Cawangan Perak

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WELCOME SPEECH FROM THE CHAIRMAN

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

بسم الله الرحمن الرحيم السلام

عليكم ورحمة الله وبركاته

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

A CONCEPTUAL FRAMEWORK: IDENTIFYING THE FACTORS INFLUENCING SATISFACTION OF POST-OCCUPANCY IN CCC-APPROVED HOUSING DEVELOPMENT

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ABSTRACT

Post-occupancy satisfaction is a critical indicator of residential quality, especially in housing developments certified under Malaysia's Certificate of Completion and Compliance (CCC). Although CCC certification verifies technical and regulatory compliance at the point of handover, numerous housing developments exhibit post-occupancy issues such as structural defects, poor indoor environmental quality, and inefficient maintenance. This conceptual paper aims to identify the key factors influencing post-occupancy satisfaction in CCC-certified housing developments. A qualitative approach was adopted, with the analysis grounded solely in secondary data from academic journal articles. The findings point to three significant factors affecting residents' satisfaction: structural integrity and building safety, indoor environmental quality (IEQ), and housing design and layout. This paper highlights the gap between formal certification and the actual residential experience. It offers valuable insights for developers, policymakers, and regulatory bodies to reconsider how they integrate post-occupancy factors into housing policies and design practices. However, it also underscores the need for further research to explore regulatory enhancements that bridge the gap between CCC compliance and actual residential quality, ensuring housing developments not only meet compliance standards but also fulfil the needs of their residents.

Keywords: Post-Occupancy Satisfaction, Housing development, Certification of Completion and Compliance (CCC)

I. INTRODUCTION

Residential satisfaction is a crucial measure of the success and quality of housing developments, particularly those certified under Malaysia's Certificate of Completion and Compliance (CCC). The CCC is a regulatory requirement confirming that a building meets all necessary safety and technical standards before occupancy (IPM, 2024). However, post-occupancy evaluations often highlight recurring issues that the certification process does not fully address, such as structural defects, inadequate maintenance, and poor indoor environmental quality. These challenges demonstrate the need to look beyond initial compliance and focus on long-term residential satisfaction.

Post-occupancy evaluation (POE) offers a practical framework to bridge this gap. By systematically assessing housing quality and residents' satisfaction, POE helps identify overlooked issues and provides actionable insights for future housing developments (Jiwane, 2021). This conceptual paper aims to explore the critical factors that influence post-occupancy satisfaction in CCC-certified housing, providing valuable guidance for policymakers, developers, and regulatory bodies to ensure sustainable and liveable residential spaces.

II. LITERATURE REVIEW

Post-occupancy satisfaction is essential in evaluating housing quality, particularly in CCC-certified developments. This literature review examines four key areas that influence residential satisfaction which are, Certification of Completion and Compliance (CCC), Post-Occupancy Evaluation (POE), housing satisfaction, and post-occupancy housing challenges. These interconnected concepts provide a theoretical foundation for assessing the effectiveness of CCC-certified housing.

A. Certification of Completion and Compliance (CCC)

The Certification of Completion and Compliance (CCC) is a mandatory approval under Malaysia's housing regulations. It ensures that a building is safe, complete and ready for occupation. Established in 2007 to replace the Certificate of Fitness for Occupation (CFO), CCC transfers compliance responsibility to Principal Submitting Persons (PSP), such as architects and engineers (Mirza, 2021). The process involves 21 inspection stages, including electrical systems, fire safety, and drainage checks, ensuring technical standards are met before occupation (Thaqif, 2021).

However, CCC certification does not always guarantee housing quality. Studies indicate that delays in CCC approvals are often caused by incomplete documentation, developer non-compliance, and miscoordination among regulatory bodies (Mohammad et al., 2023). More critically, CCC focuses on initial compliance rather than long-term residential satisfaction, highlighting the need for Post-Occupancy Evaluation (POE) to address quality deficiencies beyond certification.

B. Post-Occupancy Evaluation (POE)

Post-Occupancy evaluation (POE) is a structured assessment process that examines the performance of buildings after the residents have moved in. It evaluates dimensions such as structural integrity, environmental comfort, and residents' satisfaction (Elsayed et al., 2023). The primary purpose of POE is to identify potential defects and issues that may arise post-occupancy, allowing for improvements in future housing developments.

In housing schemes, POE provides valuable feedback on ventilation, lighting quality, and maintenance efficiency (Norazman et al., 2023). Issues such as poor ventilation, lighting deficiencies, and structural flaws often surface after residents have moved in, emphasizing the need for ongoing assessments beyond the certification stage (Norazman et al., 2023). Moreover, POE is crucial in integrating socio-cultural factors into housing design by considering community relations, spatial arrangement, and lifestyle compatibility (Aliyu et al., 2016).

The POE process typically involves a combination of surveys, interviews, and on-site inspections, capturing objective measurements (e.g., air quality, energy efficiency) and subjective user experiences. Findings from POE studies can significantly influence policy decisions, guiding developers and regulators in enhancing housing quality and ensuring that residents' needs are adequately met (Norazman et al., 2023).

C. Housing Satisfaction

Housing satisfaction reflects how well a home meets residents' comfort, safety, and functionality expectations. Physical attributes and socio-environmental factors, such as neighbourhood conditions and maintenance services, shape this satisfaction (Mohit & Raja, 2014). Studies have shown that common determinants of housing satisfaction include structural quality, maintenance, space utilization, and indoor environmental factors (Hoo et al., 2021).

Housing satisfaction is commonly measured using Likert-scale surveys, quantifying residents' experiences and perceptions. Researchers employ statistical tools, such as SPSS, to analyse satisfaction patterns and identify key areas for improvement (Kamaruzzaman et al., 2018; Mohit & Raja, 2014). Common grievances include factors related to indoor environmental quality (IEQ), like air quality, noise levels, and temperature control, all contributing to reduced satisfaction levels (Hoo et al., 2021). Addressing these concerns through improved building design and proactive maintenance strategies is essential for achieving long-term resident satisfaction.

D. Issues Arise in Post-Occupancy Housing Development

Despite CCC certification, many housing developments experience post-occupancy issues that negatively impact residents' satisfaction. Structural defects, such as wall cracks, unstable foundations, and construction material failures, pose safety risks and contribute to long-term dissatisfaction (Hasrul, 2015). While CCC ensures that buildings meet initial compliance standards, it does not guarantee long-term durability. Studies indicate that architectural defects account for a significant percentage of complaints in Malaysian residential projects, mainly due to poor workmanship, non-compliance with specifications, and insufficient supervision (Rahimin et al., 2024).

Advancements in construction assessment, such as non-destructive testing (NDT) methods, have improved the accuracy of identifying structural weaknesses. Techniques like ultrasonic testing and ground-penetrating radar enable early detection of defects, minimizing risks associated with poor construction quality (Gupta, 2024). These technologies provide an opportunity for more reliable housing assessments, reinforcing the role of POE in identifying and addressing post-occupancy defects (Mastor & Ibrahim, 2010).

Indoor Environmental Quality (IEQ) is another primary concern in post-occupancy evaluations, as it directly affects residents' health, well-being, and satisfaction. Poor ventilation, thermal discomfort, and inadequate lighting contribute to dissatisfaction and may lead to respiratory problems, fatigue, and reduced productivity (Kamaruzzaman et al., 2018). Green building standards, such as the Green Building Index (GBI) and GreenRE,

emphasise the importance of indoor air quality, daylighting, and pollutant control to ensure a healthy residential environment (Che Aziz & Hamid, 2015). Moreover, Tharim, Samad, and Ismail (2017) found that thermal comfort, visual comfort, and indoor air quality are key contributors to occupant satisfaction in GBI-rated office buildings, while acoustic comfort showed no significant impact.

Finally, housing units' design and spatial arrangement are crucial in shaping residents' daily experiences. Poorly planned layouts, lack of storage space, and inefficient circulation areas often lead to dissatisfaction, as they impact the functionality and comfort of living spaces (Woon et al., 2015). Studies suggest that flexible housing layouts, green space integration, and community-friendly features enhance post-occupancy satisfaction by catering to evolving lifestyle needs (Asojo et al., 2021; Othman & Samsudin, 2021). By incorporating POE findings into design improvements, housing developers can create environments that align with residents' expectations while meeting compliance standards.

III. METHODOLOGY

This study utilises a qualitative research design and presents a conceptual paper based on secondary data. The research aims to identify key factors influencing post-occupancy satisfaction in CCC-certified housing developments across Malaysia. Given its conceptual nature, this study does not involve primary data collection but instead relies on credible academic sources.

To ensure robust and reliable findings, relevant literature was carefully selected based on its academic rigour, relevance, and contribution to housing research. Peer-reviewed journal articles discussing post-occupancy satisfaction, Certification of Completion and Compliance (CCC), and Post-Occupancy Evaluation (POE) were reviewed. These sources were retrieved from academic databases, ensuring high-quality references.

The analysis was conducted through thematic content analysis, enabling the detection of recurring patterns and trends across multiple studies. A manual coding process was used to categorise findings into core themes, including structural integrity and building safety, indoor environmental quality (IEQ), and housing design and layout. These themes consistently appeared across multiple sources, reinforcing their importance in shaping post-occupancy satisfaction.

This methodology synthesises findings from various studies, establishing a robust theoretical foundation for understanding post-occupancy satisfaction in CCC-certified housing. It provides critical insights that can guide policymakers, developers, and regulatory bodies in refining housing standards and assessment methodologies, ensuring better residential outcomes.

IV. FINDINGS

The review of existing literature has identified several recurring themes as key contributors to post-occupancy satisfaction in CCC-certified housing developments across Malaysia. These themes provide valuable insights into residents' experiences after moving into their homes, highlighting critical factors that shape their overall satisfaction. Hence, these findings form the basis of the conceptual framework, which systematically analyzes the factors influencing post-occupancy satisfaction in CCC-certified housing developments

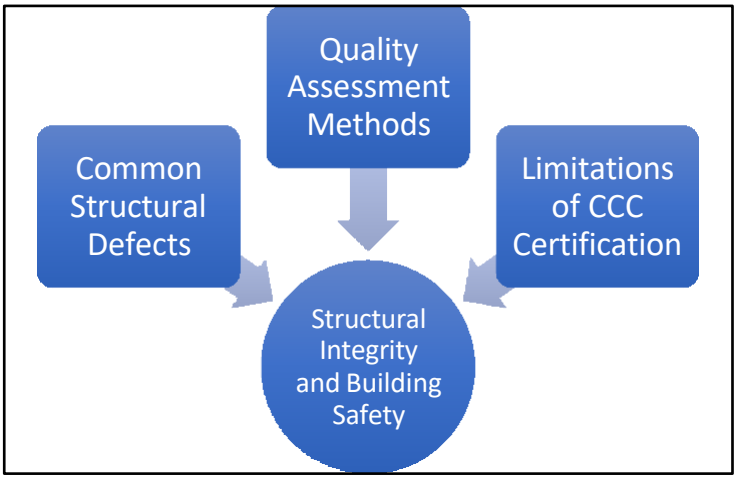

Figure 1.0. Conceptual Framework for Evaluating Structural Integrity and Building Safety in Post-Occupancy Housing
Source: Zaini & Anuar (2025)

G. Structural Integrity and Building Safety

As illustrated in figure above, the conceptual framework visually represents for structural integrity and building safety. Based on findings from journal review, this framework highlights key elements such as common structural defects, quality assessment methods, and limitations of CCC certification that are essential to post-occupancy satisfaction. Findings indicate that despite CCC certification, post-occupancy defects such as wall cracks, water leakage, and uneven flooring are frequently reported, raising concerns about long-term construction quality. These issues often stem from inconsistent workmanship and supervision, demonstrating that compliance at completion does not necessarily equate to lasting durability (Rahimin et al., 2024).

Non-destructive testing (NDT) methods, including ultrasonic testing and ground-penetrating radar, have been introduced as proactive assessment tools to enhance housing resilience (Gupta, 2024). These technologies enable early detection of hidden defects, reinforcing the need for Post-Occupancy Evaluation (POE) as an ongoing monitoring process. By integrating POE-driven policies, housing regulators can bridge the gap between initial certification and actual residential satisfaction, ensuring that structural performance aligns with residents' expectations.

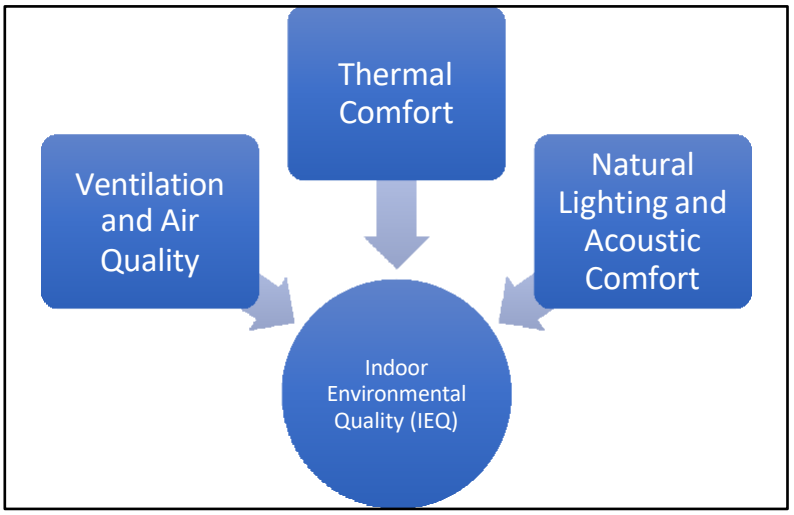

Figure 2.0. Conceptual Framework for Evaluating Indoor Environmental Quality (IEQ) in Post-Occupancy Housing
Source: Zaini & Anuar (2025)

B. Indoor Environmental Quality (IEQ)

As illustrated in figure above, it showcases the conceptual framework for Indoor Environmental Quality (IEQ). Drawing from journal findings, this framework emphasises key elements such as ventilation and air quality, thermal comfort, and natural lighting and acoustic comfort that are essential to post-occupancy satisfaction. This factor is profoundly affects comfort, well-being, and health, rendering it a crucial factor in post-occupancy satisfaction. Findings highlight that ventilation and air circulation are critical elements, particularly in high-density housing environments, where airflow restrictions can lead to pollutant accumulation and respiratory discomfort. Sustainable housing initiatives emphasise air circulation strategies and pollutant control, reinforcing the relevance of green building certifications such as the Green Building Index (GBI) and GreenRE (Che Aziz & Hamid, 2015).

Beyond air quality, thermal comfort and lighting shape daily residential experiences. Studies suggest that temperature inconsistencies in compact housing designs frequently contribute to dissatisfaction, reinforcing the importance of energy-efficient cooling solutions (Kamaruzzaman et al., 2018). Additionally, insufficient daylight exposure negatively impacts mental well-being and productivity, highlighting the need for optimised window placements and spatial arrangements. Findings emphasise that integrating POE feedback into housing development frameworks can refine IEQ standards, ensuring residences are both environmentally sustainable and responsive to occupant needs.

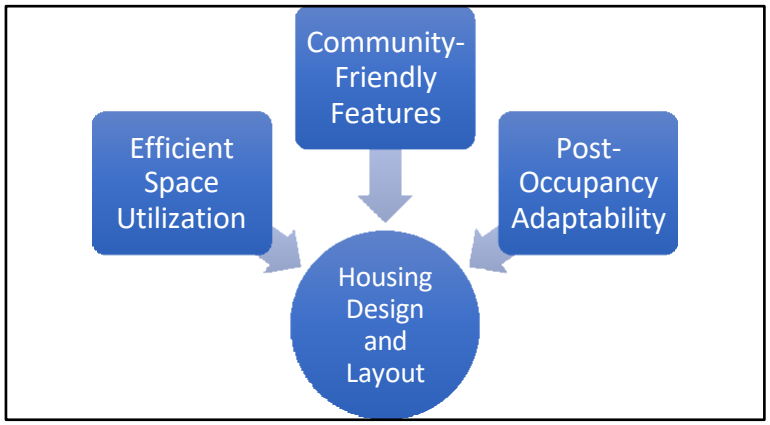

Figure 3.0. Conceptual Framework for Evaluating Housing Design and Layout in Post-Occupancy Housing
Source: Zaini & Anuar (2025)

H. Housing Design and Layout

As illustrated in figure above, the conceptual framework outlines for housing design and layout. Based on findings on journals analyses, this framework highlights key elements such as efficient space utilization, community-friendly features, and post-occupancy adaptability that are essential to post-occupancy satisfaction. Housing design directly affects liveability and long-term adaptability. Findings indicate that space utilization, circulation efficiency, and storage capacity are fundamental in shaping residential satisfaction. Poor interior layouts, including restricted circulation and insufficient storage, often result in dissatisfaction, particularly in compact urban housing developments (Woon et al., 2015). Adaptive spatial configurations, which allow for flexible use of space and can be adjusted to meet changing needs, support functionality, ensuring residential spaces remain practical and user-friendly.

Additionally, community-friendly features such as shared green spaces and pedestrian-oriented environments contribute to social engagement and overall neighbourhood well-being. As housing trends shift toward multi-generational living and work-from-home adaptations, residential layouts must accommodate evolving lifestyle needs. Findings suggest that POE-driven design modifications enable developers to refine spatial planning, ensuring homes are designed to meet modern residential demands efficiently while supporting practical functionality and social well-being.

This conceptual framework systematically categorises the factors influencing post-occupancy satisfaction in CCC-certified housing. While CCC certification ensures initial compliance, findings highlight the necessity of post-occupancy assessments to evaluate housing performance beyond completion. Addressing structural integrity, IEQ, and housing design through enhanced POE frameworks and adaptive policies will contribute to more sustainable and liveable housing environments. Future housing strategies should integrate these insights to ensure developments are not only compliant but also aligned with residents' evolving expectations.

CONCLUSION

This conceptual paper explored the critical factors influencing post-occupancy satisfaction in CCC-certified housing developments across Malaysia. Findings highlighted recurring gaps between regulatory compliance and residents' experiences, particularly in structural integrity, indoor environmental quality, and housing design. These insights reinforce the importance of adopting more proactive strategies in housing development to bridge the gap between CCC certification and residential reality.

To address these challenges, developers, planners, and policymakers must integrate Post-Occupancy Evaluation (POE) into regulatory frameworks. This approach enables continuous monitoring beyond certification and provides data-driven feedback for improving housing quality. Additionally, leveraging advanced assessment tools such as non-destructive testing (NDT) can help identify latent structural defects before they impact satisfaction. Housing projects should also emphasise sustainable design principles, ensuring residential environments remain adaptable to evolving lifestyle needs.

Further empirical research, including resident feedback surveys and case studies, is essential to validate these conceptual findings and refine housing policies. This ongoing research is crucial for strengthening the link between CCC certification and post-occupancy experiences, ensuring that future housing developments meet compliance standards and provide residents with long-term comfort, safety, and liveability.

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