ADDRESSING THE COMPETENCY OF PRACTITIONERS WITHIN BIM E-SUBMISSION IN MALAYSIAN LOCAL AUTHORITIES

Mohd Fawwaz Najmi Mohd Fuzi[1], Hafez Salleh[2], Loo Siaw Chuing[3]

[1,2,3] Faculty of Built Environment,
UNIVERSITY OF MALAYA

Abstract

This paper delves into the impact of the transition to Building Information Modelling electronic submission (BIM e-Submission) within local authorities (PBT) in Malaysia. The study comprehensively analyzes the essential competencies necessary to implement BIM e-Submission successfully. It emphasizes the potential dire consequences of inadequate skill allocation in Malaysia's BIM e-Submission initiatives, underlining the urgency of addressing this issue. Using a multi-method qualitative approach to gather primary data and thoroughly examine existing literature, the research constructs a robust conceptual framework elucidating the critical competencies required of BIM e-Submission practitioners within the PBT domain. The findings underscore the necessity of developing a BIM e-Submission occupational competency framework as a development strategy to enhance the training and proficiency of BIM e-Submission practitioners. This paper aims to advance understanding of BIM e-Submission in Malaysia, increase stakeholder awareness of relevant roles, responsibilities, and competencies, and promote the advancement of digital construction through optimized utilization of BIM e-Submission practices.

Keywords: Building Information Modelling (BIM), BIM electronic submission, BIM roles and responsibilities, individual BIM competencies

[1] PhD Candidate Email: 17056189@siswa.um.edu.my

INTRODUCTION

Malaysia's new investment in Building Information Modelling Electronic Submission (BIM e-Submission) by introducing the National BIM e-Submission (NBeS) system is a notable example of the country's dedication to the digital transformation of the built environment (Lee & Tan, 2022). A more effective and transparent regulatory environment will be promoted by NBeS, a digital platform for building plan submission and approval, which is positioned to expedite administrative procedures and shorten approval timelines (Ibrahim et al., 2020). However, NBeS practitioners' proficiency determines the system's installation and long-term viability (Zhang & Lim, 2021). The complexity of the system and the increased degree of knowledge it requires mean that defining and standardizing the competencies needed by professionals involved in BIM e-Submission is imperative (Wong & Chong, 2023). Despite the well-established benefits of BIM, integrating it with regulatory electronic submission procedures comes with a unique set of challenges (Patel & Kumar, 2019; Nguyen & Pham, 2022). A particular set of skills is required due to the complexity of BIM software and the unique demands of e-Submission protocols (Omar & Hassan, 2020). It is also necessary for practitioners to study continuously to keep up to date with the newest advancements because technology is a dynamic field (Tan & Lee, 2021). This continuous learning is not just a necessity, but a key to staying relevant and competitive in the industry. It is important from an efficiency standpoint and national economic stance that professionals are adequately prepared to handle the intricacies of NBeS (Ali & Yusof, 2022). This study addresses the competence challenges practitioners encounter in overseeing and guaranteeing the future success of Malaysia's BIM e-Submission. This research intends to pave the road for a more robust and resilient BIM e-Submission occupational competency framework by exploring the present competence landscape in PBT, finding gaps, and suggesting remedies (Zhang & Lim, 2021). It is impossible to overestimate the importance of BIM-skilled practitioners in Malaysian PBT as Malaysia moves closer to being a developed country (Wong et al., 2023). The literature on BIM competencies that has already been written will be examined, the study methodology used will be explained, our findings will be presented, and their implications for the future of BIM e-Submission in Malaysia will be discussed in the following parts.

LITERATURE REVIEW
The Concept of BIM e-Submission

The building industry has significantly transformed with the advent of BIM, which provides a comprehensive digital representation of a facility's functional and physical attributes (Eastman et al., 2011). BIM enhances critical information retrieval, analysis, and storage, thereby improving management (Mustafa et al., 2019). Within this context, the concept of e-Submission has become integral to

the BIM ecosystem (Agus et al., 2019). Fundamentally, e-Submission involves electronically sending specific data files for renewal, update, or approval processes (Suzana et al., 2018). This typically means that industry participants submit digital building or development plans to a regulatory agency, where automatic compliance checks ensure adherence to current standards and regulations (Suzana et al., 2018). The complexity and error-proneness of manual verification underscore the necessity of e-Submission. Manual techniques for ensuring compliance with national codes are cumbersome and susceptible to human error (Suzana et al., 2018).
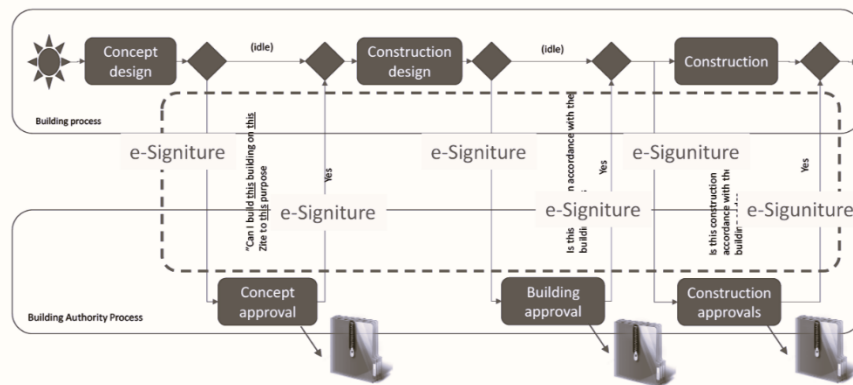
Figure 1: e-Signature and archive in data exchange between the applicant and regulatory body (buildingSMART International, 2020)

According to Lee et al. (2010), automated rule checking allows software to evaluate a design by analyzing object placements, interrelations, and characteristics without altering the architectural design. The digitalization of construction documentation and regulatory processes has progressed significantly with BIM e-Submission, allowing building professionals to submit digital models for assessment and approval rather than traditional paper-based submissions. This study explores the development of BIM e-Submission and its impact on the construction sector, particularly on local governments in Malaysia. Researchers have investigated BIM technology's potential to streamline regulatory procedures (Azhar, 2011), acknowledging that BIM e-Submission can enhance code compliance, reduce errors, and accelerate approval processes (Succar, 2009). BIM e-Submission involves creating a digital building model with detailed design data for regulatory approval, utilizing automated code checking (ACC) to ensure compliance (Ding et al., 2016).

Case studies have demonstrated that BIM e-Submission shortens approval times and enhances regulatory compliance (Cheng & Lu, 2015), improving accuracy and administrative efficiency while fostering a transparent regulatory environment. The future of construction lies in integrating BIM with e-Submission systems, such as Singapore's CORENET, South Korea's KBIM, and the United Kingdom's D-COM Network (Brito et al., 2022). Singapore, in particular, mandates BIM e-Submission for projects larger than 5000 m², setting a model for other countries (Suzana et al., 2018; Khemlani, 2005; BCA, 2011). Despite its advantages, BIM e-Submission faces challenges, including resistance to change, lack of BIM model uniformity, and substantial technology and training investments (Kassem et al., 2015). In Malaysia, these challenges are exacerbated by regional law variations and differing local government BIM development levels (Mohd et al., 2018). Successful implementation in Malaysian PBT requires technological investments and a focus on practitioner competency development (CIDB, 2022).

NBeS: The First BIM e-Submission in Malaysia
Malaysia launched its NBeS project in 2017 as part of the Construction Industry Transformation Program (CITP) 2016-2020, spearheaded by the Construction Industry Development Board (CIDB) Malaysia, to augment the efficiency of the construction sector through the automation and digitization of the Building Plan submission procedure. NBeS, different from the current One Stop Centre (OSC) 3.0 Plus Online System, is an innovative endeavour as the first-in-the-world Auto Checker system (CIDB, 2023). Building plans are intended to be reviewed and approved by the PBT using this approach. NBeS uses 3D BIM models instead of the conventional approach, which uses 2D drawing plans for the Uniform Building By-Law (UBBL) compliance evaluation and other associated procedures.
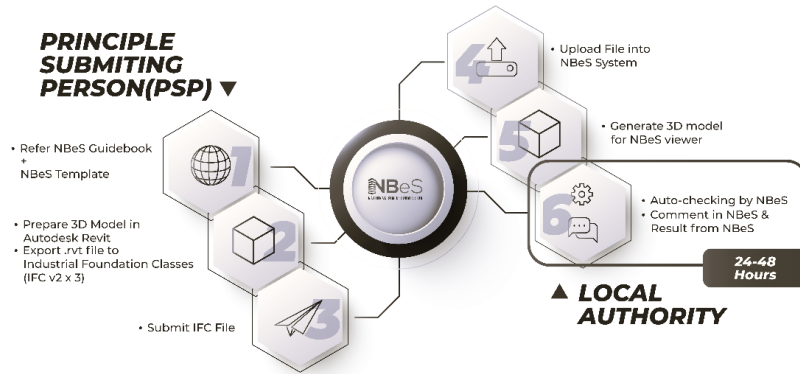
Figure 2: NBeS Process Flow (CIDB, 2023)

In January 2017, CIDB E-Construct Services Sdn. Bhd. (CIDBEC) produced the NBeS prototype, ushering in a new era for building plan submissions (CIDB, 2022). The term "PBT" refers to government bodies that are generally led by civil servants holding the titles of President (*Yang Di-Pertua*) for municipalities and rural districts and Mayor (Datuk Bandar) for cities, with a few exceptions known as "special and modified local authorities." In 2019, five PBT – Putrajaya Corporation (PPj), Petaling Jaya City Council (MBPJ), Kangar Municipal Council (MPK), Historic Melaka City Council (MBMB), and Kuching North City Hall (DBKU) – implemented pilot projects to assess the system's usefulness.
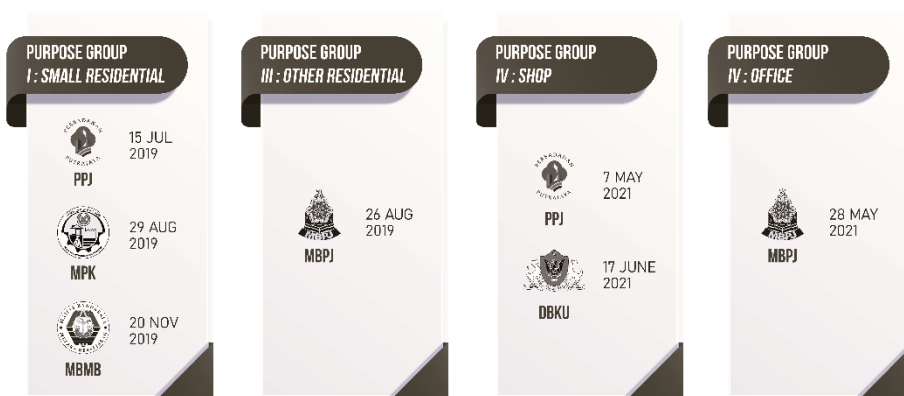

Figure 3: NBeS Pilot Project (CIDB, 2022)

Based on the NBeS Report by CIDB (2022), many of these authorities' feedback was optimistic and positive. However, they also understand that a defined structure is necessary to direct its implementation (Ahmad & Rahman, 2021). Their assessment score of 92% showed a high degree of accomplishment. Additionally, simulations showed that NBeS integration with the OSC 3.0 Plus Online system might yield a 70% improvement in the building plan approval procedure. The accomplishment of this project demonstrates how crucial it is to align BIM technology with legal procedures. This involves specifying the skills professionals need to utilize BIM e-Submission systems efficiently (Zhang & Lim, 2021). With the launch of the NBeS initiative, Malaysia has established a leading position as nations worldwide recognize the many benefits of BIM (Ahmad & Rahman, 2021).

COMPETENCY ISSUES IN MALAYSIA'S BIM E-SUBMISSION

Despite the strong demand for expertise in this area, Ahmad and Rahman (2021) highlight a significant gap in local government units' understanding of roles, duties, and competencies associated with BIM e-Submission. CIDB (2022) underscores that a significant obstacle to the successful implementation of NBeS is the competency required for processing building plan approvals. This is particularly critical given the importance of PBT officers' roles and responsibilities in Malaysia's initial BIM e-Submission project. The absence of a structured competency framework has hindered the consistent quantification of BIM adoption successes or failures from a capability-building perspective. The lack of comprehensive BIM e-Submission competence units may impact the recognition of internal BIM talent among PBT technical personnel in future formal skills certification programs. This raises concerns about the capability and training required for the Principal Submitting Person (PSP), internal technical agencies (ATD) officers, and external technical agencies (ATL) officers for future NBeS implementation.

Addressing this research gap necessitates thorough studies exploring the capabilities needed for BIM e-Submission in the Malaysian context. This includes defining the duties and responsibilities of PBT officers, the skills required of PSP, and the training and development requirements for ATD and ATL officers. Methodical research and training initiatives are crucial for closing the capability gap and ensuring the successful deployment and sustainability of NBeS (CIDB, 2022). Future research should incorporate recent findings (2018–2023) and relevant case studies to elucidate the specific abilities required to navigate NBeS complexities. It should also consider the evolving BIM technology and its incorporation into regulatory processes.

Resolving competence issues becomes paramount as Malaysia advances programs like NBeS to develop its construction industry. Skill gaps affect the building sector and the country's economic development and

international competitiveness. Addressing this capability gap is essential for the efficacy and efficiency of NBeS and the overall growth of Malaysia's construction sector in the digital age. The OSC 3.0 Plus Manual (KPKT, 2019) emphasizes the shift towards digital submission management, requiring all documents to be digitally created and reviewed by qualified individuals in Malaysian PBT. While this transition is positive, it exposes the unconscious shortcomings of the involved parties. The NBeS Guidebook for PSP (CIDB, 2021) defines the roles and responsibilities of PSP but omits those of PBT officers, underscoring the need for a comprehensive understanding and adherence to rules. The PSP's responsibilities include setting up the NBeS submission account, approving BIM e-Submission documents, and ensuring correct BIM model implementation. This highlights the critical need for PSP competence in the BIM e-Submission environment. However, the roles, responsibilities, and individual competencies necessary for PBT officers to ensure BIM e-Submission success remain undefined. Integrating these standards and objectives into the Malaysia Smart City Framework adds complexity, especially given the lack of competency studies among PBT officers to improve efficiency. Consequently, while integrating NBeS into the OSC 3.0 Plus Online system is a positive step, it unintentionally highlights the lack of awareness regarding competency in managing BIM e-Submissions.

Incompetency of PSP, ATD, and ATL Officers in Executing New 3-D System
CIDB (2022) highlights a range of incompetency among the PSP who come from the private consultation firms, and ATD and ATL officers who mainly come from PBT and other public agencies, which have been brought to light by the introduction of BIM e-Submission in Malaysia. Shahruddin et al. (2020) emphasized that being competent in a BIM setting involves more than being technologically savvy; it also involves having abilities in project execution, change management, and strategic planning. Nevertheless, there is a noticeable disparity in these competencies across PSP, ATD, and ATL officers in the Malaysian context. This disparity stems from a lack of technology savvy and knowledge of the larger BIM ecosystem and how it affects workflow. All papers must be created in digital format by a competent PSP and checked by competent ATD and ATL officers, as mandated in the OSC 3.0 Plus Manual (KPKT, 2019) and NBeS Guidebook for PSP (CIDB, 2021). Therefore, to overcome these inadequacies, a concentrated effort must be made to create training programs tailored explicitly to practitioners' needs, specifically among PBT officers, before Malaysia can fully use its BIM e-Submission.

Unclear Baseline to Define Roles, Responsibilities, and Competencies in the Malaysian BIM e-Submission

The implementation of BIM e-Submission in Malaysia is hindered by the absence of a common baseline for defining roles, duties, and capabilities. The NBeS Guidebook for PSP (CIDB, 2021) outlines an Autodesk Revit process, emphasizing the need for organized digital BIM models to meet technical and local ordinance specifications. However, it fails to establish a uniform capability standard among practitioners, particularly in PBT. While aiming to expedite urban management and development procedures, the guidebook does not address the specific operational requirements of local authorities for BIM e-Submission, focusing instead on procedural frameworks for building plan approval and development control. This oversight highlights the need for a defined baseline to manage and succeed with BIM e-Submission programs (Al-Ashmori et al., 2020).

Despite the recognized advantages of BIM, its implementation in Malaysia is impeded by building professionals' lack of understanding and incomplete comprehension of the technology (Othman et al., 2020). This is exacerbated by the absence of a structured framework delineating the specific responsibilities and skill sets required for efficient BIM implementation (Shahruddin et al., 2020). Consequently, there is a fragmented approach to BIM adoption, with varying interpretations of roles during the e-Submission process.

Future studies should explore the dynamics of collaboration within and across enterprises for BIM adoption to establish a clear baseline for roles and responsibilities (Sinoh et al., 2020). Ibrahim et al. (2018) emphasize the importance of organizational behaviour, particularly communication and responsibility, for practical BIM projects. Empirical research is crucial in defining a precise set of duties and skills specific to the Malaysian BIM e-Submission environment (Uhm et al., 2017). Addressing this gap will create a standardized and effective BIM e-Submission system in Malaysia, fostering its advancement within local authorities. A coherent and focused research approach is essential for defining BIM e-Submission duties and ensuring a viable, standardized infrastructure.

The Unsuitability of Global Documents Towards Malaysia's BIM e-Submission

One major obstacle to the successful deployment of BIM e-Submission in Malaysia is that any global documents and scholarly papers are unsuitable for defining BIM roles, responsibilities, and competencies in the unique operational environment of Malaysian PBT. They frequently overlook Malaysia's BIM e-Submission requirements, resulting in discrepancies between global norms and regional customs, although worldwide standards provide a starting point (Al-Ashmori et al., 2020). Che Ibrahim et al. (2018) emphasize the need for localized research because much of the existing literature represents a small group of BIM

practitioners' views, which may not entirely reflect the more significant Malaysian sector. This emphasizes the necessity of a BIM competency development strategy that is inclusive and customized for the Malaysian context. Sinoh et al. (2020) call for a study that explores the coordination dynamics inside enterprises to provide a clear baseline for BIM e-Submission roles and duties in Malaysia. Furthermore, Jang and Collinge (2020) point out systemic industrial traits that result in ongoing issues with BIM asset management, implying that international norms might not readily apply to Malaysian contexts. This highlights even more how important it is to create rules considering Malaysia's unique BIM e-Submission processes. According to Othman et al. (2020), Malaysia is still in the early phases of BIM adoption, with a significant disparity between potential and actual utilization. The dependence on international studies that do not address the unique characteristics of the BIM environment in Malaysia exacerbates this disparity.

Difference in Jurisdictions between Public Agencies & PBT
The Local Government Act 1971 of Malaysia defines local government in Malaysia as city councils, municipal councils, and district councils. Several jurisdictional issues are involved in integrating BIM into the building approval system executed by the Malaysian PBT, notably the Sabah Local Government Ordinance 1961 and the Sarawak Local Authority Ordinance. Different legal and procedural frameworks govern how public organizations and local authorities' function, making adopting and using BIM technology consistently more challenging (Wong & Gray, 2019). The variation in jurisdictions is a noteworthy obstacle to the standardization of BIM e-Submission procedures, resulting in inefficiencies and irregularities that may hinder the completion of projects. The many operating settings of local authorities, each with its own set of regulations and procedures for building project permits, exacerbate the absence of a cohesive strategy. This scenario differs from the story of global BIM adoption, where uniform principles frequently fail to consider local variations and governance systems (Al-Ashmori et al., 2020). The Malaysian BIM e-Submission system needs a customized strategy that conforms to its local government bodies' unique legislative and regulatory framework. There is limited research on how these jurisdictional disparities affect the effectiveness of BIM e-Submissions in Malaysia. Research on the relationship between technology, competency, and governance is desperately needed to create a framework that considers the particulars of Malaysia (Latiffi et al., 2015). In addition to closing the present competency gap, this study would speed up the development of a reliable, efficient, and contextually appropriate BIM e-Submission system. The differences in jurisdiction between local authorities and public bodies in Malaysia highlight the need for locally specific, research-based rules for BIM e-Submission. It is imperative to address this issue to ensure that BIM e-

Submission's full potential is utilized to expedite the building approval process and improve the competencies needed to manage and thrive in Malaysia's BIM e-Submission projects.

The Absence of BIM e-Submission Occupational Competency Document in Malaysia

This paper recognizes that the absence of an occupational competency document significantly hinders the adoption of BIM e-submission in Malaysia because it is essential to equipping local authorities with the information required for the training process (CIDB, 2022). Al-Ashmori et al. (2020) highlight the benefits of BIM deployment and emphasize that one huge challenge is the lack of knowledge and comprehension of BIM technology among construction experts. This competency gap affects more than just technology; it also affects abilities related to project delivery, change management, and strategic planning (Shahruddin et al., 2020). Malaysia's BIM e-Submission system is now in its infancy and it is clear that there is a dearth of industry experience and training options (Eadie et al., 2013). Ibrahim et al. (2018) also point out that the perspectives expressed in previous studies are frequently restricted to small-scale BIM practitioners, indicating a more extensive knowledge and research vacuum throughout the sector. There is a significant gap between promise and practice as seen by the limited use of BIM in both the public and private sectors (Othman et al., 2020). According to Kong et al. (2020), there is potential for BIM deployment to be effective; nevertheless, it is crucial to solve the primary competence challenges. The building sector and academic institutions must work together to develop strategies for developing BIM-skilled individuals through relevant instruction and training (Ibrahim et al., 2020). Additionally, knowing the standards for evaluating an organization's BIM capabilities may help develop industry-specific tools, which might then influence the formulation of policies for hiring and educating BIM specialists (Rajabi et al., 2022). One of the significant challenges to Malaysian local authorities building a robust BIM e-Submission framework is a lack of vocational expertise in BIM e-Submission. There is an immediate need for focused research and teaching programs to develop a distinct set of skills and duties appropriate for the Malaysian BIM e-Submission environment (Uhm et al., 2017). It is still challenging to manage and be successful in Malaysia's BIM e-Submission without this fundamental ability.

RESEARCH METHODOLOGY

This paper forms a crucial part of ongoing research and employs a comprehensive literature review methodology to investigate the competencies of BIM e-Submission practitioners within Malaysian PBT. The review encompasses articles published between 2012 and 2022, focusing on BIM, BIM e-Submission, and individual BIM competencies. Keywords such as "BIM e-Submission,"

"Individual BIM Competencies," "BIM Adoption in Malaysia," and "Smart City in Malaysia" ensured the retrieval of relevant articles. Only articles discussing BIM within the construction industry context, particularly electronic submission processes, roles, responsibilities, and individual competencies, were included. The review was confined to documents written in English and Malay and published in peer-reviewed journals, ensuring high-quality and reliable sources. Articles that did not directly address the BIM e-Submission process or the Malaysian context were excluded. Document analysis was conducted on guidelines and standards defining the BIM body of knowledge concerning roles, responsibilities, occupations, and competencies in Malaysia, as detailed in Table 1.

Table 1: Selected BIM Guidelines for Document Analysis

Author	Guideline
AEC (UK) BIM (2012)	AEC (UK) BIM Protocol Implementing UK BIM Standards for the AEC industry 2.0
myBIM Centre (2016)	BIM Guide 2016: Adoption
myBIM Centre (2017)	BIM Guide 2017: BIM Execution Plan
DSD (2020)	Occupational Framework MSIC 2008 F43 – Specialized Construction Activities.
	Garis Panduan Program Persijilan BIM Jabatan Kerja Raya – BIM Modeller
JKR (2020)	Garis Panduan Program Persijilan BIM Jabatan Kerja Raya – BIM Coordinator
	Garis Panduan Program Persijilan BIM Jabatan Kerja Raya – BIM Manager

The literature synthesis employed thematic analysis to identify, analyze, and report patterns within the data. This method facilitated the identification of core competencies required by BIM e-Submission practitioners in Malaysian local authorities. Databases such as Scopus, Web of Science, Emerald, and Science Direct were searched due to their extensive coverage of peer-reviewed articles in the built environment field. A multi-method qualitative research approach was adopted, recognizing the complex reality behind the current building plan approval process in PBT implementing BIM e-Submission (Saunders et al., 2009). The primary objective was to gather comprehensive views from NBeS pioneer participants and interpret these insights to improve the current situation (Creswell & Creswell, 2018).

The research design leverages the Design and Development Research (DDR) Approach – Model Research (Type 2) as described by Richey and Klein (2007), integrating the Developing Standard and Curriculum (DESCUM) method by DSD (2020). This design is well-suited for developing practical solutions to complex issues encountered in BIM e-Submission processes. Data collection involved face-to-face interviews and focus group discussions (FGDs) with BIM e-Submission practitioners from various relevant agencies, selected based on their involvement in the first Malaysian BIM e-Submission pioneer project (2017-2020).

The purposive sampling technique was employed to identify informants based on specific criteria outlined in DESCUM (DSD, 2020), such as years of experience with BIM-based projects and knowledge of BIM e-Submission in PBT. Feedback from NBeS practitioners was collected through face-to-face interviews to uncover challenges faced in managing BIM-based construction projects. The inspection of BIM document reviews assessed compliance with BIM e-Submission standards. The study unit comprises technical officers operating NBeS from 2017-2022, with sub-units including BIM e-Submission in the building drawing approval process, competency issues, and solutions. The overall research design is illustrated in Figure 4.
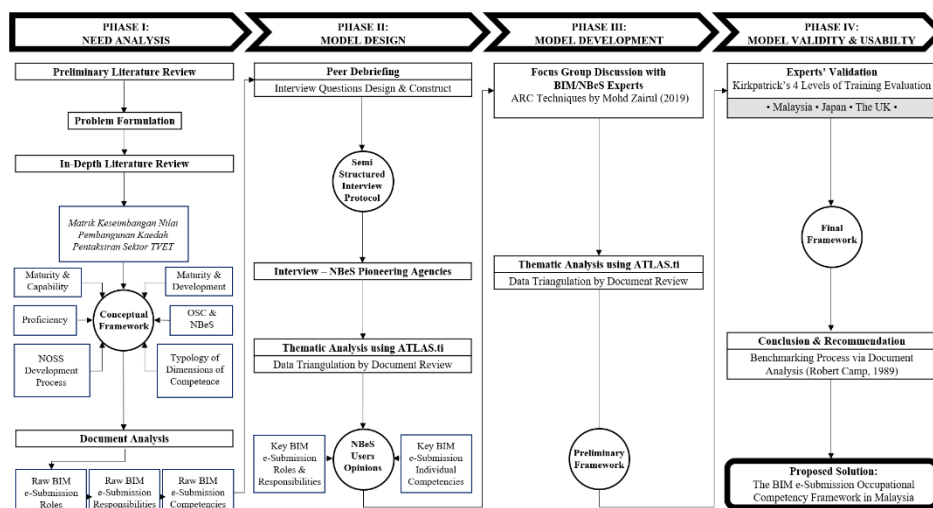

Figure 4: The research design for the proposed study

The constructs focused on BIM e-Submission roles and responsibilities, individual BIM e-Submission competency, and the preliminary BIM e-Submission occupational framework, which will be evaluated by local and international experts in the final phase to determine validity and suitability for future operations within Malaysian PBT jurisdictions. Participants were informed about the study's purpose, consent was obtained before interviews and FGDs, and confidentiality and anonymity were maintained. Malaysia, Japan and the UK experts will validate the preliminary framework in *Phase IV: Model Validity & Usability*.

FINDINGS

The research requires further investigation concerning the right individual BIM e-Submission competencies that PBT officers should master in executing it. As highlighted above, many missing parts must be improvised to solve the ambiguities and inadequacy issues. The full potential of BIM e-Submission in Malaysia demands a high level of collaboration that can integrate the client, PSP, PBT, and other relevant agencies differently from the non-BIM e-Submission environments they used to work in. It can also add more value to the BIM supply chain by showing the interrelationships among stakeholders throughout the building life cycle. The findings disclosed that the integration of individual competency among PBT officers with the context of BIM e-Submission in Malaysia remained unknown. Hence, this study could lead to a reasonable prospect of overcoming the inadequacy of the roles, responsibilities, and competencies of BIM e-Submission within the various phases of the building plan approval process. The study's findings reveal a competency gap that spans several dimensions, including technological proficiency, strategic planning, and interdisciplinary collaboration. An inspection of BIM documents was also conducted to assess compliance with NBeS and OSC 3.0 Plus Online system requirements. Modifications to the proposed BIM e-Submission process were explored during primary data collection. Theoretical frameworks were selected from preliminary reviews (Table 2), and a conceptual framework for this research was proposed (Figure 5).

Table 2: Selected Theoretical Frameworks Used for the Conceptual Framework Development

Author	Guideline
Bew & Richard (2008)	BIM Maturity Level
Succar (2009)	BIM Capability Stages
Barison & Santos (2012)	Level of BIM Proficiency
BuildingSMART International (2020)	BIM e-Submission Maturity Level
BuildingSMART International (2020)	BIM e-Submission Development Level
KPKT (2019)	OSC3.0 Plus Online Process
CIDB (2021)	National BIM e-Submission (NBeS) Process
Le Deist & Winterton (2005)	Typology of Dimensions of Competence
Zulkifli M. S. (2018)	*Matrik Keseimbangan Nilai Pembangunan Kaedah Pentaksiran Sektor TVET*
DSD, 2020	NOSS Development Process

The conceptual framework proposed in this research (refer to Figure 5) is a testament to the need for a strategic process protocol framework to navigate the complexities of BIM e-Submission. This conceptual framework is predicated on the principles of process protocol, adapted to the unique requirements of BIM e-Submission. It envisages a phased approach to BIM e-Submission, delineating the PBT officers' roles, responsibilities, and individual competencies within each

phase and subphase of the building plan approval process. Integrating NBeS process principles within Malaysia's OSC 3.0 Plus Online system context is a novel exploration. It can also address identified competency gaps, facilitating a more seamless and effective BIM e-Submission process within Malaysian local authorities. The findings of this study underscore the imperative to address the competency gaps in BIM e-Submission. They advocate for a strategic occupational competency framework attuned to the nuances of BIM e-Submission work processes and the evolving competencies of PBT officers. As Malaysia strides towards a future where BIM is an integral part of the construction industry, developing and applying such a framework will be pivotal in realizing the transformative potential of BIM e-Submission.
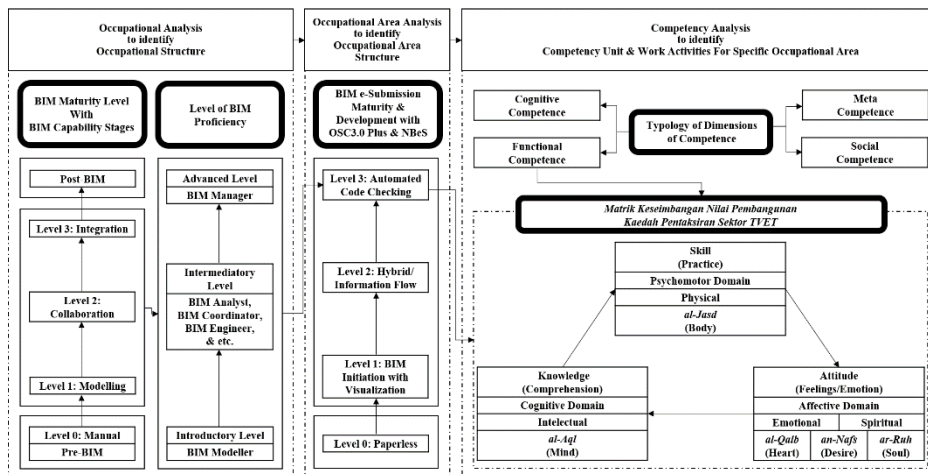

Figure 5. Conceptual framework of the proposed study

CONCLUSION

To fully harness Building Information Modelling (BIM) in Malaysia's construction industry, examining the competencies of BIM e-Submission practitioners is essential. The study, "*Addressing Competency of BIM e-Submission Practitioners within Malaysian Local Authorities*," examines into the underexplored domain of BIM e-Submission, where competencies remain inadequately defined. Utilizing findings from the literature review, a conceptual framework for the BIM e-Submission Occupational Competency Framework was developed. This framework integrates identified competencies into a structured model to assess and enhance BIM practitioners' capabilities within Malaysian local authorities. Concerns about BIM's legal and contractual issues stem from its complexity during implementation. The NBeS implementation has highlighted significant competency issues. Transitioning to BIM e-Submission requires a thorough understanding of BIM processes and tools. However, a gap in defining

roles and responsibilities for practitioners within local authorities persists (Shahruddin et al., 2020). This gap impedes effective BIM adoption and its potential benefits to Malaysia's construction industry.

The limited efforts to delineate roles and responsibilities in BIM e-Submission among Malaysian local authorities have resulted in a lack of standardized practices, leading to inefficiencies and potential quality declines (Jacobsson & Merschbrock, 2018). The absence of a unified BIM competency framework exacerbates this situation, leaving practitioners without clear paths to acquire the necessary skills. This paper proposes developing Malaysia's *BIM e-Submission Occupational Competency Framework* to address these challenges. The framework aims to empower PBTs by providing structured information to aid training and delineating necessary competencies and responsibilities at various expertise levels (Dakhil et al., 2019). This framework is a transformative tool designed to standardize BIM practices across local authorities, facilitating seamless BIM integration into local governance and enhancing e-Submission efficiency, accuracy, and quality (Eadie et al., 2013). Furthermore, it will provide a benchmark for educational institutions to align curricula with industry needs, ensuring graduates are equipped with relevant BIM competencies (Russell et al., 2014). In conclusion, addressing current competency issues is crucial for implementing and managing BIM e-Submission in Malaysia. The proposed BIM e-Submission Occupational Competency Framework offers a pivotal solution, calling on Malaysian local authorities to enhance BIM competencies proactively, ensuring BIM e-Submission's future success.

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