Journal of Creative Arts, Vol. 2, No. 2 (Special Theme 1), 2025
e-ISSN: 3030-6086
Page: 160-173

Preserving Cultural Heritage And Sustainability In Malay Traditional Houses: Architectural Elements, Adaptation, And Modern Challenges

Mohd Zulakhmar Zakiyudin
Universiti Teknologi MARA, Malaysia
Corresponding Author: zulakhmar@uitm.edu.my

Received: August 29th, 2025
Accepted: December 19th. 2025
Published: December 22nd, 2025

ABSTRACT

Malay traditional houses are quintessential cultural and historical symbols that embody architectural heritage intertwined with sustainability principles. This review synthesizes existing literature to explore their distinctive architectural elements, including decorative motifs, indigenous construction techniques, spatial organization, and cultural-religious influences. It further examines the challenges posed by modernization, urbanization, and loss of traditional craftsmanship, alongside the adaptation strategies that integrate traditional design with contemporary sustainable practices. Preservation efforts highlighted include documentation, community engagement, adaptive reuse, and policy development aimed at safeguarding this heritage. The review identifies gaps in awareness and technological incorporation while advocating interdisciplinary research and digital tools to enhance conservation. This comprehensive analysis underscores the critical need to sustain the cultural and environmental values inherent in Malay traditional houses for future generations.

Keywords: Malay traditional houses, architectural heritage, cultural preservation, sustainability, adaptation strategies, traditional craftsmanship, modernization challenges

Journal of Creative Arts, Vol. 2, No. 2 (Special Theme 1), 2025
e-ISSN: 3030-6086
Page: 160-173

1. INTRODUCTION

Malay traditional houses stand as profound cultural and historical artifacts embodying the lifestyle, beliefs, and environmental adaptations of the Malay people. These dwellings represent more than mere shelters; they are an architectural testimony to a rich heritage that continuously reflects the intricate relationship between the community, their natural environment, and socio-cultural dynamics (Rashid, Baharuddin, & Alauddin, 2021). The architectural form of traditional Malay houses incorporates indigenous knowledge systems, aesthetic values, and functional design that harmonize with Malaysia's tropical climate, demonstrating early sustainable building practices.

Preserving the architectural heritage of these houses is pivotal not only for safeguarding cultural identity but also for maintaining historical continuity. As tangible artefacts, they provide insights into past social practices, religious influences, and communal values that have shaped Malay architecture over centuries (Azman, Mazlan, Sujak, Mat So'od, & Wallen, 2022). This preservation fosters community pride and sustains local craftsmanship, such as traditional woodcarving and construction techniques, which are integral to the Malay architectural identity (Azman et al., 2022; Rashid et al., 2021).

A salient feature of traditional Malay houses is their inherent sustainability, derived from their climatic responsiveness and material use. Their elevated stilt structures promote natural ventilation and flood protection, while large overhanging roofs and open spatial layouts mitigate solar heat gain and encourage airflow, thereby enhancing indoor comfort without mechanical means (Nor, Misnat, Isa, & Karim, 2021; Hassan et al., 2010). Moreover, the buildings utilize locally sourced timber and natural materials, reducing environmental footprints and demonstrating ecological harmony (Rahman et al., 2022). Modern studies also highlight how traditional design strategies align closely with green architectural principles, underscoring their relevance in today's sustainability discourse (Mohamad Farid, 2020; Husen & Mohamed Farid, 2021).

Despite their significance, traditional Malay houses face increasing threats from rapid modernization, urban development, and shifting socio-economic patterns. Alterations and hybridizations of design threaten to erode original aesthetics and cultural relevance, with many older structures being abandoned or transformed beyond recognition (Yaman, Ramele, & Muhammad Ariff, 2021). Such transformations raise critical concerns about heritage loss and the diminishing transmission of culturally embedded architectural knowledge (Monikasari & Fitriyanti, 2023). Furthermore, challenges such as high construction costs, loss of skilled artisanship, and limited documentation exacerbate preservation difficulties (Ibrahim, Liew, Nawi, & Yusoff, 2015; Abdul Rahman et al., 2022). The objective of this review is to explore the architectural

elements that characterize Malay traditional houses, their adaptive transformations in response to modern challenges, and the sustainability embedded within their design. This analysis aims to provide a comprehensive understanding of how these houses serve as living cultural monuments and how their continued relevance can be ensured through strategic preservation and innovative adaptations. Key contributors to this field include Rashid et al. (2021), who provided an extensive historical overview and architectural transformation study of Perak traditional houses, offering critical insights into the environmental and cultural contexts influencing design evolution. Azlin et al. (2022) contributed significantly to understanding the cultural imprints within traditional Malay architectural designs, connecting spatial organization with social customs. Moreover, Samat et al. (2023) enriched the discourse with a focused study on traditional entertainment spaces such as the bergendang and their integration into house spatial use, illustrating the functional and social dimensions inherent in design.

Together, these studies and others form the foundational knowledge upon which this review builds, aiming to synthesize contemporary understanding of Malay traditional houses within the broader context of cultural heritage preservation, sustainable design, and modern adaptation challenges.

.

2. ARCHITECTURAL ELEMENTS OF MALAY TRADITIONAL HOUSES

2.1 Decorative Elements

Decorative motifs form a significant architectural characteristic in Malay traditional houses, reflecting both aesthetic appeal and cultural symbolism. Woodcarvings are notably prominent, embodying intricate designs mainly inspired by flora and fauna, geometric patterns, and Islamic calligraphy, which convey cultural, religious, and cosmological meanings. Yusof et al. (2022) identified that Johor traditional Malay houses predominantly feature floral motifs, particularly the 'labu maya' (pumpkin) motif serving as a local identity marker. This motif, alongside other designs, directly reflects Islamic influences, as the choice of patterns often signifies religious values, demonstrating a synthesis of cultural and spiritual elements in woodcarving. Similarly, Rashid, Baharuddin, and Alauddin (2021) compared the decorative elements of Perak and Johor limas houses and found distinctive typologies and characteristics unique to each region, indicating regional variation within the traditional Malay architectural vocabulary.

Moreover, Hassan and Ramli (2010) detailed various types of ornamental woodcarvings linked with symbolic meanings, highlighting the importance of these motifs beyond decoration—they serve functional purposes, such as enhancing natural ventilation, daylighting, and structural strength. The Tunjuk Langit or finial decorative elements, studied by Rashid et al. (2021), represent

another category of ornamental features with typological and chronological significance, demonstrating subtle variations that distinguish Kelantan traditional houses. Likewise, Hanita Yusof et al. (2022) documented Islamic influences on woodcarving panels in Johor houses, emphasizing the intertwining of religious principles with traditional craftsmanship to preserve cultural heritage in architecture. The continuous practice and preservation of these decorative motifs face challenges due to diminishing artisan numbers and scarce documentation (Hassin & Misni, 2023).

2.2 Construction Techniques and Materials

Traditional Malay houses incorporate indigenous construction techniques that contribute to their sustainability and architectural integrity. A distinctive feature is the tanggam system, a sophisticated wooden joint method utilized in assembling structural components without nails, enhancing durability and aesthetic continuity (Rahman et al., 2022). This technique facilitates not only sound structural connections but also enables the dismantling and reassembling of houses, contributing to preservation and relocation possibilities.

Local materials such as hardwood and bamboo are commonly employed, offering environmental benefits due to their natural insulating properties and availability. These materials, combined with design elements such as raised floor structures on stilts or stages ('panggung'), cater to climate adaptation by promoting ventilation and termite protection. Faisal (2019) highlighted that the stage and stilts not only elevate the house for protection from floods and pests but also create communal spaces beneath the house for social interactions or storage.

Furthermore, roof design holds unique importance, with different regional styles like the Rumah Limas and Rumah Lontiok characterized by specific roof shapes and structures facilitating thermal comfort and rainwater protection (Rashid et al., 2021; Faisal, 2019). The use of local materials and indigenous methods embodies an ecological approach that sustains the architectural identity while addressing tropical climatic challenges.

2.3 Spatial Organization

The spatial arrangement within traditional Malay houses is carefully structured to reflect functional diversity, social hierarchy, and cultural customs. Norasyikin et al. (2022) described the spatial layout as consciously designed for social and religious practices, containing public, semi-public, and private areas.

Key rooms such as the 'serambi' (veranda) serve multifunctional purposes including social gathering, ritual conduct, and customary education (Tuzzahrah & Kamarul, 2017). The serambi also acts as a transitional space accommodating visitors while maintaining household privacy. This functional complexity is echoed

by

Samat et al. (2023), who studied the 'bergendang' room in Sarawak Malay houses, a space dedicated to traditional entertainment that varies between early and later architectural models, with spatial use linked to the social status of occupants. Central spaces such as the 'rumah ibu' (main house) and 'rumah tengah' denote private living quarters. The division of spaces often aligns with gender roles and ritual cleanliness, illustrating cultural influences on spatial hierarchy (Nor & Misnat, 2021). Moreover, architecture embodies social logic facilitating family interactions, privacy, and social control (Sharifah Salwa & Yahya, 2020).

2.4 Cultural and Religious Influences

Islamic principles prominently influence the design and layout of traditional Malay houses. Abu Rahman et al. (2021) articulated three core aspects where Islam impacts traditional Sarawak Malay houses: occupant social connections, residential spatial organization, and construction and design guidelines. Privacy for women, separation of male and female spaces, and accommodating Islamic rituals are essential considerations integrated into architecture.

In addition, Hassan and Ramli (2010) emphasized that decorative motifs encapsulate religious symbolism, representing not only aesthetic but also cosmological and spiritual narratives relevant to Malay-Muslim identity. Cultural customs such as the Adat Perpatih are manifested architecturally in the design and function of spaces like the serambi, reinforcing the social fabric and Malay identity (Tuzzahrah & Kamarul, 2017).

Traditional Malay houses, thus, serve as physical embodiments of Malay culture and religion, where architectural elements and spatial organization harmonize functional needs with cultural symbolism, preserving the intangible heritage through tangible design.

2.5 Modernization and Alteration of Traditional Houses

Traditional Malay houses have increasingly undergone transformations to accommodate evolving lifestyle needs amidst modernization pressures. Yaman et al. (2021) identified that heritage villages in Malacca experience extensive modernization, incorporating new internal usages where traditional house components such as 'rumah ibu' and 'rumah dapur' are altered or extended. This hybridization, while reflective of adaptive use, often results in houses losing their original vernacular authenticity. Similarly, Aziz et al. (2020) elucidated various modifications in architectural form and function in the Malay houses within Medan and its environs, where Western and modern influences effected significant changes while attempting to retain Malay cultural identity.

Urbanization and increased land development also pose serious threats to traditional houses. Monikasari and Fitriyanti (2023) documented the near

disappearance of the Malay House Limas Potong in Batam due to rapid urban development, scarcity in raw materials, and a shift towards contemporary architectural models emphasizing efficiency. This loss is emblematic of broader regional trends wherein traditional house types diminish under developmental pressures.

Efforts to preserve such heritage are evident in selective areas where conservation and heritage village initiatives are pursued. Ramli et al. (2023) presented detailed documentation of Rumah Tok Gajah in Terengganu, underscoring the need for comprehensive preservation strategies through multidimensional documentation. Likewise, Salleh et al. (2022) emphasized the proactive inventorying of traditional houses in Gombak District to ensure their longevity through conservation. Nevertheless, these are isolated efforts contrasted by widespread neglect and modifications diluting heritage authenticity.

2.6 Adaptation Strategies for Sustainability

In response to modernization challenges, there is a growing interest in integrating traditional design elements into contemporary housing frameworks to achieve sustainable comfort and cultural continuity. Hosseini et al. (2016) argued for the relevance of authentic traditional Malay design values as a foundation for innovation in modern Malay houses, advocating for the transference of design principles that embody environmental responsiveness and cultural significance.

Passive design strategies such as natural ventilation and thermal comfort measures inherent in traditional houses have been studied extensively. Hassan and Ramli (2010) observed that traditional Malay houses in Penang effectively employ cross-ventilation and natural airflows to regulate indoor temperatures, maintaining a balance with tropical climatic conditions without reliance on mechanical cooling. Similarly, Hassin and Misni (2023) evaluated the thermal performance of rumah Negeri Sembilan berserambi dua dan beranjung, identifying fenestration, building orientation, and open compound areas as key sustainable features facilitating thermal comfort through natural ventilation.

Ethnomathematics, the application of indigenous mathematical concepts, also plays a vital role in sustaining architectural identity and functional design enhancements. Putri et al. (2024) and Pasaribu et al. (2023) described how geometric transformations and mathematical motifs embedded in Malay traditional ornamentation serve educational and cultural functions while inspiring architectural creativity. These symbolic motifs reinforce identity while offering design principles relevant to modularity and spatial harmony.

Additionally, modern technological integration is beginning to blend with traditional architecture. Albons et al. (2022) demonstrated the design of a flexible home automation system using IoT technology within traditional Malay houses, allowing remote control of appliances. This technological convergence illuminates pathways for retaining traditional house forms while meeting contemporary lifestyle

demands.

2.7 Challenges in Preservation

Despite these adaptation efforts, preservation faces significant hurdles primarily due to the rapid loss of traditional craftsmanship. Husin and Mohd Noor (2015) highlighted the decline in skilled woodcarving artisans and the consequent jeopardy to traditional decorative practices. Hassan and Ramli (2010) also emphasized that the intricacy and symbolism embedded in woodcarvings represent vital cultural heritage at risk from generational discontinuity.

Compounding the issue is the lack of systematic documentation and public awareness. Abdul Majid et al. (2015) pointed out the insufficiency of academic and governmental efforts to catalog and promote traditional Malay architectural heritage comprehensively. Hamzah et al. (2023) further stressed the need for accurate and in-depth documentation of specific houses and their components to support conservation policies.

Public misconceptions and economic challenges also hinder preservation. Ibrahim et al. (2018) reported that housing developers are reluctant to build traditional Malay houses due to perceived high costs and misconceptions about these houses' functionality and relevance to modern lifestyles. Such economic and perceptual barriers contribute to the preference for conventional contemporary housing models, exacerbating heritage erasure.

Legal and policy frameworks remain inadequate to enforce the conservation of traditional Malay houses effectively. While some policies exist, the lack of integration across planning, cultural, and housing development sectors creates implementation gaps, risking historical architectural assets.

In summary, the modernization and urban pressures facing traditional Malay houses necessitate balanced adaptation strategies emphasizing sustainability, cultural identity, and technological responsiveness. However, overcoming the challenges in craftsmanship loss, documentation, public perception, and policy enforcement remains critical to the preservation and continued relevance of Malay architectural heritage.

3. PRESERVATION STRATEGIES AND POLICY RECOMMENDATIONS

Preserving the architectural and cultural heritage of traditional Malay houses necessitates a robust framework encompassing documentation, community involvement, adaptive reuse, sustainability, and legal strategies. An essential first step is the comprehensive documentation of traditional techniques and motifs. Hamzah et al. (2023) emphasize the critical need for systematic documentation of Malay architectural heritage, as exemplified by their inventory work in Gombak District, where over thirty-nine traditional houses were recorded along with masjids, highlighting the importance of timely conservation efforts to prevent

irreversible loss. Such documentation not only preserves knowledge of construction techniques and decorative elements but also serves as a basis for future restoration projects and educational material.

In tandem with documentation, integrating education and community involvement is vital for the sustainability of these heritage buildings. Engagement with local communities fosters a deeper appreciation and respect for cultural identities embedded in traditional dwellings (Illyani et al., 2020). By involving village residents and local craftsmen in preservation efforts, the transfer of intangible knowledge such as symbolic meanings in woodcarving and traditional construction methods can be ensured. Moreover, campaigns promoting awareness among younger generations combat the risk of cultural erosion due to modernization (Yusof et al., 2021). Training and workshops targeting both artisans and homeowners can rejuvenate interest in traditional craftsmanship, mitigating the decline of skilled woodcarvers pointed out by Husin and Mohd Noor (2015).

Adaptive reuse and relocation strategies have also emerged as pragmatic approaches to preservation in the face of urbanization pressures and land scarcity. Tan (2019) discusses the innovative concept of the "reconstituted village," where architecturally significant Malay houses are dismantled and relocated to new sites to protect them from demolition. This method not only safeguards physical structures but revitalizes living heritage by creating cultural tourism destinations and educational hubs. Similarly, Monikasari and Fitriyanti (2023) highlight the near disappearance of the Limas Potong Malay house in Batam City due to modernization but showcase efforts to conserve remaining structures within heritage villages as a means of cultural continuity. These approaches balance heritage conservation with contemporary development needs, offering flexible solutions that respect traditional values.

The promotion of green and sustainable design practices that draw on traditional Malay architecture principles further strengthens preservation efforts. Mohd Farid Mohamed (2020) identifies numerous sustainable features embedded within Malay traditional houses, such as passive ventilation, natural shading, and appropriate orientation, which are suitable for Malaysia's hot and humid climate. These indigenous design methods can inform modern constructions to reduce energy consumption and environmental impact. Husen and Mohd Farid Mohamed (2021) further dissect the green design strategies across several traditional Malay houses, cataloging 22 typical sustainable design components that collectively embody an integrated response to local climate and social context. Encouraging modern architecture to incorporate these sustainable elements ensures the vitality and relevance of Malay heritage while aligning with contemporary environmental goals.

Another critical avenue lies in the development of heritage management policies and legal frameworks. Hamzah et al. (2023) underscore the urgency for proactive preservation initiatives combined with policy mechanisms aimed at protecting

architectural heritage. Legal protection can regulate demolition, mandate proper restoration, and promote heritage tourism, thus creating economic incentives for conservation. Additionally, addressing challenges such as public misconceptions and the high costs associated with traditional construction, as detailed by Ibrahim et al. (2015), requires policy interventions that provide subsidies or grants to support traditional craftsmanship and maintenance of heritage houses.

Complementing legal and policy strategies, targeted efforts are necessary toward safeguarding the intangible cultural assets, particularly the craftsmanship of woodcarving motifs integral to Malay houses' identity. Yusof et al. (2022) highlight how the gradual loss of skilled artisans and the demolition of houses bearing rich woodcarvings compromise cultural transmission. Enhancing support for preservation of these skills through academic research, apprenticeships, and public exhibitions can bolster heritage conservation. Furthermore, multidisciplinary collaboration between architects, historians, conservationists, and local communities enriches preservation approaches, enabling holistic understanding and safeguarding of traditional Malay houses as living cultural symbols.

In summary, a multifaceted preservation strategy combining thorough documentation, community participation, adaptive reuse, sustainable design integration, and supportive legal frameworks forms the cornerstone for maintaining the cultural heritage embodied in Malay traditional houses. Such strategic measures ensure that these dwellings continue to serve not only as architectural relics but as vital cultural vessels adaptable to contemporary societal and environmental dynamics.

4. FUTURE DIRECTIONS AND RESEARCH OPPORTUNITIES

The preservation of Malay traditional houses faces significant challenges that underscore the need for innovative and multidisciplinary research approaches. Moving forward, enhancing the documentation and conservation of these architectural heritages through digital technologies such as three-dimensional modeling, virtual reality (VR), and augmented reality (AR) presents a promising direction. Salleh et al. (2022) documented numerous traditional Malay structures, emphasizing the urgency of proactive conservation through detailed inventory and documentation efforts. Taking this further, integrating VR could facilitate immersive experiences that raise public awareness and support heritage education, preserving intangible cultural knowledge embedded in architectural forms and spatial arrangements.

Applying modern construction materials while respecting the traditional aesthetics and structural designs of Malay houses is another vital research avenue. Studies like Salvi et al. (2023) highlight structural challenges in re-establishing traditional stilt constructions in contemporary settings, pointing to the potential use of recycled and hybrid materials to enhance durability and reduce cost. This material

innovation must be sympathetically balanced with cultural authenticity and environmental considerations. The importance of this balance resonates in efforts by Mohamad (2020) and Husen and Mohd (2021), who advocate for sustainable design principles derived from traditional Malay architecture that can be incorporated into modern housing developments to improve energy efficiency, environmental responsiveness, and comfort without sacrificing cultural identity.

Alongside technological and material advancements, analyzing the socio-cultural impact of restoration and adaptation projects is crucial for successful preservation. Rashid et al. (2021) and Samat et al. (2023) demonstrate how social practices and ritual uses of spaces influence architectural forms and vice versa, suggesting that any modifications to traditional houses should consider community engagement and cultural continuity. Further research should investigate how restored or adapted houses function within contemporary Malay societies, ensuring that preservation does not disconnect these structures from their living cultural contexts.

Climate resilience and energy efficiency are central concerns driving future investigations into traditional Malay houses. Recent thermal comfort studies, such as those by Hassin et al. (2023) and Nik Siti Fatimah Nik Hassin et al. (2023), indicate that the architectural design elements of traditional houses such as fenestration systems, natural ventilation, elevated floors, and open compound areas remain relevant in coping with tropical hot-humid climates. There is potential for research combining ethnoclimatic architectural strategies with modern passive cooling technologies to create hybrid solutions that reduce reliance on artificial cooling, thereby mitigating environmental impact.

Ethnomathematics research, exemplified by Alwahab et al. (2024) and Pasaribu et al. (2023), invites interdisciplinary approaches that bridge architecture with cultural mathematics and geometry. Understanding the geometric transformations and spatial algorithms inherent in traditional Malay ornamentation and construction not only offers an enriched appreciation of cultural heritage but also provides innovative methods for design education and construction practices that underscore local knowledge systems.

Interdisciplinary studies involving architecture, anthropology, environmental science, and cultural studies are needed to address the multifaceted aspects of preserving Malay traditional houses comprehensively. For instance, insights from social sciences enhance understanding of how community identities are maintained or transformed through housing forms, while environmental sciences contribute knowledge on sustainable materials and climate adaptation. The integration of technological innovation with cultural conservation promises to ensure the longevity of these houses not merely as relics but as dynamic components of Malaysia's living heritage.

Lastly, relocation and adaptive reuse strategies, as discussed by Tan (2019) and Monikasari and Fitriyanti (2023), present valuable preservation frameworks that

reconcile urban development pressures with heritage conservation. Creating reconstituted villages or heritage centers can safeguard architecturally significant houses by relocating and reconstructing them. Future research should explore the socio-economic and environmental impacts of such initiatives, including how they can foster tourism, community identity, and education.

Collectively, future research directions must emphasize digital documentation, sympathetic material innovation, socio-cultural contextualization, climate-responsive design, ethnomathematics integration, interdisciplinary collaboration, and innovative preservation models to sustain the architectural and cultural legacy of Malay traditional houses.

5. CONCLUSION

Malay traditional houses represent a rich cultural and architectural legacy deeply rooted in the social, religious, and environmental fabric of Malay society. Their distinctive decorative elements, construction methods, and spatial arrangements reflectaharmonious blend of cultural identity and sustainable design practices. However, the pressures of modernization, urbanization, and the decline in traditional craftsmanship pose significant challenges to their preservation. Adaptation strategies incorporating traditional knowledge into modern sustainable architecture have shown promise but require further development and support. Effective preservation necessitates comprehensive documentation, community involvement, adaptive reuse, and robust heritage policies. Future efforts should prioritize integrating digital technologies for documentation and restoration, enhancing climate resilience, and fostering interdisciplinary research. Ultimately, preserving Malay traditional houses is not only about safeguarding physical structures but also about maintaining cultural continuity and promoting environmental sustainability in the face of contemporary challenges.

ACKNOWLEDGMENT

The author acknowledges the use of generative artificial intelligence (AI) tools (ChatGPT, OpenAI) in the preparation of this manuscript. AI assistance was limited to language refinement, structural suggestions, and improving readability. All core ideas, analysis, interpretations, and conclusions are entirely the author's own. The author takes full responsibility for the content of this work.

REFERENCES

Abdul Majid, N. H., Denan, Z., Abdullah, F. H., & Mohd Noor, M. S. (2015). Shariah compliance hospitality building design: A Malay Muslim oriented

architecture. *Procedia - Social and Behavioral Sciences*, 201. https://doi.org/10.1016/j.sbspro.2015.08.159

Abdul Rahman, A. Y., Abd Rahman, R., Muhammad Ariff, N. R., & Ramele, R. B. (2022). The adaptation of Islamic principles in Sarawak traditional Malay house. *Journal of Islamic Architecture*, 6, 0-0. https://doi.org/10.18860/jia.v6i4.13044

Albons, B. V., Yusof, K. H., Mahamarowi, N. H., Ahmad, A. S., & Azlan, A. S. M. (2022). Designation of a home automation system using Nodemcu with home wireless control appliances in traditional Malay house. https://doi.org/10.1109/ETSAIDE53569.2022.9906385

Aziz, N. S., & Jalil, N. Y. (2020). Changes of form of Malay traditional houses in Medan and surroundings. *Britain International of Humanities and Social Sciences (BIoHS) Journal,* 2. https://doi.org/10.33258/biohs.v2i2.250

Azman, N. S., Mazlan, I., Sujak, I., Mat So'od, N. F., & Wallen, L. (2022). Traditional Malay House in Negeri Sembilan: Cultural influence in design and construction. *Environment-Behaviour Proceedings Journal,* 7. https://doi.org/10.21834/ebpj.v7i21.3775

Azmin, A. K., Abdullah, F., Sanusi, A. N., Yusof, Z. B., & Asif, N. (2021). sustainability of Malay wood craftsmanship symbolism in deciphering Malaysia's architectural identity. https://doi.org/10.46529/darch.202124

Faisal, G. (2019). Arsitektur Melayu: Identifikasi Rumah Melayu Lontiak Suku Majo Kampar. Langkau Betang: Jurnal *Arsitektur*, 6, 0-0. https://doi.org/10.26418/lantang.v6i1.31007

Hamzah, N. R., Mudzafar, N., & Mohd Nasir, M. R. (2021). Woodcarving motifs at Melaka traditional houses: Kampung Morten. The Journal of Social Sciences Research. https://doi.org/10.32861/jssr.spi1.321.330

Hanita Yusof, Azmal Sabil, Amalina Hanapi. (2022). Woodcarving panels in Johor traditional Malay houses influenced by the Islamic principle. Journal of Islamic Architecture, 7, 0-0. https://doi.org/10.18860/jia.v7i2.17659

Hassan, A. S., & Ramli, M. (2010). Penerapan Ciri Khas Arsitektur Melayu Pada Fasad Bangunan Kontemporer Di Kota Pekanbaru (Kasus Perkantoran Pemerintahan Di Tenayan Raya). *Journal of Architectural Design and Development,* 2. https://doi.org/10.37253/jad.v2i2.4967

Hassan, A., Ramli, M., Sabil, A., Utaberta, N., & Yusuf, N. (2010). Natural Ventilation of Indoor Air Temperature: A Case Study of the Traditional Malay House in Penang. *American Journal of Engineering and Applied Sciences*, 3. https://doi.org/10.3844/ajeassp.2010.521.528

Hassin, N. S. F. N., & Misni, A. (2023). Sustainable architectural design features of Negeri Sembilan Malay houses: An analysis of indoor thermal comfort. No Journal, 1217, 0-0. https://doi.org/10.1088/1755-1315/1217/1/012013

Hosseini, E., Mursib, G., & Shahminan, R. N. R. (2016). Implementation of traditional Malay design values in contemporary Malay houses. International *Journal of Built Environment and Sustainability*, 3. https://doi.org/10.11113/ijbes.v3.n2.125

Husen, N. A., & Mohamed Farid, M. (2021). Comparison of Green Design Strategies in Five Traditional Malay Houses. *Jurnal Kejuruteraan*, 33. https://doi.org/10.17576/jkukm-2021-33(1)-05

Husen, N. A., & Mohd Noor, M. (2015). Heritage identity conservation of the woodcarving placement and design composition typologies on Johor Malay houses. Planning Malaysia, 18. https://doi.org/10.21837/pm.v18i12.739

Husin, N. B., & Mohd Noor, N. (2015). Shariah Compliance Hospitality Building Design: A Malay Muslim Oriented Architecture. *Procedia - Social and Behavioral Sciences,* 201. https://doi.org/10.1016/j.sbspro.2015.08.159

Ibrahim, S. H., Liew, A. A. H., Nawi, M. N. M., & Yusoff, M. N. (2015). Reinventing traditional malay house for sustainable housing design: Obstacle and proposed solution. *Jurnal Teknologi*, 72. https://doi.org/10.11113/jt.v72.3134

Mohamad Farid, M. (2020). Sustainable Design Approaches in Malaysia's Traditional Mosques and Houses*. Proceeding International Conference On Engineering*, 1. https://doi.org/10.36728/icone.v1i1.1263

Monikasari, M., & Fitriyanti, F. (2023). The Existence of The Malay House 'Limas Potong' In the Midst of Modernization Currents in the City of Batam 1970-2022. Riwayat: *Educational Journal of History and Humanities*, 6. https://doi.org/10.24815/jr.v6i2.31445

Nik Siti Fatimah Nik Hassin, A. M., & Misni, A. (2023). The Evaluation on Thermal Performance of Rumah Negeri Sembilan Berserambi Dua dan Beranjung. International Journal of Built Environment and Sustainability, 10. https://doi.org/10.11113/ijbes.v10.n2.1054

Nor, O. M., Misnat, N., Isa, H. M., & Karim, N. A. (2021). Space Organization In Perak Malay Traditional House. *Malaysian Journal of Sustainable Environment*, 8. https://doi.org/10.24191/myse.v8i1.12663

Norasyikin, A. H., Ab Aziz, A., & Mohamad, M. N. (2022). Analysis on the socio-cultural values of the traditional Malay houses compound. Planning Malaysia, 18, 0-0. https://doi.org/10.21837/pm.v18i12.747

Pasaribu, R., Husna, A., et al. (2023). Exploration of ethnomathematics houses Malay 'Limas Potong' the Batam Islands of Riau. Indonesian Journal of Mathematics Education, 6. https://doi.org/10.31002/ijome.v6i2.975

Putri, A. A., Cancerlia, C., Hani, Z., Lestari, P. I., & Husna, A. (2024). Ethnomathematics exploration of the Malay traditional house Indera Perkasa Penyengat Island, Riau Islands. *Cahaya Pendidikan*, 9. https://doi.org/10.33373/chypend.v9i2.5553

Rahman, N. B. A., Ahmad, M. H., Daud, R., Abd Rahim, S. A., Sharkawi, N., Abdullah, S., & Arshard, W. N. R. (2022). Architectural Value in Tanggam System on the Traditional Malay House. In Lecture Notes in Civil Engineering (Vol. 223). https://doi.org/10.1007/978-981-16-8667-2_21

Ramli, N. F., Mat Jusoh, Z., Mat So'od, N. F., & Hinchman, M. (2023). Heritage conservation: Documentation of Rumah Tok Gajah, Kuala Berang, Terengganu. Environment-Behaviour Proceedings Journal, 8. https://doi.org/10.21834/e-bpj.v8i26.5149

Rashid, M. S. A., Baharuddin, M. N., Alauddin, K., & Choo, I. A. H. (2019). Decorative elements of traditional Malay house: Comparative study of Rumah Limas Bumbung Perak (RLBP) and Rumah Limas Johor (RLJ). No Journal, 385, 0-0. https://doi.org/10.1088/1755-1315/385/1/012022

Rashid, S., Baharuddin, N., & Alauddin, K. (2021). The history and transformation of perak malay traditional house. Malaysian Journal of Sustainable Environment, 8. https://doi.org/10.24191/myse.v8i1.12661

Rashid, S., Choo, I. A. H., Ramele, R. B., Baharuddin, M. N., & Alauddin, K. (2018). Decorative elements of traditional Malay houses: Case study of Rumah Limas Bumbung Perak (RLBP). Journal of Social Sciences Research, 2018. https://doi.org/10.32861/jssr.spi6.105.115

Salleh, N. H., Abdullah, M. Z., Ab Jalil, N., & Shaharil, M. I. (2022). Inventory of Malay architectural heritage in Gombak District, Selangor. Journal of Architecture, Planning and Construction Management, 12. https://doi.org/10.31436/japcm.v12i1.655

Salvi Mari, T., Liew, J., & Ng, V. (2023). Re-establishing traditional stilt structures in contemporary architecture–The possibilities. Archnet-IJAR: International Journal of Architectural Research, 17. https://doi.org/10.1108/ARCH-12-2021-0353

Samat, Y. S., Syed Ariffin, S. A. I., Abdullah Goh, N., & Ting, J. H. S. (2023). 'Bergendang' and Its Spatial Use in Traditional Sarawak Malay House. Environment-Behaviour Proceedings Journal, 8. https://doi.org/10.21834/ebpj.v8i23.4489

Sharifah Salwa, S. M., & Yahya, A. S. (2020). The visual graph analysis of Malay traditional houses. SSRN Electronic Journal, 0-0. https://doi.org/10.2139/ssrn.3565675

Tan, Y. R. (2019). Reconstituted village: Relocating traditional houses and transforming traditional malay villages. Journal of Regional and City Planning, 30. https://doi.org/10.5614/jpwk.2019.30.3.6

Tuzzahrah, S. F., & Kamarul, A. F. (2017). The serambi of Negeri Sembilan traditional Malay house as a multifungsional space - role in custom (ADAT). Journal of Design and Built Environment, 17, 0-0. https://doi.org/10.22452/jdbe.vol17no2.4

Yaman, Y. N. A., Ramele, R. B., & Muhammad Ariff, N. R. (2021).

MODERNIZATION OF TRADITIONAL MALAY HOUSE IN HERITAGE VILLAGE OF MALACCA. Built Environment Journal, 18. https://doi.org/10.24191/bej.v18i1.11415

Yusof, H., Sabil, A., Hanapi, A., & Abd Wahab, I. (2020). Heritage identity conservation of the woodcarving placement and design composition typologies on Johor Malay houses. Planning Malaysia, 18, 0-0. https://doi.org/10.21837/pm.v18i12.739

Yusof, H., Sabil, A., Hanapi, A., & Abd Wahab, I. (2022). Islamic influence on woodcarving motifs in Johor traditional Malay houses. Journal of Islamic Architecture, 6, 0-0. https://doi.org/10.18860/jia.v6i4.13028