Adoption and Impact of Digital Transformation Tools among Fresh Graduate Quantity Surveyors in Malaysia

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ABSTRACT

Digital transformation is a complex process that involves integrating new technologies into an organization's operations, which requires significant change management. The process affects all facets of an organization, from its business model to its culture, and requires a clear understanding of the potential challenges to pave a more efficient and successful path toward transformation. Building Information Modelling is a set of digital transformation tools or software that can integrate the data and manage construction projects to run efficiently and effectively. BIM is also a technology that can improve the effectiveness and standard of built asset design, construction, and operation. The quantity surveyors can accomplish their typical tasks, such as measurement, procurement advising, estimating and cost planning, and the creation of bills of quantities, more successfully and efficiently by adopting BIM. However, the adoption of BIM amongst quantity surveyor is still low in many countries, including Malaysia. Thus, this research aims to present the adoption of Building Information Modelling (BIM) amongst fresh graduate quantity surveyors based on current demand on work in the construction industry with the intention of uncovering new findings. There are two research objectives had been developed which are to identify the advantages of BIM amongst fresh graduate quantity surveyors, to determine the challenges encountered in adopting BIM amongst fresh graduate quantity surveyors. To achieve these objectives, a questionnaire survey based on random sampling methods was adopted. The questionnaire survey had been distributed to the fresh graduate quantity surveyors working at Contractor G7 in Selangor. Consequently, the findings of this research revealed that the advantages of implementing BIM are that BIM produce time savings in the preparation of costs. The challenges encountered in adopting BIM are lack of information technology and computing skills in adopting BIM.

Keywords: BIM, Fresh Graduate Quantity Surveyors, Construction Industry

INTRODUCTION

Construction is among the least digitised sectors in the world, according to Mckinsey Global Institute (MGI) digitisation index (Barbosa et al., 2017). Construction industry is experiencing an increasing implementation of digital technologies such as building information modeling (BIM), augmented and virtual reality (AR/VR), laser scanning, robotics, 3D printing, prefabrication and DfMa platforms, analytics software, blockchain, digital twins, internet of things (IoTs), and machine learning solutions throughout the built asset lifecycle (e.g., project, organization, and industry levels) (Koch et al., 2019; Singh, 2019; Brozovsky, J., Labonnote, N., & Vigren, O., 2024). One digital technology which many governments around the world would like to see gain traction is building information modelling (BIM). Building Information Modelling (BIM) is the holistic process of creating and managing information for a built drawing project. This

technology is an asset to change and increase the development in the construction industry for improved lifecycle. In order, Building Information Modelling (BIM) is a part of the productivity and innovative technology used by architectural, engineering and construction (AEC) industries based on particular software. However, in year 2000 Building Information Modelling (BIM) has been started broadly in AEC industries and the United States of America is the first country to implement BIM in construction projects. Generally, BIM already familiar of adoption to the world which is Australia, Hong Kong, Singapore, and Malaysia (Abd Hamid et al., 2018). In 2022, Malaysia still faced the problem of lack of expertise and knowledge among construction players caused implement of BIM is still fresh in construction industry (John, 2018). According to the research findings of Musarat M A et al. (2024) Malaysian construction industry is aware of going forward by adopting digitization, but players are still battling to grasp and execute it properly. On that statement, it is essential to take the serious issue of that cause of awareness of BIM among construction players will gain the quality and effectiveness to implement of BIM work in construction industry.

According to NBS (2010) a basic premise of BIM is collaboration by different stakeholders at different phases of the life cycle of a facility to insert, extract, update or modify information in the BIM to support and reflect the roles of that stakeholder. This is because the implementation of BIM in construction projects is challenging, but once adopted the BIM methodology, it will bring multiple benefits, especially in the area of productivity. According to the Ismail et al., (2017) has looked into the use of BIM in China, India, Pakistan, Sri Lanka, Malaysia, Indonesia, Thailand, and Vietnam. They emphasised that cultural resistance, prolonged processes, large investments costs, a lack of awareness and demand, and ambiguity about the return on investment (ROI) were the key obstacles to the adoption of BIM (ROI). However, the problems in the practical application of BIM do not generally relate to the capability of the BIM methodology or software but to the effective implementation within existing systems and to practice and equipping construction players with the skills necessary to take advantage of its many benefits. The impact of BIM drives will optimum utilization of the resources as well as greater productivity and profitability.

In Malaysia, for the year 2018, the construction industry is predicted to rise by at least 10.3% (Ahmad Jamal et al., 2019). One of the key indicators of national economic growth has been the building sector. In the construction business, expectations for cutting-edge technologies, specialised designs, and materials. Environmental sustainability solutions, and productivity enhancement have all grown dramatically. However, Malaysia construction industry condition confronts more sophisticated customers' requirements that make challenging among the Quantity Surveyors to handle it. At the same time, Quantity Surveyors has been asked to update their skills and competencies. They have also been asked to adopt advanced ICT, like Building Information Modelling (BIM), for more precise and automated cost estimation and planning from the start of a construction project (Ullah et al., 2019). Although, to ensure their careers in the cutthroat modern construction sector, Quantity Surveyors must recognise future business directions and strengthen their capacity to react quickly to unanticipated developments (Ariono et al., 2022).

LITERATURE REVIEW

Fresh Graduate Quantity Surveyors

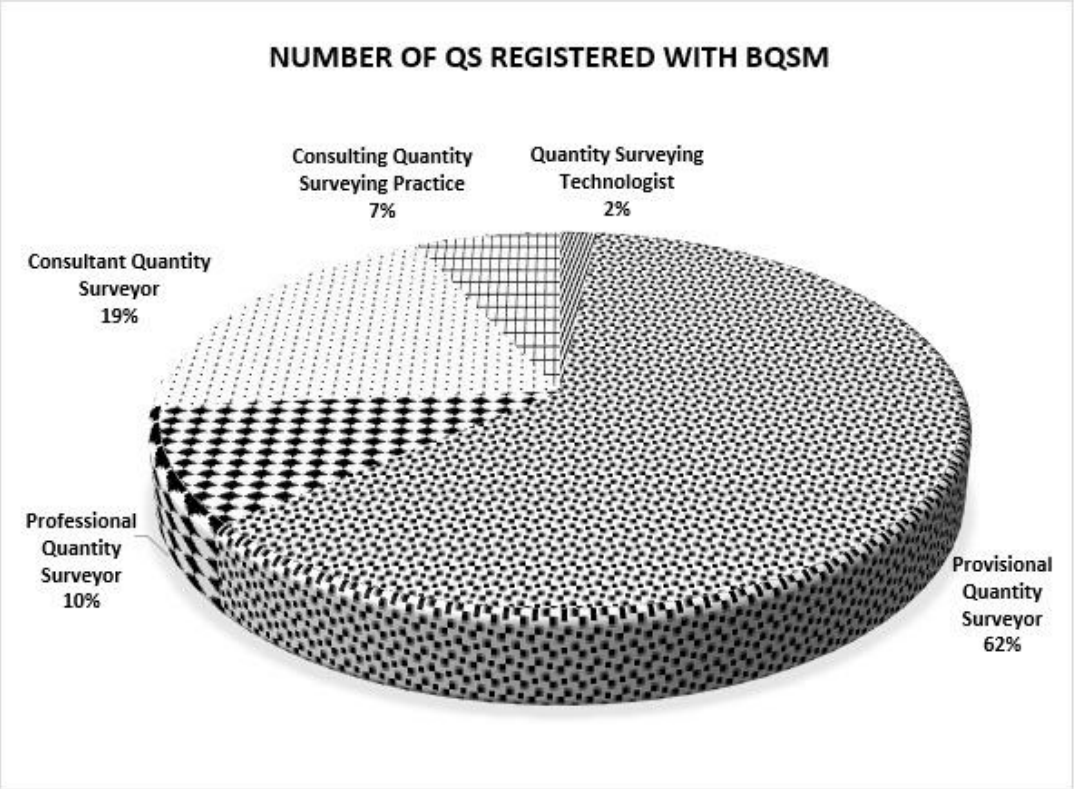
The aim of this research is to identify BIM adoption amongst fresh graduate quantity surveyors based on current demand on work in construction industry has effective as well as to educate practitioners in the construction industry about the areas where BIM has improved and increased construction performance. Generally, after finishing a suitable pre-university programme, students should enroll in universities that provide a bachelor's degree in quantity surveying after completing an appropriate pre-university programme. Due to the fact that some programmes provide an internship or a semester of industry training, this degree could take three and half years to finish. Via courses like measurement and construction

technology, first year students will study the fundamentals of the construction industry. After that, students will be taught how to use the latest software, such as Cost-X and Revit, which are useful project costing tools for quantity surveyors. Otherwise, project management and construction law are additional courses included in a degree in quantity surveying.

Graduates must register with the Board of Quantity Surveyors Malaysia (BQSM) in order, to become a certified quantity surveyor. This is followed by finding employment that is supervised by the Royal Institution of Surveyors Malaysia (RISM) for two years. Then, individuals must sit for a professional interview and exam set by BQSM and RISM. It is only those who pass will be recognised as registered quantity surveyors in Malaysia. Below is statistical analysis on 2 March 2023 a number of registered members with BQSM produced by BQSM which is accurate and kept up to date on official website BQSM.

Figure 1: Statistic Analysis Number of Registered Members with BQSM

Figure 1: Statistic Analysis Number of QS Registered with BQSM



In addition, the term “fresh graduate” typically refers to person who has recently graduated from college or university and has little or no work experience in their field of study (Kaur & Singh, 2015). This statement is supported by Faizahani et al., (2019) and Ginting, (2021) the exact length of time that considered a fresh graduate can vary depending on the industry or profession, but it is generally considered to be within the first 1-2 years after graduation. In order, the perspective of fresh graduate can be clarified as a is an individual that was admitted into tertiary institution, studied, passed all exams, and awarded certificate. Basically, fresh graduates usually have hard skills and soft skills (Suleiman & Abahre, 2020).

Generally, hard skills which are connected with the technical aspects of acquiring the knowledge to perform a job. However, soft skills which are capabilities required for managing relationships among people such as communication skills. During the initial phase, fresh graduate is provide a productive contribution to

organisational objectives with diligently within the duration of confirmation and have a dispositional ability and readiness to act successfully and in a self-organised manner when facing novel, unstructured or complex situations (Akinbode & Oyelude, 2020). In order, fresh graduate has an ability and willingness to learn, initiative and personal planning before starting cooperative working experiences (Pang et al., 2019). In order, fresh graduates are knowing their capabilities and strength on their profession to achieve the goal on work and committed, dedicated, and intelligent to perform on work to produce a good innovation on the work (Serhan & Tsangari, 2019).

Importance of BIM Competencies for Fresh Graduate Quantity Surveyors

Graduate quantity surveyors receive their academic training and internship experience to develop their competencies the graduate acquires during their education, however, has no standard as simplify by Ilmi et al., (2021) and Noor et al., (2020). Besides that, the construction industry's expectations of graduate competencies for quantity surveyors and the competences attained by university graduates do not match up because there is no benchmark. Otherwise, understanding the demands of the client is constantly given top priority in the developing field of quantity surveying (Ilmi et al., 2021). In order to completely understand what quantity surveyors graduate learnt during their training term and to identify what is lacking in the needs of the industry, it will be crucial to obtain feedback from both the fresh graduate and the industry. So, this is important as a fresh graduate quantity surveyor to registered with the Board because they will find the right sources of guidance in our career journey to make better performance on work.

This is because one of the guides support the Building Surveying a RICS which is a global professional organisation for person working in the built environment, construction, land, property, and real estate is the Royal Institution of Chartered Surveyors (RICS). The RICS competency framework make that persons pursuing the RICS certification are qualified to work in their field and adhere to the highest professional standards. There are several various approaches to becoming a qualified RICS professional, spanning a wide range of practice areas (RICS, 2018). Hence, the goal of the RICS evaluation is to ascertain their suitability to perform the duties of a qualified chartered surveyor. Possessing the aptitude or capacity to carry out a duty or function is referred to as competence. In addition, attitudes and behaviors are the foundation of the RICS competencies. Each competency is defined at three levels of attainment. It must reach the required level in a logical progression and in successive stages.

a. Level 1 – Knowledge and understanding.

Demonstrate knowledge and understanding of the technical, process, and collaborative aspects of using BIM on projects.

b. Level 2 – Application of Knowledge

Create and implement management systems, such as unified control and reporting procedures, to make it easier to employ BIM on projects.

c. Level 3 – Reasoned advice, depth and synthesis of technical knowledge and its implementation

Demonstrate how they have used the skills acquired to advise client or senior management on BIM Strategy.

All global plans discussed by RICS and AEC industry parties aim to address one of the barriers to digitalisation: fresh graduates lack the necessary digital competences. This claim can be supported by global survey responses research done by Sawhney & Knight (2022) which revealed the hinder factors of digitalised blockers. In placing more emphasis, Abidoye R.B et al. (2024) property graduates is the subject of global discourse and is an increasingly critical gap as employers demand with competencies in their

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fundamental roles and digital technologies.

Building Information Modelling (BIM)

In the construction industry, the comprehensive process of creating and managing information for a built object is known as Building Information Modelling (BIM). BIM creates a digital representation of an asset throughout its existence, from planning and design to building and operations, based on an intelligent model and made possible by a cloud platform. Modern BIM models are 3D with orthographic 2D plans that also come with section and elevation views (Doumbouya et al., 2016). According to the UN, by 2050, they predict that there will be 9.7 billion people on the planet by the year 2050. In order to not only keep up with global demand but also to contribute to the creation of places that are smarter and more robust, the global AEC industry must look to better, more efficient ways of designing and building. Furthermore, teams involved in design and construction can work more productively thanks to BIM, which also enables them to record the data they generate during the process for use in operations and maintenance.

In addition, the UK BIM academic Forum (BAF) held discussions around strategic advancements for higher education as a result of the UK government's adoption of BIM in the UK BIM report and Government Construction Strategy (GCS). The industry's push for students' employability with BIM competence, the framework for learning and the need to keep up with BIM's evolution were all noted by BAF. The BAF also called attention to the need to increase staff skills to support the delivery of the intended learning outcomes on BIM. Furthermore, BIM could provide a variety of advantages by being adopted in the construction sector. According to the Smart Market Report, 9 out of 10 BIM users in UK (92%) say they have benefited more from continued use of BIM since they have a positive attitude towards its principles (Yang et al., 2020). BIM, the latest development in the construction sector, will contribute to improving the construction process in many ways including visualisation and simulation.

In a full 3D BIM, project stakeholders can also see the constructability and construction sequences. According to the (Adquisiciones et al., 2019; Liao et al., 2020; Manuscripts, 2016) disagreement can be seen and resolved during the coordination process, this allows for the evaluation of alternatives to the construction plan. Based on these characteristics, the project team members can establish protocols and collaboration techniques. Even though this feature has resulted in significant increases in labour costs and other preplanning expenses, the savings on labour, rework, and expedited completion have more than compensated all of these additional expenditures before construction even begins (Lindblad, 2013). These have been summarised in Table 1.

Table 1: Building Information Modelling (BIM) Work Process

WORK PROCESS	**DETAIL WORK**
Conceptual Design	Drawings, Calculations, and Visualization
Detailed Design	3D Models, Engineer, and Architect
Analysis	Simulation, Life cycle predictions, and environment
Documentation	Estimates, Requirements, and Conditions
Fabrication	Database, Industry, and Assembling
Construction Management	Constructors, Scheduling, and Resources
Construction Logistics	Logistics, and Manager
Facility Management	Operation, Maintenance, and Life cycle costs
Renovation	Conservation, Heritage, As built
Programming	Planning, and Organization

BIM Acceleration in Construction

According to Nicolas Mangon (2021) at least 50% of projects presently employ BIM, including 60% of architectural projects. Within the next two to three years, that percentage is expected to soar to 89% and 80%, respectively. In order, civil engineering has been the most significant and recent adopter of BIM. Since 2016, over 70% of engineers have utilised BIM. The recent period's notable increase in civil engineers reflects the rapidly expanding use of BIM for infrastructure projects. The study contends that BIM is a crucial step in the process of going through a digital transformation. Compared to just 26% of BIM users overall, nearly half 47% of high-intensity BIM users are moving towards the objective of digital transformation. It's mean BIM plays a big role in the construction sector and increase the productivity and performance on work. The new Dodge Data & Analytics report is clear–by 2024 even late-adopting sectors will be using BIM on the majority of their projects.

a. Architect

60% of BIM using architects report using BIM an over half of their projects, with a total of 89% forecast by 2024.

b. MEP and Structural Engineer

51% of BIM-using MEP and structural engineers report using BIM on over half of their projects, with a total of 80% forecast by 2024.

c. Civil Engineers

46% of BIM-using civil engineers report using BIM on over half of their projects, with a total of 72% forecast by 2024.

d. Contractors

41% of BIM-using contractors report using BIM on over half of their projects, with a total of 69% forecast by 2024.

Advantages Quantity Surveyors in Adopting Building Information Modelling

BIM technology is seen as a new delivery method for construction projects. BIM technology is a breakthrough that significantly improves the delivery of construction domains over the course of a project. Concurrent construction is supported by BIM use throughout the project lifecycle (Al-ashmori et al., 2020). However, the development stages of a project's lifecycle, from the preliminary conceptual stage through the design, construction, and operation phases to destruction, can undoubtedly be facilitated (Ahmad Jamal et al., 2019). Even while BIM is typically connected to design and preconstruction, it is unquestionably beneficial for every stage of the project lifecycle, including after the structure is finished. Building information modelling enables projects to be virtually developed prior to being physically erected, hence removing numerous inefficiencies and issues that develop during the construction process.

Time savings in the preparation of estimating costs

Nowadays, the world is changing fast, and the pace appears to be accelerating more quickly than ever. Change management has recently emerged as a crucial component of organisational behavior research, and qualified quantity surveyors work is no exception (Ying & Kamal, 2021). BIM's ability to automate measurement and expedite the conventional estimating process can be useful to quantity surveyors. Quantity

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surveyors can estimate costs more accurately thanks to the capacity of BIM and quantity surveying to link key quantities and cost data to the building model and update them concurrently with design modifications. This statement clearly shows that the BIM skill among Quantity Surveyors will save time in the preparation of estimating costs.

Improved visualization for measurement

The technology of BIM allows quantity surveyors to visualise, simulate, and assess a project's whole lifecycle in a virtual environment, which gives them a more accurate and through picture of the project (Adquisiciones et al., 2019). Quantity surveyors are better able to comprehend and covey complicated information because to this improved visualisation, it can promotes effective decision-making and optimal project outcomes. The visualization in BIM tool also helps the quantity surveyors to better understand and communicate complex information, facilitating efficient decision-making and optimized project outcomes. Even though conventional knowledge and abilities are still very valuable, there is no denying that technology is changing the field of quantity surveying. As we move towards a time when building projects involve more bytes and bits than concrete and steel, it is critical to combine traditional QS knowledge with cutting-edge technical capabilities. It can be concluded, as software-driven technologies augment BIM, their potential significance will only increase for quantity surveyors.

Produce reliable and accurate quantities

In construction industry, the use of BIM in building projects has several advantages and can improve the standard of the work (Latiffi et al., 2013). BIM is very valuable to the Malaysian government. While the design and building phases are where BIM's advantages are most noticeable, clients may also see an improvement in build quality. In general, adopting BIM will produce reliable and accurate quantities. This is more functional for the quantity surveyor as an estimator in construction project. According to the (Zainon et al., 2018) in comparison to traditional paper drawings, the estimation task for Quantity Surveyors is becoming easier and clearer. In the past, taking off and bill of quantities required a lot of work and time to produce, as well as a high chance of human error. BIM has become widely accepted in the developed world's construction sector because of the complexity of building projects, and QS firms are expected to adopt it in order to increase the efficiency and value of the construction processes. Table 2 summarized the potential use of BIM in QS practice.

Table 2: The potential use of BIM in Quantity Surveyors Practice

QS PRACTICE	**BIM USES**
Quantity take-off Cost Estimation	Open 2D drawings and 3D models for viewing and quantity extraction.
Cost estimation report	The classification of reports according to locations, blocks, concrete grades, subcontractors, and other pertinent records can be done fast.
Clash Analysis	When many models (architectural, structural, etc.) are incorporated into one main BIM model, collision detection during quantity take-off happens.
Preparation of BQ	Creation of a bill of quantities utilising the standard measurement technique.
Cost Data	Creation of a cost data platform to enable knowledge management operations for a variety of construction projects.
Tendering process	Model checking is used to ensure that the bidders' offers, and the client's requirements are in accordance.
Cited By: (Mahamadu et al., 2020; Ying & Kamal, 2021; Zainon et al., 2018; Zealand, 2021)	

Challenges Quantity Surveyors in Adopting Building Information Modelling

In the move to comply with the UK government's mandate to work to BIM Level 2 by 2016, organisations are likely to encounter challenges in the process. However, smaller organisations, in particular, will be wary of the deployment of BIM because it requires time and financial investment. Otherwise, the building sector as a whole lacks clarity on the problem, and there will be a prevalent assumption that BIM is the province of larger firms rather than smaller ones. There is no exception in the construction sector. BIM technology has changed how the construction industry functions ever since it was introduced, but especially in the last few years. For major public projects, many nations, like the UK, have made the use of BIM mandatory. So, this session will explain the challenges encountered in adopting BIM technology.

Lack of information technology and computing skills

The use of information technology and computing abilities in the construction industry has lagged behind most other sectors. There are a lot of factors at play here. The building industry's excessive fragmentation is undoubtedly the main cause. Many firms think it costs too much money and takes too long to master new software and technology. However, firms must understand that the time and financial sacrifice will probably lead to more business chances. In order to deal with any uncertainties that may arise during construction, contingencies are frequently added to the budget to reduce the possibility of cost overruns and incorrect estimations. Many variables, such as the amount of time between cost estimates and construction, design modifications, market shifts, and quality problems, have an impact on cost estimates (Raouf & Al-Ghamdi, 2019). Quantity surveyors frequently point to a lack of time during the building phase, a deficient documentation record, and poor means of communication as the main reasons why cost estimates are inaccurate. That the tough reason as quantity surveyors is vital to be a greater in IT and computing skills on the profession.

Lack of competencies in the Quantity Surveyors profession

In the construction projects, with the low labour productivity, the poor performance of the construction sector has been a source of great concern among practitioners and academics, making productivity in construction crucial. Construction projects throughout the world have been experiencing major cost and time overruns (H. S. Ilmi et al., 2021). The limited professional development opportunities because quantity surveyors may not have access to sufficient professional development opportunities to keep their skills up to date. This can lead to a lack of proficiency in new technologies and techniques that are being introduced in industry. The majority of fresh graduate quantity surveyors not registered with BQSM may not have enough practical experience in the field, which can affect their ability to apply their theoretical knowledge to real world situations (Chen, 2013). Apart from that, lack of competencies in the Quantity Surveyors profession also due to the shortage of qualified Quantity Surveyors is a growing concern, leading to a lack of new entrants to the profession (Noor et al., 2020). To ensure the successful deployment of BIM in the construction industry, it is imperative to cultivate digital literacy and ICT competency, create awareness of BIM's potential, and promote education and training. To keep up with the latest developments in the construction industry, including the integration of cutting-edge digital technology like BIM, quantity surveyors must keep up with updates to their knowledge and abilities.

Limitation of BIM in Quantity Surveyors Practices

Generally, there are several limitations of BIM in quantity surveyors' practices. However, from the existing researcher they are highlighted on interoperability issues and dependency on model quality. Interoperability issues happen when different BIM software and platform used due to lack of standardization and compatibility. According to the (Succar, 2013), interoperability issues will impact on the integration issues

impeding the project stakeholders' smooth cooperation and communication. Apart from that, the lack of interoperability may impact on the accuracy of cost estimation and quantity take-off that have a potential leading to errors and discrepancies. The limitation of the dependency on model quality is refers on substandard quality of BIM models. According to the (Muimi, 2020), quantity surveyors will be faced difficulties due to substandard quality of BIM models, which can happen when architect and design consultants refuse and give complete details. This information gap affects the accuracy of cost estimation by impeding quantity take off and model-based measurement.

METHODOLOGY

This research is to examine Building Information Modelling (BIM) adoption amongst fresh graduate quantity surveyors, for this research there are multiple approaches were employed to guarantee the data gathered comprehensively. The sources of data are journals, websites, and thesis. Generally, quantitative method was adopted for gathering and analysing numerical data. It can be used to identify trends and averages, formulate hypothesis, examine causality, and extrapolate findings to larger population. Besides that, the quantitative methods approach to collect data and information are literature review and questionnaire. Target respondents for this study are fresh graduate quantity surveyors working at contractor G7 at Selangor. Apart from that, the population of this study is 3394 and sampling size is 346. In addition, 346 copies of the questionnaire were sent. But out of 346 responses, only 103 returned the questionnaire. After the data collected it needs to make statistical analysis to answer the questions. The benefits of this research to make initial preparation on skill and competencies for the future graduate students in Quantity Surveying based on the market demand in construction industry.

Otherwise, it helps the future industry with the good specialist on Quantity Surveyors to improve the project's quality, time, and cost. This research uses quantitative methodology to present the Building Information Modelling (BIM) adoption amongst fresh graduate quantity surveyors.

DISCUSSIONS OF FINDINGS

The first objective is the advantages of building information modelling amongst fresh graduate quantity surveyors. Consequently, the findings from the survey of this study revealed that the first rank of advantages of building information modelling (BIM) are BIM produce time saving in the preparation of costs regarding BIM amongst fresh graduate quantity surveyors which required the implementation of BIM in a project at work. This integration produce automates the transfer of data from the BIM to the cost estimating software that can reduce errors and the need of manual data entry (Ying & Kamal, 2021). This will help the fresh graduate quantity surveyors to prepare the cost of project within the specified period with an efficient and productive way.

Secondly, the results show that the second rank of benefits BIM which is BIM improved visualization for better understanding of design for measurement, to enhance the productivity and efficient management in a project at work. This is because the application of BIM is a modern technology that gives the opportunity to increase the quality of work on estimation. According to the (Adquisiciones et al., 2019), the quantity surveyors will have a better understanding on the project's design and construction to prepare bill of quantity.

Thirdly, based on results also revealed the advantages which is BIM informed decision-making leading to greater productivity and cost savings, to ensure the best decision from the quantity surveyors on their project estimation. This finding correlated with the studies conducted by (Kim & Park, 2016), there are several in building information modelling (BIM) capabilities towards quantity surveyors however one of that is data coordination which allow quantity surveyors to access and evaluate information for well-informed decision-

making and cost prediction.

Table 3: Challenges encountered in adopting building information modelling (BIM) among fresh graduate quantity surveyors

Item	Statement	Mean	Rank
A.	Lack of information technology and computing skill in adopting BIM	4.48	1
B.	Limited on BIM knowledge in the quantity surveyor profession	4.47	2
C.	Limitation of BIM in quantity surveyor practices	4.46	3
D.	High cost needed for the installation of BIM software and hardware	4.46	4
E.	Lack of trained professionals in the BIM industry	4.42	5
F.	Lack of personal attributes in adopting BIM	4.40	6
G.	No clear instruction or direction available for the application or execution of BIM in construction	4.38	7
H.	Lack of expertise and awareness	4.38	8

Next is the second objective which is the challenges encountered in adopting building information modelling amongst fresh graduate quantity surveyors. Consequently, the findings from the survey of this study summaries in Table 3 revealed that the first rank challenges encountered in adopting building information modelling (BIM) are lack of information technology and computing skills in adopting BIM that have been a challenge amongst fresh graduate quantity surveyors in implementing BIM works. The finding consistent with past researchers Navendren et al. (2014) and Ahmed, Y. A. (2024) as they have highlighted lack of training can hinder quantity surveyors from acquiring the necessary skills.

Secondly, based on results from the survey, the second rank challenges found that the limited on BIM knowledge in the quantity surveyor's profession that may influence the performance of work in adoption of BIM. As stated in the literature review, these challenges are category of class 2 organisational which is limited on BIM knowledge in the quantity surveyor's profession due to lack of knowledge. This claim can be supported by similar research done by Heaton et al. (2019) that many contractor firms have faced problems amongst fresh graduate quantity surveyors because limitation on BIM knowledge and training.

Thirdly, also revealed the challenges which is limitation of BIM in quantity surveyors' practices that have been a gap of knowledge about BIM technology with the current demand in construction industry. There are some limitations that quantity surveyors may face in adopting BIM. However, these challenges are focused on limitation of interoperability issues and dependency on model quality. The findings are supported by (Succar, 2013) stated that to overcome this limitation in BIM, QS professionals and organisations need to invest time and resources in understanding the potential benefits of BIM and developing appropriate standards and procedures for BIM implementation. In placing more emphasis, Johannes B, Nathalie L, Olli V (2024) asserted that recent graduates had the requisite skill sets for effective adoption of digital technologies in the enterprise, hence bridging the academic-industrial divide.

CONCLUSION

The research presented in these studies indicated that the primary advantage of BIM was "BIM produces time saving in the preparation of the costs". As a profession in quantity surveyors must be perform during the estimation and measurement to come out the reliable and accurate quantity. In order to the reliable and accurate in preparation costs produce with the good application used to adapt with the new technology such as BIM. According to the data gathered from the survey, this study found that most of the respondents notified those major challenges that contributed towards BIM technology on work was "lack of IT and

computing skills in adopting BIM" and "limited on BIM knowledge in the quantity surveyor profession. These challenges usually occur when many firms think of the high cost for make an investment and taking a long time to upgrade new software and technology. These challenges must be prevented to ensure that fresh graduate quantity surveyors can increased their performance on work in implementing BIM.

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