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17TH RISM INTERNATIONAL SURVEYING CONFERENCE FOR UNDERGRADUATES

Embracing Construction Revolution 4.0 (CR4.0): Transforming Malaysia's Built Environment

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WELCOME SPEECH FROM THE CHAIRMAN

RISM 17th International Surveying Conference for Undergraduates (ISCU 2025)

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ السَّلَام

عَلَيْكُمْ وَرَحْمَةُ اللَّهِ وَبَرَكَاتُهُ

Greetings to all,

It is with great pleasure that I welcome you to the 17th RISM International Surveying Conference for Undergraduates (ISCU 2025), themed “*Embracing Construction Revolution 4.0: Transforming Malaysia’s Built Environment.*” On behalf of the Royal Institution of Surveyors Malaysia (RISM), I also wish to express our sincere appreciation to Universiti Teknologi MARA (UiTM), Perak Campus, for graciously hosting this significant event.

As we navigate the era of the Fourth Industrial Revolution (IR4.0)—or in our context, Construction Revolution 4.0 (CR4.0)—we are witnessing transformative advancements across the global construction sector. Technologies such as Building Information Modelling (BIM), the Internet of Things (IoT), artificial intelligence (AI), robotics, big data analytics, and cloud computing are redefining the way we build, manage, and interact with our built environment. For Malaysia, embracing CR4.0 is a strategic imperative to achieve our socio-economic and environmental goals.

This conference serves as a vital platform to unite surveying undergraduates from various disciplines, fostering critical dialogue on industry challenges, enhancing professional networking, and preparing a new generation of talent for the rapidly evolving construction landscape. It is also an opportunity for employers to engage with and inspire our future professionals.

I would like to extend my heartfelt thanks to all industry speakers, paper presenters, judges, and participants for their time, contributions, and support in making ISCU 2025 a success. I also commend the organising committee for curating a meaningful and dynamic conference experience.

May the knowledge gained, connections formed, and ideas exchanged during this event inspire all participants to lead and innovate in their future endeavours.

Wishing everyone a productive and memorable conference.

Prof. Ts Sr Dr. Adi Irfan Bin Che Ani'

Chairman, Universities' Partnering Committee

RISM Session 2024/2025

May 2025

WELCOME SPEECH FROM CO-CHAIRMAN

RISM 17th International Surveying Conference for Undergraduates (ISCU 2025)

Bismillahirrahmanirrahim.

السلام عليكم ورحمة الله وبركاته and greetings to all.

It is my great pleasure to welcome everyone to the 17th International Surveyor Conference for Undergraduates (ISCU 2025), proudly hosted by Universiti Teknologi MARA (UiTM) Perak Branch in collaboration with the Royal Institution of Surveyors Malaysia (RISM). This event is a meaningful platform for students in the built environment to share ideas, showcase innovations, and build professional networks. We are honoured by your presence and enthusiastic participation, with 135 accepted papers and 78 poster presentations this year.

UiTM Perak, home to the College of Built Environment, has long been a hub for academic excellence in architecture, planning, and surveying. Our commitment remains strong in nurturing competent graduates who meet industry demands and contribute to nation-building.

While you're here, we invite you to experience the heritage and culture of Perak Tengah from the architectural richness of Rumah Kutai to the historical towns of Pasir Salak, Bota, and Kampung Gajah.

To all presenters and winners, congratulations on your achievements. Let your work today be a catalyst for future success and academic growth. We hope this conference will inspire you to explore new ideas, foster collaboration, and make lasting memories.

My deepest thanks to the Royal Institution of Surveyors Malaysia (RISM) and the organising committee for making this event a success.

We hope your experience here will be rewarding and unforgettable.

Thank you. Selamat datang dan selamat berjaya.

Associates Professor Dr. Nur Hisham Ibrahim, *PMP*

Co-Chairman, Universities' Partnering Committee

RISM Session 2024/2025

May 2025

WELCOME SPEECH FROM THE PROJECT DIRECTOR

RISM 17th International Surveying Conference for Undergraduates 2025

Alhamdulillah, all praise to Allah S.W.T. for His guidance and blessings in making the RISM 17th International Surveying Conference for Undergraduates (ISCU) 2025 a reality.

It is with great honour and gratitude that I welcome all participants, guests, academicians, and industry professionals to this prestigious event, proudly organized under the Royal Institution of Surveyors Malaysia (RISM). This 17th edition of ISCU stands as a proud testament to our collective dedication toward academic excellence, professional collaboration, and youth empowerment in the field of surveying.

I extend my heartfelt appreciation to RISM for its unwavering support, to the hardworking ISCU 2025 Organising Committee, and to all 16 partnering universities across Malaysia for their commitment and contributions. Your efforts have shaped this conference into a dynamic platform for knowledge exchange, innovation, and professional growth.

To the academicians and practitioners present, your insights are invaluable in bridging the gap between academic theory and real-world practice. To our undergraduate participants, your passion, curiosity, and commitment are the very foundation of our future. May this conference not only deepen your academic journey but also ignite a spirit of leadership, integrity, and sustainable thinking.

Let this gathering serve as more than an academic milestone. May it foster lifelong networks, inspire transformative ideas, and chart new directions in our shared professional journey.

Wishing everyone a rewarding and inspiring conference experience.

Sr Dr. Nurul Fadzila Zahari

Project Director

RISM 17th ISCU 2025

CONCEPTUAL FRAMEWORK TO IDENTIFY THE KEY BARRIERS IN ADOPTION OF BIM AMONG BUILDING SURVEYOR PROFESSIONAL AND EDUCATION IN MALAYSIA

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ABSTRACT

Building Information Modeling (BIM) holds immense potential to revolutionise the construction industry by improving visualisation, collaboration, and data management throughout the building lifecycle. However, BIM adoption remains slow among building surveyors in Malaysia, mainly due to technological, educational, and organizational barriers. In response to this issue, this paper aims to propose a guiding framework that links BIM and building surveying and to identify the key barriers to BIM adoption in the building surveying industry. The qualitative research method was employed by using document analysis and review following the content analysis approach. The results suggested a framework for connecting BIM and building surveying. This proposed conceptual framework is intended to be used in designing future strategies to enhance the integration of BIM within the scope of building surveying. This framework may facilitate the integration of BIM in building surveys in the future. The findings also highlighted technological costs, lack of training, cultural resistance, and the absence of standardized processes as significant obstacles that prevent the adoption of BIM in this field. Addressing these challenges requires collaboration between industry and educational institutions, better training opportunities, and policy reforms. The findings of this paper provide a foundation for future strategies to improve BIM adoption, ensuring enhanced project efficiency, compliance, and digital transformation in Malaysia's construction industry.

Keywords: BIM, Building Surveyors, BIM Adoption, Education and Professional Collaboration

I. INTRODUCTION

This research focuses on identifying the guiding framework that links BIM and building surveying, as well as the key barriers to BIM adoption in the building surveying industry. BIM has been recognized globally as a transformative tool that can significantly enhance the efficiency, accuracy, and collaboration involved in construction projects (Eastman et al., 2021). By providing a comprehensive digital representation of a building's physical and functional characteristics, BIM allows stakeholders to visualize, simulate, and manage the entire lifecycle of a project. Despite its widespread use in countries such as the United Kingdom and the United States, the adoption of BIM in Malaysia, particularly among building surveyors, has been slow and uneven (Rahim et al., 2021).

Building surveyors play a crucial role in the construction process, ensuring that projects comply with legal, regulatory, and safety standards. The integration of BIM into building surveying workflows could streamline processes, reduce errors, and improve regulatory compliance. However, surveyors face multiple challenges in adopting this technology, ranging from high software costs and insufficient training to cultural resistance within organizations (Sattineni & Keller, 2019). These challenges are further compounded by a lack of standardized protocols and inadequate collaboration between educational institutions and the construction industry, resulting in inconsistent uptake of BIM (Rahim et al., 2021).

To address these concerns, this study aims to bridge the knowledge gap by investigating the specific obstacles faced by building surveyors in adopting BIM. By focusing on these barriers, the research contributes to the broader

discourse on technology adoption in the construction industry, offering actionable recommendations to enhance BIM uptake among building surveyors in Malaysia. The following sections present the research background, literature review, methodology, and findings that provide insights into the current state of BIM implementation and outline the steps necessary to overcome existing barriers. Building on this discussion, the next section explores the theoretical framework.

II. LITERATURE REVIEW

I. Guiding Framework Towards BIM Adoption in the Building Surveying Industry

The theoretical framework for this study forms the basis for understanding and analyzing the factors influencing BIM adoption among building surveyors. It draws on established theories to explore the challenges faced by building surveyors in adopting Building Information Modeling (BIM) and how collaboration between the construction industry and educational institutions can help overcome these challenges. Specifically, the framework integrates four key theories that will guide the research process and provide insights into the barriers and solutions related to BIM adoption.

II. Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), developed by Davis in 1989, explains how individuals' acceptance of technology is influenced by two key factors: perceived usefulness (PU) and perceived ease of use (PEOU). According to TAM, people are more likely to adopt technology if they perceive it will improve their performance and is easy to use. In this study, the adoption of BIM by building surveyors will depend on how useful they believe BIM will be in enhancing their professional tasks such as inspections, compliance, and collaboration. Additionally, the ease with which they can learn and apply BIM tools will also impact their willingness to adopt the technology.

III. Collaborative Learning Theory

Collaborative Learning Theory, based on Vygotsky (1978), emphasizes the importance of collaborative environments in enhancing learning experiences. It suggests that when individuals work together, they can leverage each other's expertise, which leads to more effective learning outcomes. Applied to this study, the theory highlights the value of collaboration between educational institutions and the industry in closing the knowledge gap. Through such partnerships, educational institutions can provide building surveyors with the necessary skills to use BIM tools, while the industry offers practical, real-world knowledge about BIM applications.

IV. Knowledge Transfer Theory

Knowledge Transfer Theory focuses on the process by which knowledge is transferred from one entity to another, especially in situations where expertise needs to be shared between professionals and learners. Nonaka and Takeuchi (1995) explain that knowledge transfer is critical for learning in organizational contexts. In the context of this study, this theory supports the idea that collaboration between educational institutions and industry professionals is essential for effectively transferring BIM knowledge to building surveyors. Industry experts can provide valuable insights into BIM's practical applications, ensuring that building surveyors have the knowledge necessary to adopt BIM in their professional workflows.

Comparative analysis

While the Technology Acceptance Model (TAM) focuses on perceived usefulness and ease of use, it does not address factors like organizational culture or resistance to change, which play significant roles in the adoption process. The Collaborative Learning Theory highlights the importance of collaborative environments, yet it may struggle to account for the practical limitations within institutions that hinder effective industry-education partnerships. Similarly, the Knowledge Transfer Theory underscores the importance of knowledge exchange but its implementation can face challenges due to institutional resistance and infrastructure limitations.

Limitation of Theories

Although TAM offers valuable insights into technology acceptance, its focus on individual perceptions may overlook the organizational resistance and institutional barriers that are critical in the case of BIM adoption. Collaborative Learning Theory, while emphasizing the value of educational partnerships, may struggle to address the time constraints and cultural differences between academia and industry. Knowledge Transfer Theory underscores the importance of knowledge sharing, but effective implementation may be hindered by institutional

silos and lack of infrastructure.

V. Current Status of BIM Adoption in the Malaysian Construction Industry and Building Surveying

Despite many advantages of BIM in construction and built environments, the integration of BIM in certain areas of the construction industry, especially in building surveying, has been somewhat limited. BIM adoption in Malaysia has faced a relatively slow uptake compared to countries like the United Kingdom (UK) and Australia. While the Malaysian government has made efforts to encourage the use of BIM, particularly in public sector projects, the private sector has been slower in adopting this innovative technology (Sirim, 2020). This delay in adoption can be attributed to various factors, including a lack of standardized processes, limited access to technology, and insufficient training for professionals. Nevertheless, positive progress has been made, especially with larger firms and government-related projects gradually incorporating BIM into their processes (Rahim et al., 2019). In contrast, countries like the UK have made significant strides in implementing it across the construction industry. The UK provides a useful comparison, as it has been at the forefront of BIM adoption, particularly through government mandates and industry-wide initiatives. Gov.uk, 2012; Malaysian Journal of Sustainable Environment, 2021).

Generally, building surveyors are responsible for ensuring that buildings meet legal, regulatory, and safety standards. They check that construction projects comply with building codes, zoning laws, and safety regulations. BIM has the potential to significantly enhance the efficiency of building surveyors' work by automating some of their tasks, improving inspection processes, and ensuring that buildings meet all necessary requirements (Azhar, 2011). For instance, BIM can help surveyors identify compliance issues during the design phase, so they can be addressed before construction begins. This reduces the risk of costly errors and delays due to non-compliance.

Furthermore, Building Information Modelling (BIM) provides a valuable approach to improve the efficiency of building surveyors by automating certain tasks and enhancing the inspection processes (Kim et al., 2020). BIM enables surveyors to identify regulatory compliance issues during the design stage, reducing the potential for costly errors and project delays later on (Azhar, 2011). The shift from conventional 2D paper-based drawings to BIM's 3D models minimizes the risk of human errors and increases accuracy in building evaluations (Choi & Kim, 2008). Additionally, BIM allows building surveyors to assess design flaws early in the project, which leads to proactive corrections before construction begins, saving time and resources (Kim et al., 2020; Ismail et al., 2016).

In addition, BIM can streamline the inspection process by allowing surveyors to monitor construction progress more accurately. Using BIM, surveyors can compare the model to the actual construction to ensure that the building is being constructed as planned and in line with the approved design. This technology also allows surveyors to access detailed information about materials, dimensions, and construction methods, which improves the accuracy of their inspections. However, despite these clear benefits, many building surveyors have been slow to adopt BIM in their work, often due to a lack of training, limited resources, or resistance to change in established practices (Azhar, 2011).

BIM also plays a role in post-construction activities. Once the building is completed, the BIM model can be used for facilities management and maintenance. Building surveyors can use the model to track the performance of building systems (like heating, ventilation, and air conditioning) and plan for future repairs or upgrades. This makes BIM a valuable tool not just during construction, but throughout the lifecycle of the building. As the technology evolves, it is expected that its use in building surveying will grow, further improving the quality, efficiency and accuracy of the profession.

Interestingly, the introduction of BIM has the potential to significantly transform the role of surveyors, making their work more efficient and accurate, and enabling them to provide more value to the construction process (Azhar, 2011). Based on this context, this study was outlined to answer the two (2) research questions, which are 1. What are the guiding framework linking the adoption of BIM in building surveying, and 2. What is the key barriers to BIM adoption in the building surveying industry? Specifically, it theoretically purposes the framework that linking the BIM with the building surveying profession and education by providing a guiding framework that shows the ways to collaborate between professionals and education in promoting BIM adoption and knowledge among Malaysian building surveyors. Following this, the next section highlights the importance of educational support, in contrast to the previously discussed technological barriers.

III. METHODOLOGY

I. Document Review and Analysis

This study utilizes a document analysis approach, as detailed by Bowen (2009), to review and analyse various materials relevant to the adoption of Building Information Modeling (BIM) in building surveying. This method involves systematically reviewing and evaluating both printed and electronic documents, including journal articles, books, industry reports, government regulations, BIM adoption guidelines, and training programs. Document analysis enables the categorization of key themes and identification of trends and gaps, helping to understand the external and internal factors influencing BIM adoption. The process involves three steps: first, skimming through the documents to get an overview; second, reading them carefully to understand the details; and third, analysing the information to find key ideas related to BIM adoption challenges and solutions. Through this structured process, the findings are organized into different themes, helping to answer the research questions, such as what guides BIM adoption and what challenges surveyors face in using BIM. Additionally, document analysis also supports the study by providing background information and strengthening the findings from other research methods. This triangulation ensures a well-rounded understanding of the topic.

IV. RESULTS

Guiding Framework Towards BIM Adoption in Building Surveying Industry

The study employed document analysis by referring to the related documents such as journal articles, books, industry reports, government regulations, BIM adoption guidelines, and training programs. This method helps contextualize and structure the theoretical foundation that underpins this research. By doing so, it provides a broader understanding of the external factors influencing BIM adoption in Malaysia and, next, produce the best strategies for enhancing the adoption of BIM in building surveying services.

These three theories - Technology Acceptance Model (TAM) (Davis, 1989), Collaborative Learning Theory (Vygotsky, 1978), and Knowledge Transfer Theory (Nonaka & Takeuchi, 1995) - are interconnected and will be used to guide the investigation into the barriers and enablers of BIM adoption. TAM will help assess how building surveyors perceive the value and ease of use of BIM, while Collaborative Learning Theory and Knowledge Transfer Theory will guide the exploration of how industry-education collaboration can bridge the knowledge gap. Specifically, collaborative learning highlights the importance of shared learning experiences, while knowledge transfers focuses on the practical exchange of expertise between the industry and educational institutions. The research framework centers on three primary variables: Barriers to Adoption, Educational Support, and Industry Collaboration. These components are essential in understanding the factors influencing BIM adoption among building surveyors in Malaysia.

The Barriers to Adoption variable focusses on challenges such as the high cost of BIM software, a lack of skilled workers, resistance to change, and inadequate infrastructure. Additionally, Educational Support examines the role of education in providing building surveyors with the knowledge and skills necessary for BIM adoption, including curriculum design, hands-on training, and certification programs. Meanwhile, Industry Collaboration addresses the role of partnerships between educational institutions and the industry, emphasizing the need for industry-driven curricula, mentorship, internships, and collaborative research to facilitate BIM adoption. These variables are interconnected, as shown in Figure 1.0, and together they form a comprehensive framework for understanding the factors that influence BIM adoption by building surveyors. By addressing these key components, the study aims to provide insights into how BIM can be effectively integrated into the surveying profession in Malaysia.

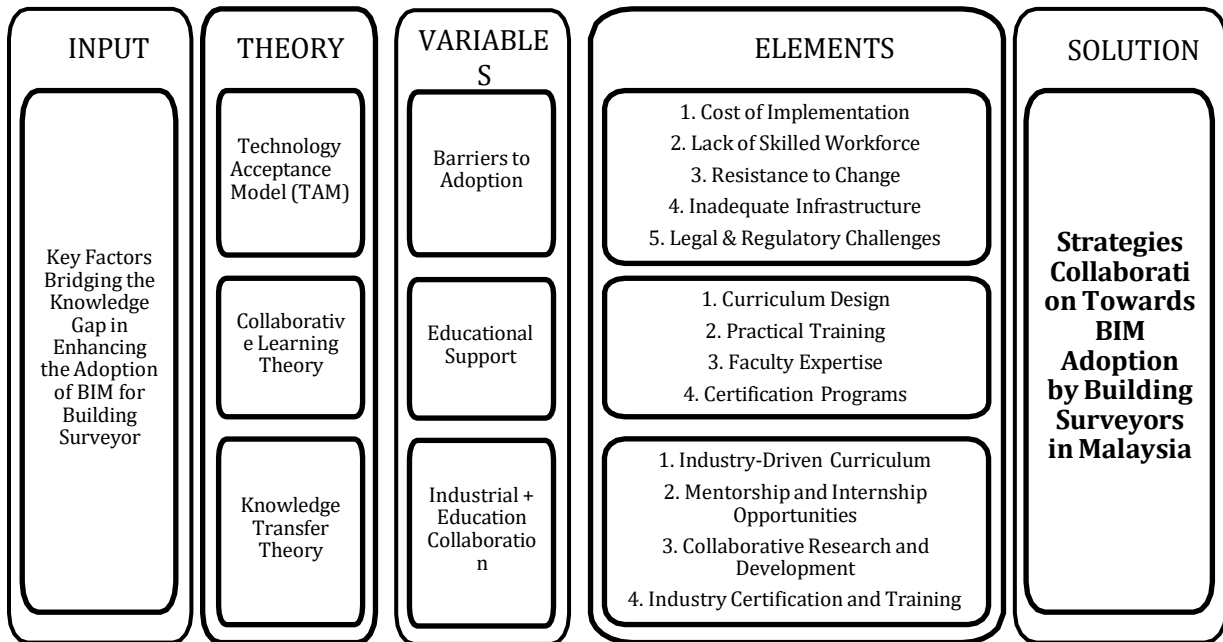


Figure 1.0 Guiding Framework Towards BIM Adoption in Building Surveying Industry

The Key Barriers to BIM Adoption in the Building Surveying Industry

Building Information Modeling (BIM) has the potential to transform the building surveying industry by improving efficiency, accuracy, and collaboration. However, its adoption has been slow due to various challenges faced by professionals and organizations. These barriers range from financial constraints to technical difficulties and resistance to change. Understanding these challenges is essential to developing strategies that can support a smoother transition to BIM integration. The following table presents key barriers to BIM adoption in the building surveying industry, highlighting their impact and relevant sources from recent studies. Each of these barriers contributes significantly to limiting the widespread use of BIM in building surveying. In the following sections, a detailed explanation of each challenge is provided, accompanied by insights from the latest research.

Table 1.0 Findings on Key Barriers to BIM Adoption in Building Surveying Industry

Barrier	Description	Source
High Software Costs	The cost of BIM software and required hardware is a significant obstacle, especially for small and medium enterprises.	Rahim et al. (2019); Sirim (2020)
Lack of Technical Skills	Many building surveyors lack the necessary BIM skills, as BIM training is not widely integrated into academic programs.	Kiviniemi et al. (2017); Chong et al. (2020)
Resistance to Change	Professionals used to traditional methods may be hesitant to adopt new digital processes like BIM.	Sage et al. (2014); Hartmann et al. (2021)
Inadequate Training Programs	Current educational and professional development programs often do not provide sufficient practical BIM experience.	Rahim et al. (2021); Davis et al. (2021)

Compatibility Issues	Difficulties in ensuring that different BIM platforms and tools work together seamlessly across projects and teams.	Chong & Wang (2017); Sirim (2020)
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High Software Costs

The high cost of BIM software and hardware is one of the most significant barriers to its adoption, especially for small and medium-sized enterprises (SMEs). BIM systems require powerful computing infrastructure and expensive software licences, which can strain the budgets of smaller organizations. For these companies, the upfront investment in BIM tools, along with the recurring costs of upgrades and maintenance, is often seen as unaffordable. This financial burden slows down BIM adoption, particularly in developing markets where construction firms operate on tight margins. Studies have consistently highlighted cost as a primary obstacle, noting that government subsidies or incentives may be necessary to mitigate this issue (Rahim et al., 2019; Sirim, 2020).

Lack of Technical Skills

Many building surveyors lack the technical expertise required to effectively use BIM tools, as BIM training is not sufficiently integrated into academic curricula or professional development programs. This knowledge gap leaves surveyors ill-equipped to transition from traditional methods to digital workflows. Educational institutions are often slow to incorporate the latest BIM practices into their programs, and industry professionals may not have access to necessary training once they enter the workforce. Without widespread BIM competency, surveyors struggle to implement the technology in their daily tasks, leading to uneven adoption rates (Kiviniemi et al., 2017; Chong et al., 2020).

Resistance to Change

Cultural resistance to change within the construction industry is another significant barrier to BIM adoption. Many professionals are accustomed to established methods and may be reluctant to transition to digital workflows, which require them to learn new tools and adjust their processes. This reluctance is often rooted in the perception that BIM involves steep learning curves and disruptions to familiar practices. To overcome this challenge, changing organizational culture to embrace digital innovation requires strong leadership and a commitment to continuous improvement, which is often lacking in traditional construction environments (Sage et al., 2014; Hartmann et al., 2021).

Inadequate Training Programs

While some training programs for BIM exist, many are inadequate in providing the practical, hands-on experience needed to master the technology. Educational and professional development initiatives often focus more on theoretical knowledge rather than real-world applications of BIM. Consequently, this leaves graduates and professionals unprepared for the technical challenges they will encounter in the field. Additionally, industry collaboration with academic institutions is often weak, meaning that the training does not reflect current industry demands. To address this gap, more comprehensive and practice-orientated BIM training within both academic and professional settings (Rahim et al., 2021; Davis et al., 2021).

Compatibility Issues

Compatibility, or the ability of different BIM software to work together smoothly, is a technical barrier to adoption. Different projects or firms may use a variety of BIM tools, leading to issues when it comes to sharing files or collaborating across platforms. These software compatibility problems can result in data being lost or duplicated, making teamwork more difficult. Until better standardization is achieved across BIM platforms, the full integration of BIM in the industry will remain a challenge (Chong & Wang, 2017; Sirim, 2020).

V. CONCLUSION

In conclusion, Building Information Modeling (BIM) holds great potential to transform the building surveying industry by improving efficiency, accuracy, and collaboration. However, several key barriers hinder its widespread adoption, including high software costs, lack of technical skills, resistance to change, inadequate training programs and compatibility issues between different BIM platforms. Addressing these challenges requires a combined effort from the construction industry, educational institutions, and policymakers. With the right strategies, such as financial incentives, improved training, and stronger industry collaboration, BIM adoption can be enhanced, leading to more efficient and compliant building surveying practices in Malaysia. This research emphasizes the importance of a multi-faceted approach, involving collaboration between industry and academic institutions to equip surveyors with

the necessary skills and knowledge. Policymakers and industry leaders should also focus on creating financial incentives and improving training programs that reflect the industry's evolving needs. Furthermore, developing standardized protocols for BIM use across platforms could significantly reduce compatibility issues, ensuring smoother integration. Future research could explore deeper collaborations between government, industry and educational institutions to promote BIM, particularly focusing on how emerging technologies can support its integration into building surveying. Ultimately, this work contributes to the ongoing efforts of digital transformation in Malaysia's construction industry, paving the way for more innovative and efficient practices.

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