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SOCIOLOGICAL IMPACT IN PUBLIC TOILET DESIGN: CASE STUDY OF KAED MALAY HERITAGE LIVING LAB.

Wan Nur Aisyah Dzulkiflee, Julaila Abdul Rahman*, Fadzidah Abdullah, Mohd Fairullazi Ayob, Nur Ulfah Awatif Umairah Alias, Roziha Che Haron, Nur Affah Mohyin, Sharifah Tahirah Syed Kamarulzaman.
Department of Architecture, Kulliyah of Architecture and Environmental Design, IIUM

ABSTRACT

Human interaction in public spaces is influenced by both environment and culture. Public toilets, however, often fall short in meeting user needs due to poor facilities and lack of proper amenities. In the Malay cultural context, *Adat* plays an important role in shaping social behaviour and shared practices, which can guide more context-sensitive design. This project explores the sociological and cultural dimensions of public toilet design with a focus on human factors. The objectives are: (1) to identify design criteria for public toilets, (2) to examine contextual impacts on user behaviour, and (3) to develop a 3D model for restroom of *Rumah Kutai*. The study employs literature review, case studies, and site observations within the KAED Malay Heritage Living Lab, IIUM. Findings are expected to highlight culturally rooted design criteria and demonstrate how traditional values can be integrated with functional requirements to create inclusive, responsive, and sustainable public toilet facilities.

Keywords: Public toilet design, Human factors, Malay culture, *Adat*, Rumah Kutai, Sociological impact,

*Corresponding author: julailarahman@iium.edu.my

INTRODUCTION

People interact for various reasons, and human behaviour in public areas is often influenced by the presence of others within the same space and time (Borowski, 2014). Public toilets, as shared social environments, become sociological touchpoints where issues of comfort, safety, privacy, and cultural expectations intersect—yet many facilities fail to meet these needs due to unpleasant odours, faulty amenities, and poor upkeep (Isham, 2022). In Malaysia's broader cultural-urban context, such shortcomings affect everyday public life, tourism experiences, and community well-being, signalling the need for design solutions that balance functionality with cultural sensitivity. Within the Malay cultural setting, *Adat* plays a vital role in shaping traditional values and guiding social behaviour, influencing expectations of modesty and spatial etiquette (Suhaib et al., 2020). The KAED Heritage Living Lab, an initiative by the Kulliyah of Architecture and Environmental Design (KAED) at IIUM Gombak, focuses on the preservation of Malay architectural heritage (Figure 1). It functions as a teaching laboratory that promotes experiential learning while showcasing Malay culture to local and international communities.



Figure 1: Location Plan (Illustrated by Aisyah, 2024)

The KAED Heritage Living Lab functions as an open space for cultural engagement and community-oriented activities, accessible to both staff and the public. This project is undertaken as part of BAQS 2300 (Integrated Multi-Disciplinary Project), involving students from the Departments of Architecture, Applied Arts and Design, and Quantity Surveying. Over a duration of five weeks, each team is required to develop a public toilet design that integrates harmoniously with the existing Heritage Living Lab environment. The necessity of this project is underscored by the current spatial condition of the site. The Heritage Living Lab is situated approximately 5–10 minutes from the KAED main building, which houses the nearest toilet facilities. This distance poses practical challenges for users, particularly during continuous activities and events. Additionally, the Heritage Living Lab frequently accommodates various programmes and receives external visitors, further highlighting the need for an accessible on-site sanitation facility to support user comfort and operational efficiency. Accordingly, the proposed designs (Figure 1) aim to better serve students, lecturers, and visitors while enhancing the overall functionality, usability, and experiential quality of the KAED Heritage Living Lab (Figure 3-4).



Figure 2: Toilet Design Proposal by Alam Citra

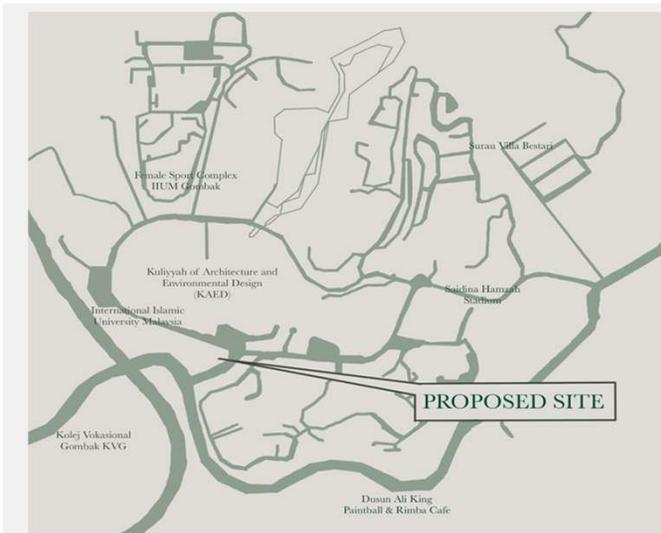


Figure 3: Key Plan
(Illustrated by Aisyah, 2024)

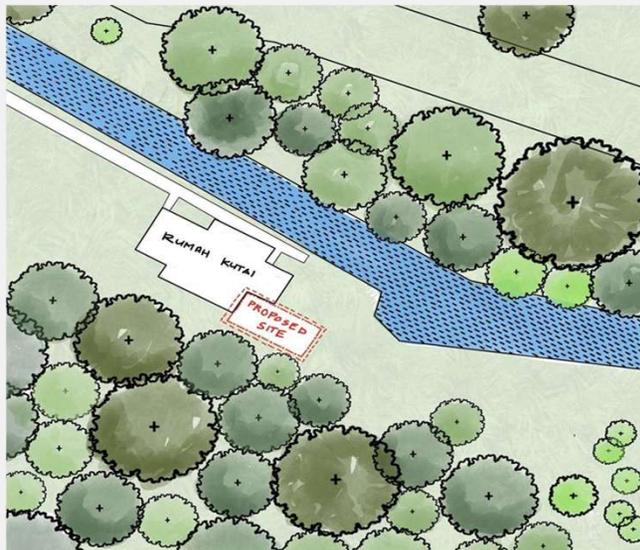


Figure 4: Site Plan
(Illustrated by Aisyah, 2024)

METHOD AND PROCEDURE

The approach illustrated in the Figure 5 was adopted to achieve the objectives of the design project. The process commenced with a site analysis (Figure 5), followed by a review of precedents and case studies. These stages informed and culminated in the development of proposed additional structures for the KAED Heritage Living Lab.



Figure 5: Methodology and Framework

SITE ANALYSIS



Figure 6: Circulation in site observation
(Illustrated by Aliff, 2024)

Findings from the **site analysis** and **behavioural mapping** indicate that the layout of public and private circulation areas reflects careful consideration of privacy. These methods revealed how users naturally move through the space and how certain zones require greater seclusion. The analysis shows that male and female areas remain distinct, aligning with Malay cultural practices and values of modesty. The PWD toilet, being non-gender specific, emerges as a key spatial element; its central placement, as observed in the behavioural patterns on site, not only improves accessibility but also functions as a natural separator between the male and female zones.

LITERATURE REVIEW

Malaysian Public Toilet Standards

According to the ASEAN Public Toilet Standard, a public toilet is a place that comprises one bowl with or without seating, to sit or squat and is connected to a drainpipe and flushing equipment that is shared by people to urinate and defecate (Isham, 2022). Some public toilets are far from clean, with an unpleasant odour, defective equipment and lack of basic facilities (Isham, 2022) (Figure 7).



Figure 7: Public toilets in Malaysia
(Source: New Straits Times 2023)

Scale and proportions of public toilets

Scale and proportions of public toilets are critical for accessibility and comfort. Anthropometric data that is inclusive must cover both able-bodied and disabled adults, primary and secondary school children, and the elderly (Adnan & Dawal, 2019). Measurements vary across countries due to factors including genetics (Majdi, 2021). Standard toilets often fail to meet the needs of elderly and disabled users (Hussain et al., 2021). As a result, improvements to daily-use items, systems, and environments should accommodate age-related functional capabilities (Pennathur et al., 2003). Designing enclosed spaces with user-centric considerations enhances comfort, accessibility, and safety for diverse users (Atef, Abdul Rahman, et al., 2023), a principle that can be applied directly to public toilet design to improve movement, usability, and overall user experience.

Sociological and Gender Impacts in Public Spaces

Public spaces are shaped by both structures and human activities, with social interactions influencing how people use these areas (Gehl, 1987; Lelévrier, 2013; Moulay, Ujang, & Said, 2017). Gender significantly affects public toilet design, as facilities often fail to meet needs for availability, hygiene, privacy, and usability (Corradi, 2023). Such shortcomings create difficult experiences, particularly for menstruating individuals, and safety concerns can limit women's access due to fear of assault or harassment (Sommer et al., 2020; Hartigan et al., 2020; Hernandez et al., 2021). Addressing these issues is vital for inclusive, safe, and supportive public spaces.

KAED Heritage Living Lab

The KAED Heritage Living Lab is an initiative by KAED focusing on the restoration and preservation of Malay architectural structures. It serves as a teaching laboratory that promotes experiential learning for future generations while showcasing Malay culture to both local and international communities within IUM. The open space of the KAED Heritage Living Lab provides a venue for cultural activities and events, which are frequently attended by staff and the public (Figure 8). At present, there are no fully equipped facilities, such as toilets, to support these events. Given the high usage of the space, there is a clear need to study and identify the types of facilities required to enhance user comfort, accessibility, and overall experience.



Figure 8: KAED Heritage Living Lab
(Source: ADUKA inc, 2024)

Behavioral patterns of Malay People

Behavioral patterns of Malay people are strongly influenced by Adat, which shapes Malay traditional heritage through customs, practices, and social norms that guide daily life and social interactions (Suhaib et al., 2020). According to Azizah and Putri (2013), modesty can be classified into two categories: (a) physical modesty, relating to dress code and design humility, and (b) inner modesty, encompassing self-perception and social interaction, including shyness, humility, and politeness. Studies on behavioral interaction with designed objects, such as playset furniture, reveal how approach behaviors are influenced by cultural and social norms (Nazri, Raja Abdul Rahman, & Umar, 2021). These insights demonstrate that design and cultural context are closely linked, shaping both how individuals engage with objects and their broader social behaviors.



Figure 9: Importance of cleanliness in Malay culture. Tempayan is placed at the entrance of a house to wash the feet.

PRECEDENT AND CASE STUDIES

Ecological Public Restrooms in Trado by MOL Arquitectura

Bioclimatic architecture focuses on designing buildings that respond to the local climate, harmonizing with the environment and natural surroundings while utilizing local resources. In this design, bioclimatic elements such as the Z-shaped geometry of the lobby roof and the facades facilitate rainwater collection and natural ventilation. Additionally, the clear separation of male and female restrooms enhances privacy and supports smooth circulation throughout the space.



Figure 10 Figure 11

Figure 10 & 11 shows the use of louvres as a natural ventilation following bioclimatic design (Source: ArchDaily, 2020)



Figure 12

Figure 13

Figure 12 & 13 shows the interior material selection opting for anti-vandal paint for low maintenance (Source: ArchDaily, 2020)

Lehi Bathroom by Fuse

The Lehi Bathroom integrates features that enhance its connection to the natural surroundings, including large windows and open spaces. The elevated roof supports effective ventilation strategies suited for tropical climates and allows the optimal use of natural sunlight. Additionally, an outdoor sink provides users with the option to wash their hands without entering the public toilet space, improving both convenience and hygiene.



Figure 14

Figure 15

Figure 14 & 15 shows use of natural ventilation through elevated roof (Source: Archchello, 2024)

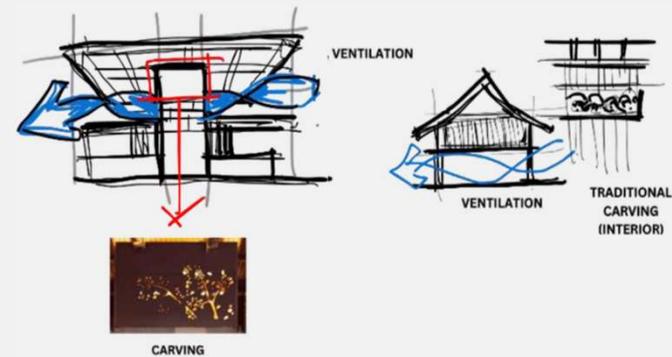


Figure 16: The illustration shows relationship of roof case study to rumah kutai. (Illustrated by Zulhelmi, 2024)

CONCEPT : ALAM CITRA

The concept of "Alam Citra" is defined as "The Reflection of the Malay World". Alam represents the context of the Malay World, while Citra translates as image or reflection. This concept seeks to evoke familiarity by reflecting the behaviours and intangible characteristics of Malay culture. It was selected to guide the design of a toilet space that provides safety and comfort for users while seamlessly integrating with the surrounding environment of the Rumah Kutai.

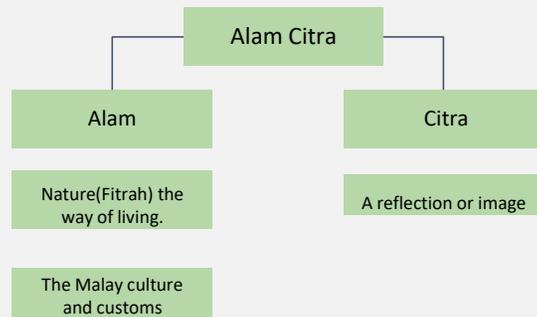


Figure 17: Alam Citra derived from two definitions.



Figure 18: Moodboards visualising the concept (Arranged by Shafie, 2024)

To establish a strong sense of identity, the concept emphasises incorporating aspects of everyday Malay life, including cultural practices, beliefs, and social background. Nature, a central element in Malay heritage, evokes nostalgia and conveys cultural meaning, demonstrating how the natural environment shapes and influences Malay traditions.



Figure 19: Sample board experimenting modern materials to achieve Malay Nostalgia. (Arranged by Shafie, 2024)

Malay Art and Architecture



Figure 20



Figure 21



Figure 22



Figure 23



Figure 24

Figure 20,21 & 22 shows characteristics of Malay culture through architecture to create nostalgia in design.

(Source: Malaysia Timber Council, 2024)

Figure 23 & 24 shows the Traditional Malay art of tekat, inspiring the landscapes of Alam Citra

(Source: Jabatan Muzium Malaysia, 2019)

DESIGN DEVELOPMENT

To create a design that reflects Malay behavioural characteristics, it was essential to understand the distinct roles and behaviours of males and females within Malay culture. The Figure 25 below summarizes the findings and highlights common characteristics observed.

ALAM CITRA	
MALE	FEMALE
Head of household upfront. responsibility to take care of family.	Play supportive roles and are more private and reserved.

Figure 25: Gender roles according to Malay culture.

Extensive research through literature review and precedent studies identified the distinct requirements and preferences of Malay males and females. This insight informed a tailored design addressing the specific needs of each gender, resulting in a balanced spatial layout. Spatial hierarchy, determined by the relative sizes of each area, guided the allocation of space for male, female, and PWD facilities. Centrally positioned, the PWD toilet functions as both an accessible facility and a natural separator between male and female areas, enhancing privacy and safety, particularly for female users (Figure 25).



Figure 26



Figure 27

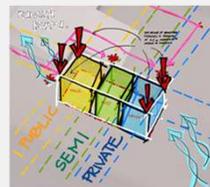


Figure 28

Figure 26, 27 & 28 shows stages of creating layout from considerations of site analysis (Illustrated by Aliff, 2024)

The design prioritises privacy, social norms, and spatial requirements. Figure 29 illustrates the spatial segregation through an open-concept layout. The male section emphasizes openness and encourages social interaction, reflecting cultural norms where male spaces are typically less enclosed and more visible. In contrast, the female section is more enclosed, underscoring the importance of privacy. This approach aligns with Malay cultural values, where privacy and seclusion are particularly significant for women, reflecting dignity and modesty within the community.

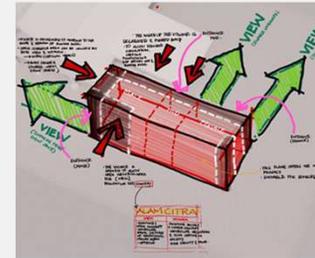


Figure 29

Figure 29 shows spatial segregation of three different spaces in public toilet. (Illustrated by Aliff, 2024)

The roof design integrates traditional Malay architectural elements with contemporary design principles. Characteristic of traditional Malay houses, the elevated and distinctive roof form is maintained, while varying roof levels facilitate natural air ventilation through strategically placed louvres, responding effectively to the local climate. Additionally, volume manipulation through a hyperbolic paraboloid introduces a visual contrast that distinguishes the space from the Rumah Kutai while still maintaining harmony with the overall architectural style (figure 30).

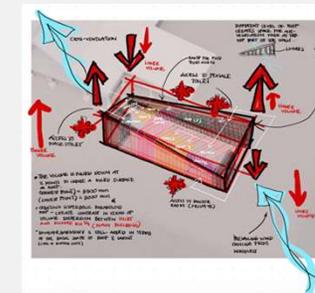


Figure 30

Figure 30 shows use of natural ventilation through the concept of Hyperbolic Paraboloid (Illustrated by Aliff, 2024)

Perspectives of Toilet



Figure 31: Female Toilet Interior



Figure 32: Natural Ventilation



Figure 33: Outdoor Sink



Figure 34: PWD Interior

The overall design of Alam Citra emphasizes the creation of a harmonious environment that honors and reflects Malay cultural heritage. Drawing inspiration from traditional Malay homes, the design evokes a sense of familiarity and nostalgia while addressing contemporary needs. In addition to exploring the sociological impact and behavioural patterns of Malay culture, the design highlights the role of material selection in shaping cultural narratives within the public toilet space. The use of timber and patterned tiles is particularly significant: timber, widely employed in Malay architecture, conveys warmth and a connection to nature, while patterned tiles introduce a nostalgic aesthetic that reinforces the cultural identity of the space (Figure 31-34).

Landscape

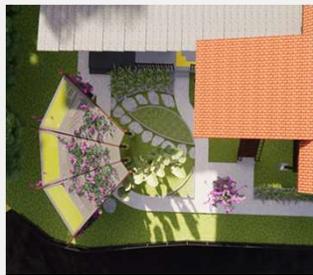


Figure 35: Top view of Landscape showing the Tekat motif



Figure 36: Pergola Teratai



Figure 37: Pergola Rimpang



Figure 38: Vegetation

Landscape is inspired by the traditional art and craft of Tekat (embroidery). The incorporation of the Tekat motif and overall landscape design is aligned with the architectural and cultural themes of Rumah Kutai, a cultural heritage of Perak. Two pergolas known as *Kelopak* (Petal) and *Rimpang* (Rhizome) are situated within the landscape with *Kelopak* nearing the women's and PWD toilet while *Rimpang* is located near the males' toilet. The pergolas are more than just structural elements, they are crucial to the design narrative. The pathway is designed with elegance in mind, reflecting the graceful forms of the teratai motif. The curved lines of the pathways mimic the delicate lines of tekak embroidery, adding cultural connection to the site (Figure 35 – 38).

Toilet Design Proposal



Figure 39: Plan



Figure 40: Axonometric View



Figure 41: Left Elevation



Figure 42: Right Elevation



Figure 43: PWD Ramp



Figure 44: PWD Entrance

CONCLUSION

In conclusion, the design demonstrates an understanding of the sociological dimensions of public toilet planning within the context of Malay culture while simultaneously aligning with broader universal design and inclusive design principles. By ensuring accessibility, privacy, comfort, and cultural sensitivity, the proposal addresses both culturally specific needs and universal user requirements, thereby increasing its wider applicability.

The collaborative effort among students from the Departments of Architecture, Applied Arts and Design, and Quantity Surveying reflects a strong commitment to producing solutions that are innovative, inclusive, and responsive to diverse user groups. The proposed design enhances the functionality of the KAED Heritage Living Lab and supports long-term adaptability.

The concept *Alam Citra* draws from the behavioural patterns, lifestyle, and cultural identity of the Malay community. Its emphasis on familiarity, safety, and comfort resonates with inclusive design principles that promote usability for all, including different genders, age groups, and users with disabilities. Furthermore, by integrating strong cultural identity and sensitivity into the spatial planning, the design ensures that the public toilet not only meets practical requirements but also harmonises with the cultural and aesthetic context of Rumah Kutai, reinforcing both heritage value and universal accessibility.

ACKNOWLEDGEMENT

ADUKA Inc., comprising 23 students and six lecturers, acknowledge insights and knowledge gained throughout the project to benefit from utilising the equipped knowledge for future projects. They extend their heartfelt thanks to the supervisors and mentors overseeing BAQS 2300, Multi-Disciplinary Project Semester 3 2023/2024 at the Kulliyah of Architecture and Environmental Design (KAED), IIUM, as well as other affiliated individuals and institutions whose support was pivotal in the projects' achievements.

LECTURERS
Mohd Fairullazi Ayob
Nur Ulfah Awatif Umairah Alias
Roziha Che Haron
Nur Affah Mohyin
Julaila Binti Abdul Rahman
Sharifah Tahirah Syed Kamarulzaman
Azrin Mohd Din

No.	STUDENTS	Program
1	NUR ILHAM HIDAYAH BADZRUL HISYAM	QS
2	ASYRAF AZIM ABDUL AZIZ	QS
3	NUR SYAMIMI ABD KHAIRI	QS
4	NUR FAQIHAH ABD KHRI	QS
5	NURUL LYANA MOHD JAIS	QS
6	NUR FASIAH IBRAHIM	QS
7	NUR FATIN AZIYATI ABD AZIZ	QS
8	ARIBAH HASYIMAH ABDUL RAHMAN	QS
9	WAN MOHAMAD ZULHELMI WAN MOHD ZAMIL	ARCHI
10	SAFARINAI ROSLAN	ARCHI
11	NURUL NABIHAH AZMI	ARCHI
12	HADAH MALIYANAH HISYAM	ARCHI
13	SITI BALQIS SUMAYYAH SALAHUDDIN	ARCHI
14	MUHAMMAD ALIFF AIMAN HEIRUL RIZAL	ARCHI
15	NUR HAYATI YUSOFF	ARCHI
16	NIK AHMAD FAISAL NIK KHAIRUDDIN	ARCHI
17	MUHAMMAD KHAIRUL IRWAN MAT ZIM	AAD (HCT)
18	PUTERI NURUL BARIZAH RIZUAN	AAD (HCT)
19	ATHIRAH HANANI AMRAN	AAD (ID)
20	MUHAMMAD SHAFIE SHAHRUM	AAD (ID)
21	WAN NUR AISYAH DZULKIFLEE	AAD (ID)
22	ANIS FAZREEN M.FADZIL	AAD(HCT)
23	NUR ANISAH RAHMAT	AAD(IDE)

REFERENCES

- Ali, K. K. (2022). A discourse on the Malay cultural identity within the Malaysian society. *Kajian Malaysia*, 40(1), 83–107. <https://doi.org/10.21315/km2022.40.1.5>
- Atef, N., Abdul Rahman, J., Mohd. Din, S. A., & Kamaruddin, Z. (2023, August 18). Characteristics of cabin design for female-friendly car. In 6th International Conference on Architecture and Civil Engineering 2022 (ICACE 2022), Kuala Lumpur, Malaysia.
- Azmin, A. K., Abdullah, F., Sanusi, A. N. Z., Yusof, Z. B., & Asif, N. (2021). Sustainability of Malay wood craftsmanship symbolism in deciphering Malaysia's architectural identity. In DARCH 2021 1st International Conference on Architecture & Design. <https://doi.org/10.46529/darch.202124>
- Corradi, G., Theirs, C., Garcia-Garzon, E., & Barrada, J. R. (2023). A silent burden: How negative experiences with public toilets impact quality of life and life satisfaction. *Scandinavian Journal of Psychology*, 64(4), 495–503. <https://doi.org/10.1111/sjop.12914>
- Ellisa, E., & Luana, L. (2021). Female restrooms in the tourist destination: How the socio-spatial conditions of public toilets influence women's perception of safety. *Journal of Asian Architecture and Building Engineering*, 21(4), 1624–1639. <https://doi.org/10.1080/13467581.2021.1941995>
- Hussain, M. R., Haron, N. A., Effendi, R. A. A. R. A., Rokhani, F. Z., Ahmad, S. A., Ashari, A., Hassan, M. K., Dolah, M. S., & Ramli, S. H. (2023). Design requirement of bathroom and toilet for the elderly in Malaysia. *Pertanika Journal of Science & Technology*, 31(4). <https://doi.org/10.47836/pjst.31.4.15>
- KAED Malay Enclave Site – Kulliyah of Architecture and Environmental Design (KAED). (n.d.). Retrieved from <https://kulliyah.iium.edu.my/kaed/kaed-malay-enclave-site-2/>
- Kostakis, I., & Lolos, S. (2024). Uncovering the impact of cultural heritage on economic growth: Empirical evidence from Greek regions, 2000–2019. *Annals of Regional Science*. <https://doi.org/10.1007/s00168-024-01280-3>
- Mawaddah, M. (2024). Cultural identity of Malaysian Malay ethnic in Perlis village. *ICORHESSTECH2024*, 1(1), 510–518. <https://journal.ibrahimy.ac.id/index.php/icorhestech>
- Mohamad Isham, N. H., Abdul Rahman, H., & Mohamed Zain, I. N. (2022). Community perception and assessment of public toilets in Kuala Lumpur among users of KTM Commuter public toilet. *Malaysian Journal of Medicine and Health Sciences*. eISSN 2636-9346
- Mustafa, N. A. B., & Abdullah, N. C. (2021). Intangible cultural heritage as right to livelihood. *International Journal of Academic Research in Business and Social Sciences*, 11(11). <https://doi.org/10.6007/ijarbs/v11-i11/11472>
- Navarrete-Hernandez, P., Vetro, A., & Concha, P. (2021). Building safer public spaces: Exploring gender difference in the perception of safety in public space through urban design interventions. *Landscape and Urban Planning*, 214, 104180. <https://doi.org/10.1016/j.landurbplan.2021.104180>
- Nazri, A., Raja Abdul Rahman, R. I. S., & Umar, R. S. (2021). Approaching behaviour treatment on a playset furniture. *Design Ideals Journal*, 3(1), 37–40.