



**6th UNDERGRADUATE  
SEMINAR ON BUILT  
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(USBET) 2023**

**SUSTAINABLE BUILT  
ENVIRONMENT**

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# THE CHALLENGES AMONG SMALL MEDIUM ENTERPRISE (SME) CONTRACTORS TOWARDS BIM ADOPTION IN MALAYSIA

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## ABSTRACT

*Building Information Modelling (BIM) drives construction stakeholders to increase productivity and efficiency. The implementation of BIM has met the requirements during the design phase but is lacking in the construction phase. The purpose of this paper is to identify and understand the challenges of BIM adoption among Small Medium Enterprise (SME) contractors in Malaysia. A questionnaire survey was carried out among G4 contractors throughout Kuala Lumpur to ascertain and analyse the challenges of BIM adoption. The results derived from descriptive analysis suggested two significant underlying challenges: companies need to spend money on employee training to adapt to the use of new technology and the culture of the construction industry. Identifying the factors provides more information regarding the challenges among G4 contractors towards BIM adoption in Malaysia. It is hoped that the result could assist industry players in improving BIM adoption in Malaysia.*

**Keywords:** *Challenges, SME contractors, G4 contractors, BIM adoption*

## INTRODUCTION

The global adoption of Building Information Modelling (BIM) has compelled several countries to confront the global construction industry's developments. BIM is a digital representation and management system that allows for the creation, visualisation, and coordination of structural and functional features of a building or infrastructure across the life of the structure. The adoption of BIM in construction is wide, ranging from the early stages until the handover of a project.

A few complex and mega projects in Malaysia, such as the Kuala Lumpur International Airport (KLIA), the second Penang Bridge, and monorail projects, are examples of projects that require new technology adaptation. The new technology adaptation may not only help the industry players before and during construction but also improve the maintenance process of such projects for the whole life cycle of the structure (Latifi et al., 2013).

In Malaysia, there are annual programmes organised by the CIDB (Construction Industry Development Board) to create awareness among construction practitioners; however, the adoption of BIM is still low. BIM is implemented during the design phase for modelling purposes, while the adoption during the construction stage remains unsatisfactory (Memon et al., 2014). Lack of BIM adoption restrains the construction industry at a low level. A lack of knowledge and understanding regarding the BIM adoption process has also been identified among small and medium enterprises (SME) (CIDB, 2019). Therefore, more action needs to be taken to ensure the SME gains at least some knowledge of BIM in the current economic conditions.

This research therefore identifies the challenges among SME in the adoption of BIM in Malaysia. Identification of the factors would provide more information regarding the challenges faced by SME in the adoption of BIM in Malaysia. The results could then assist industry players in improving the adoption of BIM in Malaysia.

## LITERATURE REVIEW

### Challenges of BIM Adoption in Malaysia

**Table 2.0: Challenges in BIM adoption (Roslan et al., 2019)**

Factor	Mean	Rank	Category
High cost of technology	4.09	1	Technology
High training cost	4.06	2	Technology
Lack of knowledge on BIM	4.05	3	People
High cost of software	4.04	4	Technology

Insufficient availability of BIM training	3.83	5	People
Lack of time for experimentation and implementation in fast-paced projects	3.79	6	Process
Lack of references to assist in implementing BIM	3.76	7	Process
Lack of awareness of BIM benefits	3.66	8	People
Lack of time to implement	3.60	9	
Lack of competency among team members in using BIM	3.59	10	People
Existing hardware incapable of running basic BIM software	3.51	11	Technology
Reluctance to initiate new workflows for the implementation of BIM	3.44	12	People
Lack of direction of BIM in the industry	3.37	13	Process
Inadequate familiarity with the use of BIM	3.35	14	Process
No BIM requirement/ mandate exists in the industry	3.33	15	Process
BIM software is complicated to use	3.31	16	Technology
Resistance to changing to new technology	3.24	17	People
Assumption that conventional methods are better than new process	3.07	18	Process

BIM is currently a familiar topic to the construction stakeholders in Malaysia. Though it is an interesting topic to talk about, BIM adoption is still at a lower level or stagnant (Zakaria et al., 2013). The implementation of BIM is still considered taboo among construction players, even though the software will assist the stakeholders in many ways. There are so many factors influencing the lack of usage of BIM, such as low BIM knowledge (Zakaria et al., 2013) and training regarding BIM's true values. The Malaysian government, industry players, and professional organisations have taken the necessary action to encourage BIM adoption in the architecture, engineering, and construction (AEC) sector after realising the potential benefits of the technology (Hussain et al., 2018).

According to a recent research in 2019, the implementation of BIM among construction players is stagnant (Baharuddin et al., 2019). This is due to the fact that

in Malaysia, most stakeholders have the habit of performing each duty on paper and drawing physically instead of using technology. This is causing difficulty to most Malaysian construction players in performing their work because they always need to convert 2D drawings into 3D (Latifi et al., 2013). Therefore, BIM adoption can be determined at the preliminary stage of level 1.

According to Figure 1, many factors are considered to be challenges to BIM adoption in Malaysia. The top 2 reasons from the list above indicate that BIM is difficult to apply in the construction industry because of its high cost. According to the Malaysia Productivity Corporation (MPC), many construction companies were hesitant to make significant investments in new technology and employee training because they were unsure of the industry's near-term growth (Malaysia Productivity Corporation, 2012). Such sophisticated implementation takes time and requires repeated phases of implementation readiness, capability development, and performance maturity.

## Contractors

A contractor is described as a person or business hired to carry out certain duties and who offers services to another entity. Compared to employees who work as permanent staff of the hiring company, contractors are often hired for a specific project or a set amount of time. Contractors can work in a wide range of sectors and professions, such as architecture, engineering, information technology, consulting, and more. In order to satisfy the unique needs of their clients, they provide specialised skills, knowledge, and services (Adnan et al., 2011). Malaysia is facing increasing growth in the number of contractors (CIDB, 2023). Therefore, in Malaysia, contractors are a highly important element in the construction industry. The industry helps to grow the national economy, assisting in the aspiration of advancing Malaysia from a developing country into an advanced country (Dzulkalnine et al., 2016).

**Table 2.1: Grade classification for contractors in Malaysia**

Grade	Limit for tender
G1	Not exceeding RM200,000.00
G2	Not exceeding RM500,000.00
G3	Not exceeding RM1 million
G4	Not exceeding RM3 million
G5	Not exceeding RM5 million
G6	Not exceeding RM10 million



G7	RM10 million and above
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BIM is not a new concept. It has been implemented in the Malaysian construction sector for decades and the Public Works Department began using it widely in 2007 (Roger et al., 2015). It is crucial to promote the implementation of BIM among other construction players, especially in medium-sized and small contractor companies. This will enable construction managers to swiftly and accurately make decisions based on crucial information (Durdyev et al., 2022). Moreover, it will assist SME contractors to be more accurate, faster, and multi-task in their projects. An efficient BIM tool has been correlated with the success of a building project (Ahsan Waqar et al., 2023).

### **BIM Adoption in Malaysia**

BIM adoption is a wide-ranging process, starting from the early stages until the handover of a project. Nowadays, technology has become a necessity for people's lives, especially in the construction industry. Modern technology, such as BIM, may assist all parties involved in performing their work diligently. BIM is a collaborative process that involves the generation and exchange of intelligent digital information about a project, not just a 3D modelling tool. It includes the dimensions, spatial relationships, numbers, qualities, and other pertinent information of building elements and parts. Utilising information technology (IT) and BIM, for which the resources are already in place, makes the construction process from beginning to end highly sophisticated. In addition, BIM is intended to encourage collaborative planning by facilitating communication and information exchange among stakeholders (Sebastian et al., 2010). The concept and tools of BIM have been around since the 1970s.

BIM is no longer a taboo topic among construction players in Malaysia now. It has been the norm in Malaysia since a few years ago (Baharuddin et al., 2019). The concept was introduced in 2007 by the Public Work Department (PWD) (Rogers et al., 2015). There are many widely-used and well-known software programmes in Malaysia. These programmes are used by parties in the construction sector and among them are Revit, AutoCAD, Cost X, Sketchup, Tekla Structures, and many more. Most of the software were developed by a company named Autodesk.

Nowadays, BIM is quite familiar to construction stakeholders in Malaysia. Though it is an interesting topic to talk about, BIM adoption is still at a lower level or stagnant (Zakaria et al., 2013). BIM adoption is still considered taboo among construction players, even though the software will assist stakeholders in many ways. There are

various factors influencing the lack of usage of BIM, such as low BIM knowledge (Zakaria et al., 2013) and training regarding BIM's true values.

## RESEARCH METHODOLOGY

The objective of this research is to investigate the challenges of BIM adoption among SME contractors in Malaysia. According to the CIDB (2019), for future BIM adoption, attention should be paid to SME contractors as their numbers dominate the proportions of construction industry players in Malaysia. Therefore, this research is focusing on G4 contractors in Kuala Lumpur using a quantitative method. Quantitative research is more suitable for the topic under consideration, as it is appropriate to learn how many people in a population share a particular characteristic (Kempton, 2010). A quantitative design was used to collate opinions about BIM adoption among SME contractors through an online survey.

The questionnaire was disseminated to G4 contractors in Kuala Lumpur, where there are approximately 256 companies. A total of 232 valid responses were received. The questionnaire sought opinions on the challenges identified through the literature review. Questions were closed-ended using a five-point Likert scale (1 = strongly disagree to 5 = strongly agree), ensuring responses were equally balanced.

## ANALYSIS OF FINDINGS

This research involved 232 respondents, who represent the G4 companies throughout Kuala Lumpur. Table 2 displays the information of respondents according to their position within the contractor's organisation. The information is crucial in assessing the average respondent population involved in this research. Respondents holding the position of quantity surveyor made up the largest proportion, with a percentage of 34.5%. The demographic profile also shows that engineers and architects contribute about 20.7% and 19.0%, respectively, of the population, while draughtsmen represent about 14.2%. In contrast, the remaining positions contribute the least with a percentage of 11.6%.

**Table 4.0: Demographic profile of respondents**

Description	Frequency	Percent (%)
Architect	44	19.0
Draughtman	33	14.2

Engineer	48	20.7
Quantity Surveyor	80	34.5
Others	27	11.6
Total	232	100

This research involved investigating the challenges of BIM adoption among SME contractors in Malaysia. The survey asked for the respondents' views about the challenges of BIM adoption in their projects. Table 3 represents the rank of the challenges in BIM adoption among the SME contractors. Money spent on employees' BIM training made up the most crucial challenge to the SME contractors in Malaysia, with a mean of 4.81. This was followed by cultural barriers in the construction industry, which ranked second with a mean score of 4.76. At third rank was BIM adoption is slower than the traditional method (mean = 3.60). Meanwhile, BIM adoption is more difficult than the traditional method was ranked fourth with a mean score of 3.32. Ranked last are the respondents who opined that BIM adoption is not beneficial for the project.

**Table 4.1: Ranking analysis of the challenges among contractors towards BIM adoption**

No.	Description	Mean	Rank
1	Companies need to spend money on employee training to adapt to the use of new technology	4.81	1
2	Cultural barriers of the construction industry	4.76	2
3	BIM adoption is slower than using the traditional method	3.60	3
4	BIM adoption is more difficult than using the traditional method	3.32	4
5	BIM adoption in the company for a project is not beneficial	3.10	5

## DISCUSSION AND CONCLUSIONS

The findings from the quantitative method confirm that the challenges of BIM adoption among SME in Malaysia that were identified in the literature review are all deemed as true or "agreed" by respondents in SME contractors in Kuala Lumpur, Malaysia. Using BIM is more difficult than using the traditional method and BIM adoption for a

project is not beneficial and found to be the "least" challenges, receiving the smallest mean scores.

The fact that the first three ranked challenges were scored highest by the SME contractors would suggest that the industry players and policy makers need to be more active in promoting BIM adoption and also provide support in terms of financial, collaboration, knowledge transfer, and policy improvement to increase BIM adoption in the Malaysian construction industry.

Intriguingly, the two lowest ranked challenges perceived by the respondents with only "mixed feelings" are that awareness and knowledge of BIM among the SME contractors are still at a low level. To keep up with the growth of Construction 4.0, future BIM adoption must be emphasised and strengthened to advance the digital transformation of the Malaysian construction industry.

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Tarikh : 20 Januari 2023

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Kelulusan daripada pihak tuan dalam perkara ini amat dihargai.

Sekian, terima kasih.

“BERKHIDMAT UNTUK NEGARA”

Saya yang menjalankan amanah,

**SITI BASRIYAH SHAIK BAHARUDIN**  
Timbalan Ketua Pustakawan

*nar*

*Setuju.*

*27.1.2023*

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