method that has rapidly converted the technique constructions to be visualized, designed, built, and functioned.	[11]
2	BIM can be defined as a platform to design simulated models to portray all physical and functional features of construction by using IT tools.	[13]
3	BIM is a digital portrayal of a construction's geometric and non-geometric data. Also used as a dependable, common information resource to decide on a facility during its lifecycle.	[14]
4	BIM offers a more representative, participatory method to building design by the participation of architects, planners, and contractors.	[12]
5	BIM is an association process to construct, insert, distribute and control the information in an integrated model to get better designs, constructions, management, and maintenance processes.	[10]
6	BIM is a digital illustration of the physical and functional features of a construction. A BIM is a shared knowledge resource for information about a facility forming a dependable basis for decisions throughout the construction period.	[12]
7	BIM comprises more than just geometry including spatial relationships, light analysis, geographic information, quantities and properties of building components.	[14]

3. THE BENEFITS OF BIM TO QUANTITY SURVEYORS

3.1 Save time/better time management

Timing is very important in managing a construction project. The plan must be made and followed in order to ensure the construction project is completed within the timeframe. The implementation of BIM can save time and offer better time management as it can help in producing measurements and costing quickly [11]. Accurate quantities can be obtained and the complication of the traditional take-off method can be eliminated. Hence, it can save time and offer better time management [10, 13].

3.2 Save money and avoid budget overruns

It is important to keep track of the cost to ensure that the construction project is within the client's budget. BIM is able to extract more precise quantities to be compared with the traditional taking method [13]. This brilliant platform can cut down the possibility of inaccuracies and omissions [12]. As the negative impacts can be eliminated through the adoption of BIM, money can be saved and budget overruns can be avoided [10, 12].

3.3 Better design

As the years pass by, every construction player is very competitive in designing innovative construction. BIM has the ability to create an accurate visualization of construction based on the CAD drawing. The ability to extract an accurate visualization may help the construction players to create a better design for construction [11] and also produce a higher quality of construction information [14] which will lessen the complication of a construction design.

3.4 Accurate visualization

Certain construction players may have good imaginations of construction projects by looking at and understanding the drawings while the rest may not have good imagination and understanding of construction drawings. BIM act as an innovative tool that can produce an accurate visualization of a construction which is better than the current 2D drawings that require construction players to imagine the construction themselves [11]. This can help in designing better construction.

Based on the advantages mentioned, we can conclude that BIM is the perfect benchmark to reduce improbabilities and increase the proficiency of the construction process. It provides a transparent visualization of design to verify all potential improbabilities so that the design can be enhanced at the initial stage to save time, and cost and produce better quality.

4. METHODOLOGY

In a nutshell, a literature review was carried out to explore the definition of Quantity Surveying and Building Information Modelling (BIM), the advantages of BIM, and connect it to the adoption of BIM in Quantity Surveying Practice in Malaysia.

The collection of data will be divided into preliminary and secondary data. The preliminary data is collected through questionnaire surveys (i.e. Google Form) from the targeted respondents in the construction industry and the results of the questionnaire surveys will be evaluated. The secondary data is derived from articles, journals, research papers, reports, conference papers, and resources available on the internet.

The population sample was restricted to the Kuala Lumpur area only. The research sample consist of 1000 respondents who undertook questionnaires. Apart from that, the research sample is restricted to quantity surveyors from quantity surveying consultant firms only. According to [15], it is a table that helps the researcher determine the sample size according to a specific number of populations. Therefore, the figure has been round up the total quantity of surveyors as my population size, N = 1000, and my sample size (S) will be 278. In other words, by sending out one thousand questionnaires, they expected to receive feedback from at least a total number of 278 respondents. These participants are experts whom they had a great experience in their respective fields of work.

All data assembled from secondary data information and primary data information will be broken down together. From both data information collected, the goals and the point of the research will be fulfilled. Following are the formulas and scales used to analyze and translate the data:

Mean, x = ∑ (*f* x *n*), where:
x = the variable
f = frequency of the respondent
n = total number of respondent

Table 1.3: Benefit of BIM Among Quantity Surveyors

BIM Application	Strongly Disagree	Disagree	Average	Agree	Strongly Agree
1. Save time / better time management	0	0	0	220	60
2. Save money & avoid budget overruns	0	0	0	190	90
3. Better design	0	0	0	220	60
4. Accurate visualization	0	0	0	190	90
5. Faster & more effective process	0	0	0	220	60
6. environmental performance is more predictable	0	0	0	190	90
7. Better production quality	0	0	0	220	60
8. Integrated of planning & implementation process	0	0	0	190	90
9. Reasonable accurate quantity take off	0	0	0	220	60
10. Reasonable accurate cost estimate	0	0	0	190	90
11. More precise	0	0	0	220	60
12. Reduce the possibility of errors & omissions	0	0	0	190	90
13. Higher quality construction information	0	0	0	220	60
14. Improve customer/client relationship	0	0	0	190	90
15. Improve profitability	0	0	0	190	90
Min	0	0	0	190	60
Mode	0	0	0	190	90
Median	0	0	0	190	90

5. RESULTS AND DISCUSSION

By referring to Table 1.3 and Figure 1.1 below, the highest frequency goes to save time / better time management, better design, faster and more effective process, better production quality, reasonable accurate quantity taking off, more precise and higher quality construction information which is 250. Respondents respond to that list of the most agreed the most suitable benefit of BIM application.

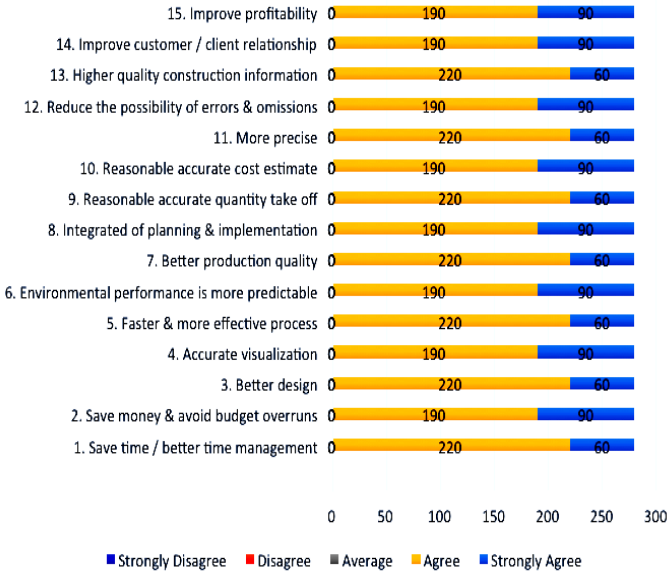

Figure 1.1: Benefits of BIM to Quantity Surveyors

6. CONCLUSIONS

As a conclusion of the literature review, as well as to results and findings, quantity surveying is related to cost, financial management, and contracts in a construction project. Quantity surveyors are well-trained professionals which have expertise in advising construction costs which makes them also known as Construction Economists or Cost Managers in the construction industry. While BIM is an innovative platform and method to design simulated models and display construction's geometric and non-geometric data through digital portrayal. It offers participation from architects, planners, and contractors in order to be more representative. BIM consists of more than a digital illustration of geometry, includes physical and functional features of a construction.

BIM application helps practitioners in making the construction industry smoother and less complicated. BIM offers more detailed, fast, and precise cost estimates for the construction industry. It assists construction practitioners with good system coordination and better construction design and constructability. BIM is the perfect benchmark to reduce improbabilities and increase the proficiency of the construction process. It provides a transparent visualization of

design to verify all potential improbabilities so that the design can be enhanced at the initial stage to save time, and cost and produce better quality.

5. REFERENCE

[1] History of Quantity Surveyor Retrieved from https://www.bqsm.gov.my/index.php/en/e-library/knowledge-sharing?id=176

[2] Definition of Quantity Surveyor Retrieved from https://www.rism.org.my/quantity-surveying-division-qs/

[3] A.E. Oke *, I.O. Timothy, A.I. Olaniyi, "Perception of Construction Professionals to The Performance of Nigerian Quantity Surveyors", Federal University of Technology, Akure Nigeria, 2010.

[4] Vineeth Raphael, Jennifer Priyanka, "Role of Building Information Modelling (BIM) in Quantity Surveying Practice", Anna University, Chennai, India, 2014.

[5] Evelyn Ai Lin Teo, George Ofori, Imelda Krisiani Tjandra and Hanjoon Kim, "The Potential of Building Information Modelling (BIM) for Improving Productivity in Singapore Construction", National University of Singapore, Singapore, 2015.

[6] Gayathri Nagalingam, Himal Suranga Jayasena & K. A. T. O. Ranadewa, "Building Information Modelling and Future Quantity Surveyor's Practice in Sri Lankan Construction Industry", University of Moratuwa, Sri Lanka, 2013.

[7] Siti Sarah Herman, "The Motivation of Quantity Surveyors in the Malaysian Construction Industry for Improved Job Performance", The University of Salford, Salford, United Kingdom, 2016.

[8] Yeshwanth Babu Reddy, "The Changing Face of Quantity Surveying Practice in Construction Industry", Deakin University, 2015.

[9] Timothy Oluwatosin, Olawumi*, Olaleke Amos, Ayegun, "Are Quantity Surveyors Competent to Value for Civil Engineering Works? Evaluating QSs' Competencies and Militating Factors", The Federal University of Technology, Akure, Nigeria, 2016.

[10] Salman Azhar, Malik Khalfan and Tayyab Maqsood, "Building Information Modelling (BIM): Now and Beyond", Auburn University, USA & RMIT University, Australia.

[11] Aftab Hameed Memon, Ismail Abdul Rahman, Irfana Memon and Nur Iffah Aqilah Azman, "BIM in Malaysian Construction Industry: Status, Advantages, Barriers and Strategies to Enhance the Implementation Level", Universiti Tun Hussein Onn, Johor, Malaysia, 2014.

[12] Christine Gee, "The Influence of Building Information Modelling on The Quantity Surveying Profession", 2010.

[13] Hassan H. Elkatawneh, "Comparing Qualitative and Quantitative Approach", Walden University; University of the Rockies, 2016.

[14] Fahmeena Odetta Moore, "Qualitative vs. Quantitative Design", Northcentral University, 2016.

[15] Krejcie, R.V., & Morgan, D.W., (1970). Determining Sample Size for Research Activities. *Educational and Psychological Measurement.*

[16] Hardin, B. (2009) BIM and Construction Management: Proven Tools, Methods, and Workflows. John Wiley & Sons, Hoboken.

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