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ABSTRACT EXTENDED

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Editors:

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PREFACE

This Abstract Extended is based on the compilation of poster presentations from the International Invention, Innovation & Design Exposition for Built Environment & Engineering 2023 (IIIDBEEX 2023). The IIIDBEEX 2023 serves as a vital platform for students, academicians, and professionals to come together and showcase their research works in the field of built environment. The abstracts featured in this compilation encompass various topics, ranging from sustainable construction practices and smart cities to artificial intelligence applications in construction, engineering, and digital design innovations. We would like to extend our heartfelt gratitude to all the authors who have submitted their work for consideration, and the organizing committee for their tireless efforts in making IIIDBEEX 2023 a success. As we delve into the abstracts within these pages, we hope that you will be inspired by the breadth of knowledge and the spirit of innovation on display. It is our collective hope that the insights shared in this compilation will not only contribute to the academic and professional communities but also stimulate further collaboration and innovation in the pursuit of a more sustainable, efficient, and digitally empowered built environment landscape. We look forward to the continued exchange of ideas and discoveries that will shape the future of the built environment field.

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BIM Education for Quantity Surveying Students Using Revit Tools: Evaluating the Knowledge, Awareness and Perceptions

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Abstract. Building Information Modelling (BIM) is well-known as one of the IT advancements that promotes a team-based, integrated working environment in construction projects. The application of BIM has been widely employed by the architecture, construction, and engineering (AEC) industry to increase project productivity and efficiency. In order to meet the demand for skilled BIM experts, the abilities and knowledge of BIM literate professionals must be developed. As such, by examining the BIM knowledge and skills of the graduates in higher education institutions that include BIM education in their curricula, these fundamentals could be interpreted at the most fundamental level. This paper intends to evaluate students' knowledge of and perceptions regarding BIM competency as well as their awareness to embrace BIM software that could be used in their future careers. A quantitative survey approach was conducted to Semester 3 Quantity Surveying (QS) students taking the course of Computer Aided Design (CAD) and Drawing (BQS516) at the Faculty of Architecture, Planning and Surveying, Universiti Teknologi MARA (UiTM) Shah Alam. As an introductory course to BIM software, the students are required to take the CAD and Drawing course, which is associated to BIM. The respondents for this study were 203 students who enrolled in the course for the first time. Using SPSS software, the quantitative data was analysed. The majority of the students who enrolled in the CAD and Drawing course for the first time had never heard of BIM or Revit, according to survey results. Yet, the majority of the students were delighted and eager to learn more about BIM software. The students also concurred that Revit software will add value to their software abilities and advance their future professional development.

1. Research Background

In countries like the United Kingdom, Singapore, and Hong Kong, the use of BIM has been shown to increase productivity and efficiency throughout the construction process (Building Research Levy, 2016). As a result, the Malaysian government has strongly supported the use of BIM to improve the performance of the country's construction industry (CIDB, 2015). Therefore, in order to satisfy the demands for experienced BIM professionals, improvements to the present construction education system in BIM or information technology curricula, as well as for professional development courses, need to be carefully addressed. Developed countries have made significant attempts to integrate BIM into their educational systems in order to raise awareness of the technology and prepare graduates with the necessary BIM knowledge and abilities (Aziz et al., 2019). Aziz et al. (2019), Howard et al. (2017), Jin et al. (2017), among others, have addressed how different professionals view the use and execution of BIM in the AEC sector. Furthermore, research by Kugbeadjor et al. (2015), Zhao et al. (2015), and Shelbourn et al. (2017) concentrated on the advancement of BIM in higher education's academic and curricular programmes. According to Kugbeadjor et al. (2015), BIM readiness is characterised as the student's openness to learning about BIM and their capacity to function in a BIM-enabled setting. Model-based data analysis, information storage and retrieval, visual decision making, and communication among project stakeholders are all supported by the innovative approach and integrated process known as BIM (Eastman et al., 2008). BIM is different from CAD, which allows for the modelling of a building's

design. CAD, on the other hand, merely offers a depiction of the engineering object (Sacks, 2010). As a result, the introduction of BIM starts a new method of teaching AEC. Stakeholders can efficiently collaborate with BIM, a comprehensive, integrated graphic and alphanumeric database (Thomsen, 2008). BIM data can be used for advanced analysis to perform a number of analytical tasks, including code checking, collision detection, energy efficiency analysis, and structural analysis. The virtual construction model is developed by incorporating time and cost data to the 3D model (Kim, 2012). Academic institutions are considering strategies and approaches to include BIM education into their undergraduate and graduate curricula in response to this promising technology and the industry's demand for relevant skills (Wang & Leite, 2014). Due to the fact that education is always in sync with the industry, the teaching methodology in the field of construction has also evolved recently. The BIM technology has been incorporated into the curriculum for construction education (Kim, 2012).

Therefore, the research issues, aim and objectives are portrayed in Figure 1 and Figure 2 below.

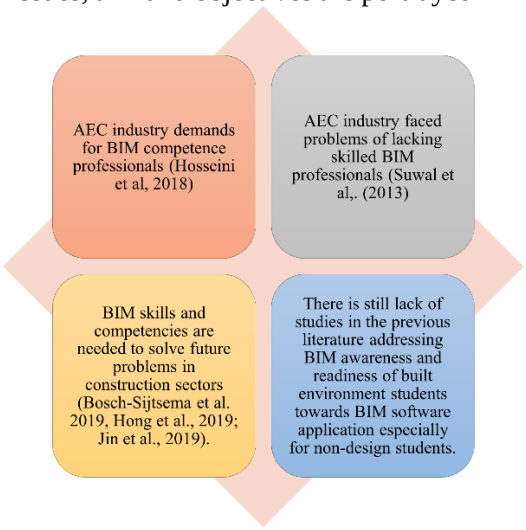

Figure 1: Research issues

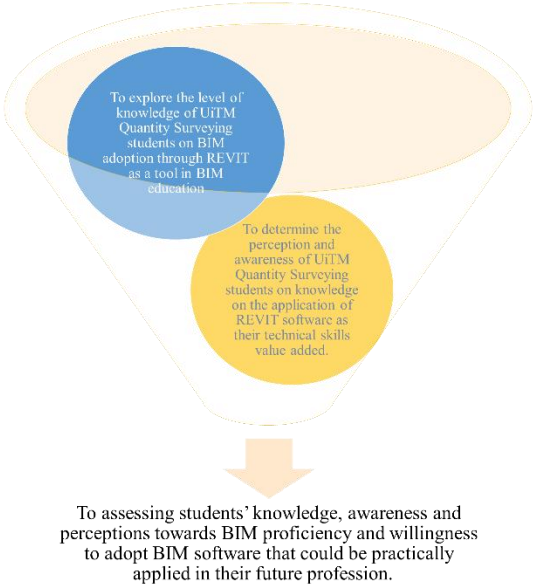

Figure 2: Research aim and objectives

2. Research Methodology

This study conducted a survey using questionnaire distributed amongst the Semester 3 Quantity Surveying (QS) students taking the course Computer Aided Design and Drawing (BQS516) at the Faculty of Architecture, Planning and Surveying, Universiti Teknologi MARA (UiTM) Shah Alam. All QS students must enroll in this 2-credit hour, non-core subject course at the undergraduate level in Semester 3. The course fulfils for two hours each week. The course was originally presented and implemented as a replacement for the previous code of Information Technology (QSM505) throughout the duration of this study, and it has been using the Autodesk Revit software as an educational platform to teach the course for 14 weeks. The course's major parts of the syllabus included an introduction to the Building Information Modeling (BIM) technology. 203 students who enrolled in this course for the first time were the study's target respondents. Statistical Package for Social Science (SPSS) software was used to perform a descriptive analysis of the survey results using measures of skewness, mean value index, and frequency analysis. The study's methodology is shown in Figure 3.

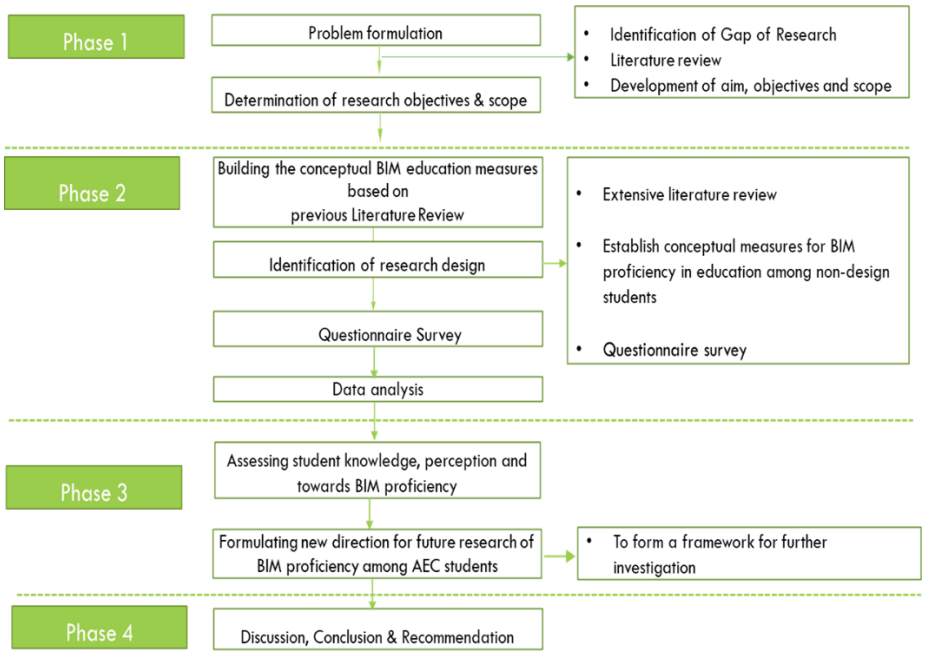

Figure 3: Research methodology

3. Research Findings and Conclusion

The findings from the study are described in Table 1 and Table 2 below. It is clear from the assessment of the students' knowledge and awareness compared to their perceptions about BIM and Revit software that the outcomes were largely encouraging. The majority of the students who responded to the survey stated that they were eager to learn more about BIM and that they were prepared to learn about and experiment with the Revit software, despite the fact that they had no prior knowledge of either concept. As a result, they were unable to comprehend how BIM and Revit operate or what advantages they can have when applying the software to construction projects. Nonetheless, they believed that BIM technology and the use of its tools, like Revit, which were covered in the course syllabus, would help them by adding value to their future professional development.

Table 1: Findings on knowledge and awareness on BIM and Revit software

		BIM		REVIT	
Questions		***Frequency (No.)***	***Percentage (%)***	***Frequency (No.)***	***Percentage (%)***
Have you heard of BIM/ Autodesk Revit Architecture before? (Without knowing what it is)	Never	119	58.6	119	58.6
	Rarely	30	14.8	38	18.7
	Sometimes	40	19.7	28	13.8
	Often	7	3.4	15	7.4
	Always	7	3.4	3	1.5
	Total	203	100.0	203	100.0
Do you know the application of BIM/ Autodesk Revit Architecture?	Never	154	75.9	149	73.4
	Rarely	31	15.3	33	16.3
	Sometimes	15	7.4	14	6.9
	Often	2	1.0	6	3.0
	Always	1	0.5	1	0.5
	Total	203	100.0	203	100.0
Do you have any idea how BIM/ Autodesk Revit Architecture works? (In term of technical aspect)	Never	159	78.3	154	75.9
	Rarely	30	14.8	34	16.7
	Sometimes	10	4.9	11	5.4
	Often	2	1.0	2	1.0
	Always	2	1.0	2	1.0
	Total	203	100.0	203	100.0
Are you aware of what BIM/ Autodesk Revit Architecture can bring to construction projects?	Never	128	63.1	138	68.0
	Rarely	35	17.2	30	14.8
	Sometimes	24	11.8	22	10.8
	Often	13	6.4	8	3.9
	Always	3	1.5	5	2.5
	Total	203	100.0	203	100.0
Are you aware of the main benefits of BIM/ Autodesk Revit Architecture?	Never	137	67.5	148	72.9
	Rarely	32	15.8	31	15.3
	Sometimes	22	10.8	14	6.9
	Often	7	3.4	6	3.0
	Always	5	2.5	4	2.0
	Total	203	100.0	203	100.0

Table 2: Findings on perceptions towards BIM and Revit Software application

	Statements	***Min.***	***Max.***	***Mean***	***SD***	***Var***	***Skewness***	
Perception on BIM	I am excited to know more about BIM	1.00	5.00	3.28	1.497	2.240	-.419	.171
	I know BIM will give me added value to my future career development	1.00	5.00	3.20	1.543	2.380	-.302	.171
	I understood the definition of BIM	1.00	4.00	1.62	0.844	0.713	1.126	.171
	I understand the key concept and usefulness of BIM for construction industry	1.00	4.00	1.58	0.813	0.661	1.090	.171
	I have read about BIM, before I am taking this course	1.00	5.00	1.57	0.872	0.761	1.586	.171
Perception on Revit Software	I know Revit will give me added value to my future career development	1.00	5.00	3.36	1.474	2.173	-.452	.171
	I am ready to learn and explore Revit	1.00	5.00	3.28	1.477	2.183	-.420	.171
	I think I can learn Revit through website i.e. YouTube Manual etc.	1.00	5.00	2.29	1.138	1.296	.243	.171
	I understand the important and usefulness of Revit for QS job scope	1.00	5.00	1.91	1.140	1.299	.945	.171
	I have experience with Revit before I am taking this course	1.00	4.00	1.36	0.663	0.439	1.920	.171

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Empowering Special Property Development Entity (SPDE) for Waqf Land Development

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Abstract. Special Property Development Entity (SPDE) is a term referring to a specialised subsidiary to conduct waqf land development. At the moment only several SPDEs are available in developing waqf lands in Malaysia despite the approach is common in any construction industry. With the intention to see optimisation of waqf land usage, this study would like to propose components to empower waqf land Special Property Development Entity (SPDE). Through comprehensive literature search, interviews and case studies, this study was managed to develop a validated framework to empower the SPDE. The framework consists of three main components and eight sub-components. The main components are the Spiritual Component Operational Components and Aims Components. Meanwhile the sub-components are the tawheedic concept as the organizational value; autonomy management structure; knowledge and expertise; finance; project management, supervision and monitoring; project delivery and maintenance; mardhatillah; and SDGs. Besides focussing on the operational aspects, this framework wants the SPDE to internalise the pure intention of developing the waqf land and recognize the spiritual aspects. So that the SPDE or the development actor would become more responsible and deliver the best for the waqf.

1. Background of the Study

Waqf institution in the Muslim world had faced many challenges during the modern era due to national reforms in many Islamic countries, especially after colonization by the Imperial powers which abolished, nationalized and overly regulated the institution [1]–[4]. In other words, the waqf institution had been neglected and forgotten as a reliable instrument to protect the socio-economic and wellness of the people [5]. Thus, the revival efforts on waqf institution are needed because it can enhance socio-economic wellness and save on government spendings.

Due to the lack of appropriate efforts in the aspect of development, the majority of waqf land is yet to unlock its latent values. Even though there are a variety of approaches were being implemented to develop waqf lands, evidence from Yayasan Waqaf Malaysia (2016) however suggest that waqf development is far from optimum [6]. Thus, more strategies are needed to provide more options such as capitalizing the property developers. The involvements of property developers are expected to improve waqf land development because they are the main agents in producing built environment products and shaping city growth [7], [8]. Furthermore, they are professionally trained to seek opportunities on the lands and create potentials. The record had shown that several property developers had worked together with the State Islamic Religious Councils (SIRCs) to develop waqf lands. However, not many property developers were interested in getting involved because waqf has some restrictions that are slightly tedious to deal compared to normal lands. Furthermore, there are issues involving the suspicion and imbalanced dealings between the property developers and SIRCs when both parties were strategizing strategies to secure their interests.

Regarding the abovementioned concerns, the Special Property Development Entity (SPDE) became an option because it is a specialized property developer which is responsible on waqf land development and is a structurally subsidiary of SIRCs, waqf governing agency or any related organisation. Conceptually, a subsidiary will follow its terms of reference and align its objectives toward the aspiration of its parent organisation. The approach is newly implemented in Malaysian waqf institution after Selangor and UDA Holdings had implemented it for waqf land development. However, it has not been critically explored and has yet to produce the expected results despite the approach is proven to be successful in other real estate sectors in Malaysia and waqf sector in Singapore. Hence, some components to empower waqf SPDE need to be explored and suggested to become a standard implementation for waqf SPDE. There are rooms to empower the waqf SPDE and create better waqf land development opportunity in the country.

Special Property Development Entity (SPDE) Empowerment Components

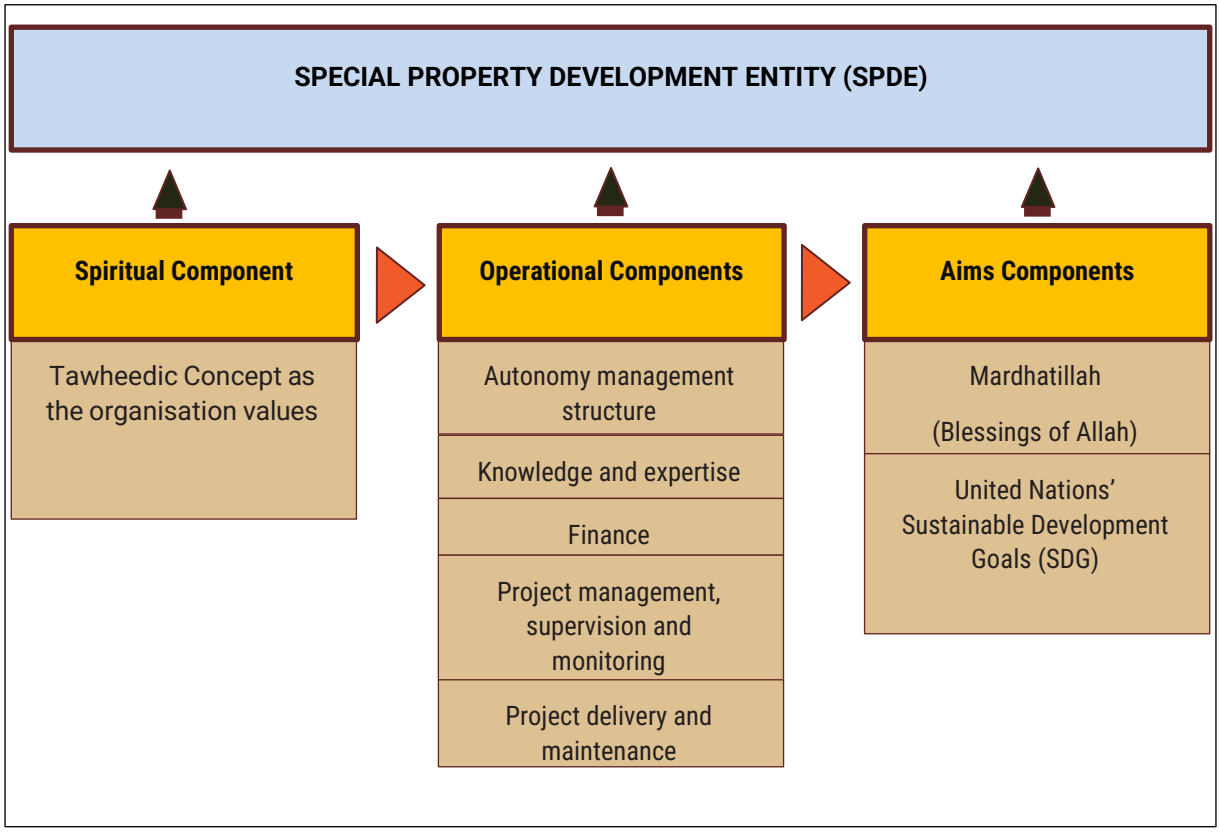

Figure 1: The empowerment framework for Special Property Development Entity

The SPDE empowerment framework for waqf land development has 3 main components namely the Spiritual Components, Operational Components and Aims Components. Also, there are 8 sub-components that are inter-related with each other to contribute to the robust setup of an SPDE.

1. **Tawheedic** - the spiritual element that the SPDE for waqf development should embrace. This element of tawheedic will shape the organisational character of the waqf SPDE and its business model. It binds the good self-conduct and professional practices in delivering waqf development, thus portray exemplary Islamic organisation.
2. **Autonomy management structure** - the autonomy management structure would benefit the SPDE by providing the freedom to control its operation, design the internal system, make any strategic decisions, respond to the market environment and many more.
3. **Knowledge and expertise** - the ability of the SPDE to attract and retain the talent within the organisation which requires effective human resource management.

4. **Financial** - vital to ensure the sustainability of the SPDE. It includes the strategy to obtain, spend, maintain and invest in its financial sources.
5. **Project management, supervision and monitoring** - In managing the development project, the SPDE must understand the intention or deeds of the waqf and incorporate them in the development projects.
6. **Project delivery and maintenance** - Accountability during the post-development stage is important because waqf must be well maintained and sustainably deliver the benefits to its beneficiaries.
7. **Mardhatillah (blessings of Allah)** - being reckoned as the aim of the development. Whereby the success of a development is measured by whether the development actor is getting the blessings from Allah for his action and being rewarded with paradise in the hereafter. It looks intangible, but it can be understood through understanding of the tasawwur.
8. **Sustainable Development Goals (SDGs)** - is a global agenda by the United Nation that intends to improve peace and prosperity, globally through the participation of the global community, including the philanthropic sector such as waqf.

The framework is holistic, which encompassing the spirituality, operational and motivational aspects for Muslim entity. It is possible to accommodate the development model for religious related properties. All the components in the framework are derived from thorough study of literature and practices. On top of that, the framework had gone through two rounds of validation.

This final SPDE empowerment framework had been simplified by categorizing the components based on three roles: spiritual, operational and aims. These categories were organised in a sequence to show how one component relates to another and how these components contribute to the empowerment process of the SPDE. Hence, the waqf SPDE can focus on the roles and components that require improvements.

This study had incorporated the gist of the Structuration theory, Structure and Agency model, Islamic-based Model and the information from the findings to guide the construction of a framework to empower the waqf SPDE as one of the strategies to boost the development of waqf lands in Malaysia. These key components are necessary to maintain the integration between the theory and the findings, although some interpretations are also needed.

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Assessing Semi-Outdoor Thermal Environment at Higher Learning Institution in A Hot Humid Climate

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Abstract. Outdoor environments at a higher learning institution can have a significant impact on students' experience and well-being. Outdoor spaces can provide students with a sense of connection to nature, which has been shown to have a number of positive effects, including reducing stress and increasing overall well-being. This paper appraises the thermal condition of semi-outdoor environment of higher learning institution in a hot humid climate. The physical measurement in selected semi-outdoor sites were evaluated based upon the measurement of major climatic parameters. The Physiologically Equivalent Temperature (PET) thermal comfort index was utilized to assess the thermal comfort conditions of selected sites. The result reveal that air temperature and relative humidity influenced the level of PET. Other than that, vegetation or plant surfaces and area features have significant contribution to PET.

1. Introduction

Outdoor thermal comfort (OTC) refers to a person's subjective perception of the temperature and other thermal conditions in an outdoor environment. Thermal comfort is the psychological state that reflects contentment with the thermal conditions and is determined by subjective views [1]. It is described as the human impression of the thermal environment as being adequate. People have different preferences for thermal comfort, and what may feel comfortable for one person may not be comfortable for another. OTC is influenced by a variety of factors, including the temperature, humidity, wind speed, solar radiation, and clothing worn by the person. In areas with rapid urbanization and high density, OTC is also affected by the impacts of the urban heat island (UHI) [2].

Physiologically Equivalent Temperature (PET) is a measure of the thermal comfort of a person in an outdoor environment, based on the temperature, humidity, wind speed, and solar radiation present. It considers the combined effect of these factors on a person's heat balance and can be used to predict how comfortable a person will feel in each outdoor environment. PET is commonly used in outdoor space design and outdoor thermal comfort research.

There have been few studies on OTC using PET in urban tropical countries. For example, Sharmin et al. [3] conducted a study to investigate the influence of urban microclimate on OTC among pedestrians in the tropical city of Dhaka. Wai et al. [4] also studied OTC, examining the connection between pedestrian-level OTC and building morphology in a densely populated city. Acero et al. [5] conducted a study on thermal comfort in outdoor and semi-outdoor regions in urban parks and non-vegetated urban canyons in Singapore and found that thermal comfort levels were enhanced in tropical semi-outdoor areas compared to outdoor areas. However, the study of OTC at

higher learning institutions in hot humid climate has not been adequately examined. The objective of this paper is to evaluate the outdoor thermal environment by applying PET assessment.

2. Methodology

2.1 The study area

This study was conducted in selected semi-outdoor areas at the main campus of Universiti Teknologi MARA (UiTM) in Shah Alam, Selangor (3.0698° N, 101.5037° E). This university is in a densely populated urban area. The climate of Shah Alam is hot and humid tropical, with abundant rainfall and constant temperatures ranging from a high of 31-33°C to a low of 22-23.5°C [6], [7]. Humidity levels average 80.5% per year, with the most humid month being December and the driest month being July.

2.2 Field measurement

The thermal environment of the semi-outdoor microclimate was measured using a Delta Ohm data logger (HD32.3 instrument). This instrument recorded parameters such as ambient air temperature (Ta), relative humidity (RH), air velocity (v), and mean radiant temperature (Tmrt). The data was collected at 10-minute intervals between 1000 and 1500 h each day for a two-week sampling period. All microclimate parameters were measured 1.5 m above the ground.

3.3 Physiologically Equivalent Temperature Analysis

All the data obtained from field measurement were used to calculate the PET value by using Rayman software As mentioned by Matzarakis [8] and Aghamohammadi et al., [9] to assess thermal indices such as PET in urban structure, Rayman 1.2 software is used.

3. Findings

3.1 Physiological Equivalent Temperature (PET)

The descriptive statistical data of semi-outdoor thermal environment parameters are tabulated in Table 1. The mean PET values for the three different semi-outdoor sites were 42.3, 44.5 and 40.1 ^{o}C respectively. While the range PET values for all sites studied were between 34.2 – 47.6 ^{o}C. These data indicated that all semi-outdoor sites in this study can be classified as between hot to very hot (Refer Table 2).

Table 1**:** The measurement value of semi-outdoor thermal environment

Location		Thermal Environment Parameters				PET (°C)
		Air Temperature, T_a (°C)	Globe Temperature, T_g (°C)	Relative Humidity, RH (%)	Air Movement, *v* (m/s)	
Semi-outdoor A	Mean	31.0	31.9	61.9	1.40	42.3
	Standard Deviation	1.4	1.6	7.1	0.70	2.1

	Range	28.1 – 33.4	28.5 – 34.2	51.0 – 76.0	0.50 – 3.80	37.4 – 46.6
Semi-outdoor B	Mean	31.7	32.6	59.7	0.80	44.5
	Standard Deviation	1.0	0.9	4.8	0.30	1.3
	Range	29.8 – 33.0	31.0 – 34.1	53.0 – 69.0	0.30 – 1.40	41.6 – 47.6
Semi-outdoor C	Mean	29.3	30.1	66.8	1.34	40.1
	Standard Deviation	0.6	0.7	2.9	0.50	2.4
	Range	27.9 – 30.3	28.7 – 31.6	61.9 – 71.7	0.55 – 2.42	34.2 – 45.8

Table 2: Thermal sensations and PET classes for Taiwan and Western/ Middle European classes

Thermal perception	PET range for Taiwan (°C PET)	PET range for Western/ Middle European cities (°C PET)
Very cold	<14	<4
Cold	14–18	4–8
Cool	18–22	8–13
Slightly cool	22–26	13–18
Neutral	26–30	18–23
Slightly warm	30–34	23–29
Warm	34–38	29–35
Hot	38–42	35–41
Very hot	>42	>41

Source: Lin and Matzarakis [10]

The different PET values of three different semi-outdoor sites have been influenced by the air temperature and humidity of the surrounding microclimate as mentioned in Acero et al., [5]. Besides that, the area features for each site such as the vegetation also influence the PET value. Makaremi, *et. al*. [11] and Zhang *et al*., [12] had suggested that OTC can be enhanced by modifying the vegetation, urban geometry, surfaces, and waterbodies.

4. Conclusion

Thermal environment of semi-outdoor microclimate measurement was carried out in three different area in higher learning institution at hot humid climate. The result reveal that air temperature and

relative humidity influenced the level of PET. Also, vegetation or plant surfaces and area features have significant contribution to PET.

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Evaluating The Thermal Environment in A Naturally Ventilated High-Rise Residential College Building

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Abstract. Thermal comfort is an important factor in hostel buildings as it can affect student productivity. Achieving thermal comfort in a hostel building in a hot, humid climate can be challenging due to extreme weather conditions. This research aims to investigate the comfort temperature ranges for students in residential college universities in Malaysia. The study measures indoor thermal conditions using the thermal microclimate HD32.3TC and HD32.3 instruments and is based on field measurements and observations of the thermal environment of students in the hostel. The findings of the study reveal that the level floor of the high-rise building influences the indoor thermal environment.

1. Introduction

Thermal comfort is a state of satisfaction with the thermal environment. It is defined by ASHRAE as the range of operative temperatures that provide acceptable thermal conditionsor the combinations of air temperature and mean radiant temperature that people find thermally acceptable. Thermal comfort is important in student hostels because it can affect students' comfort, health, learning, and overall quality of life. To create thermal comfort in free-running buildings, it is important to consider factors such as the climate-responsive envelope, ventilation, and behavioral controls [1]. Understanding occupant thermal comfort and adaptation in the built environment is crucial for controlling different environmental parameters such as air temperature, radiant temperature, humidity, and air velocity in student hostels.

There have been several thermal comfort studies conducted in student accommodations across the world, including in India [1], Singapore [2], and China [3], to understand the range of acceptable thermal comfort for students and how they adapt to restore their thermal comfort. For example, Gouet al. [2] conducted a study on the thermal comfort in student accommodation at the National University of Singapore, measuring thermal comfort, adaptive behaviors, and indoor environmental qualities. The results showed that building B's occupants were more accepting of thermal environments that did not meet the ASHRAE thermal comfort criteria f or naturally conditioned spaces.

This research aims to investigate the thermal environmental ranges for students in residential college universities in Malaysia, study case in high-rise building at Universiti Teknologi MARA, Shah Alam.

2. Methodology

2.1 Study buildings

The field study at Universiti Teknologi MARA (UiTM) Shah Alam campus was conducted in naturally ventilated high-rise hostel buildings. Permission was obtained to use three hostel rooms from the residential college campus at UiTM for the study. The design of the building and hostel rooms were also recorded. The hostel rooms in the study were identified by their floorlevel and room number. Each occupancy room in the hostels had a ceiling fan and a fluorescent lamp that were adjusted according to the number of people in the room.

2.2 Field measurement

There are four parameters in this study that influence thermal comfort: room air temperature, humidity, air velocity, and mean radiant temperature. These parameters were measured using the thermal microclimate HD32.3TC and HD32.3 instruments, which obtain three probe inputs with SICRAM modules. The instruments were placed in the center of the hostel room at a height of 1.1m from the floor and were used to record data for 48 hours in each hostel room. The SICRAM module served as an interface between the instruments and the sensors, communicating sensor parameters and calibration data to the instruments. Figure 1 shows of the instrument setup in the hostel rooms.

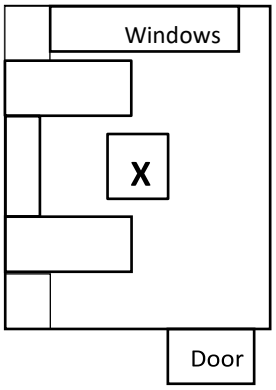

Figure 1: The setting of the instrument in the study area

3. Findings

The statistical data of indoor environmental parameters which are air temperature, humidity, air velocity, and radiant temperature for hostel rooms consists of its mean, standard deviation and range are tabulated in Table 1.

Table 1: The statistical data of indoor environmental parameters

Environmental Parameters			Air Temperature (°C)	Relative Humidity (%)	Air Speed (m/s)	Radiant Temperature (°C)
Ground level	Room 1	Mean	29.6	68.9	0.16	29.5
		Standard Deviation	0.3	2.8	0.04	0.3
		Range	29 – 30.2	62.2 – 73.3	0 – 0.31	28.9 – 30.1
Level 6	Room 2	Mean	29.1	72.1	0.05	28.9
		Standard Deviation	0.3	2.8	0.03	0.3
		Range	28.5 – 29.7	64.6 – 76.6	0 – 0.18	28.3 – 29.5
Level 9	Room 3	Mean	28.4	73.5	0.10	28.3
		Standard Deviation	0.5	2.5	0.05	0.4
		Range	27.4 – 29.5	67.7 – 78.8	0 – 0.28	27.3 – 29.5

The data showed that the air and radiant temperatures in each room were lower on higher floors, with air temperatures of 29.6 ºC, 29.1 ºC, and 28.4 ºC and radiant temperatures of 29.5 ºC, 28.9 ºC, and 28.3 ºC respectively. The relative humidity data showed a correlation with the level of the building, with higher values on the upper floors. There was no significant difference in air speed between the rooms. Previous research has also demonstrated that building height has a significant impact on surface temperature [4]. These findings suggest that there is a difference in surface temperature of more than 2°C between the lower and upper floors. In addition, occupant behavior regarding window opening may also affect the indoor thermal environment [5].

4. Conclusion

In summary, the results of this study indicate that thermal environment is a crucial aspect in student hostels because it can influence student comfort, health, and learning. The study found that several environmental parameters, including air temperature, relative humidity, air velocity, and mean radiant temperature, can affect thermal comfort, and should be properly controlled to provide a comfortable living environment for students. The data showed that the level floor of the high-rise building influences the indoor thermal environment. To ensure a comfortable living environment for students, it is important to consider and manage these environmental parameters carefully to maintain thermal comfort.

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Factors Affecting Place Attachment and Living Arrangement Among Generations in Shah Alam, Selangor

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Abstract. One of the features of a home that buyer's favour is the physical surroundings. The physical surroundings of the home will have an impact on the residents' interactions and activities, which may lead to harmony among them. Therefore, the aim of this study is to provide an overview on the place attachment factors and living arrangement structure preferences that affecting the generation in Shah Alam, Selangor. The findings will provide which place attachment features preferred by the generation of Shah Alam housing consumers. Additionally, this study can get to identify the details about the structure of living that chosen by generations to determine the factors that contribute to it. The objectives of this study: (i) to explain the meaning and categories of generations for housing study, (ii) to identify the factors of place attachment and living arrangement preference and (iii) to determine the factor of affecting place attachment and living arrangement preferences among generations in Shah Alam, Selangor. This study uses a mixed-methods approach that combines qualitative and quantitative data. The estate agent was interviewed for the qualitative data, and 110 people from different generations which is Baby Boomers, Generation X, Generation Y, and Generation Z in Shah Alam filled out the survey questionnaires to collect the quantitative data. The findings of this study are important and will be useful to the actors of development process such as estate agent and housing developers, society, and residents among generations.

1. Introduction

A generation is defined as all the people in a group or country who are the same age, especially when they share similar experiences or opinions. Age, period, and cohort can be used to define the meaning of generations in short way. In Malaysia, there have been categorized the group of ages into 4 part which is Baby Boomers (54-72years old), Gen X (39-53), Millennials (24-38 years old) and Gen Z (6-23 years old). Young age is between to Gen z and working age is between to Millennials & Gen X. The higher generation is belonged to working age with 69.7%, followed by young age with 23.3% and old age 7.0%. This age figure makes the population increase. Malaysia's population in 2021 is estimated at 32.7 million as compared to 32.6 million in 2020 according to Department of Statistic Malaysia (DOSM). Due to the growing population, most things will be affected and one of them is the housing sector. The real estate sector in Malaysia is still in encouraging growth but over the past year there have been many conflicts. The government is also visible is taking several initiatives to rebuild and develop these crippled sectors and include among them is the property sector. This clearly stated the relationship of place of a housing and people is the things that become an issue that need to be identified. People begin to know themselves guided by a place attachment.

Place attachment is defined as a positive emotions link between a person and a location, and it frequently manifests as pride in one's home and its attractiveness (Bulletin, 2015). The actual meaning of place is comprehensive and expressed in a variety of contexts and of them can be defined as positive affective relationship. Literarily, living arrangement can be consider as a

household patterns of individual. On other perspective of people, they prefer to lonely living, some more prefer to stay in with the family not to forget there is also preferring to live with friends. In general, investigations on living arrangements have assumed that in any community, there is a convergence between preferred and actual living arrangements (Panigrahi, 2009).

2. Methodology

Research design and methodology is the path by which researchers must perform their research is known as research methodology. It demonstrates how these researchers construct their problem and purpose, as well as how they present their findings based on the data collected during the study period (Sileyew, n.d.). Additionally, this chapter on research design and technique also explains how the final research result will be obtained in accordance with the study's goal.

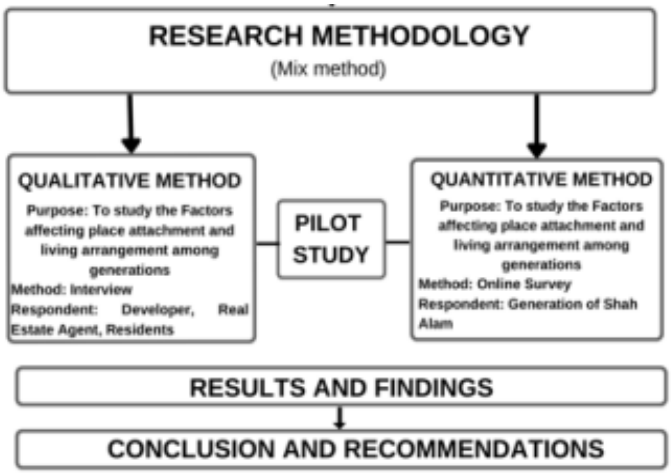

Figure 1: Research Diagram

3. Results and Findings

As many as 110 respondents among generations in Shah Alam, Selangor participate to fill out the questionnaire for quantitative and qualitative data.

Table 1: Place attachment features preference among Generation in Shah Alam, Selangor

Generation / **Level of important**	**Baby Boomers**	**Generation X**	**Generation Y**	**Generation Z**
1st	Well- being engendered	Human Characteristics	Facilities & Amenities	Job prospect
2nd	Physical Attributes	Economic	Cost of living	Education
3rd	Human Characteristic	Region	Culture & entertainment	Economic

The table above shows the results on level of important to the place by generations. Baby boomers stated, well-being engendered is the most important that affect to the place. While human characteristic is the most important factors among Generation X. Besides, Generation Y is more

on facilities and amenities and Gen Z is look on the career where it's more important when job prospect is attainable around the place.

Table 2: Living Arrangement preference among Generation in Shah Alam, Selangor

Generation	**Baby Boomers**		**Generation X**		**Generation Y**		**Generation Z**	
Factors	mean	Std. deviation	Mean	Std deviation	Mean	Std deviation	Mean	Std deviation
1. Living Alone								
Level of dependency	2.1786	.86297	2.0800	.75939	2.6071	1.34272	2.0000	.92582
Connectedness	1.9643	.74447	2.1600	.80000	2.5000	1.07152	2.1724	1.03748
Problem with the activities of daily living	2.8571	.80343	2.4400	.71181	2.5357	1.03574	2.3448	.85673
2. Living with Parents								
Responsibility	1.6429	1.09593	1.6000	.70711	2.3571	1.19301	1.8966	.93903
Family formation	1.6429	1.09593	1.7600	.72342	2.4286	1.16837	1.8621	.87522
3. Living with spouse								
Aging of householders	1.7500	.75154	2.0000	.64550	2.0000	1.15470	1.8621	.74278
Physical needs	1.5714	.69007	1.9200	.64031	2.0000	1.12217	1.8621	.74278
Geographic relocation	1.6429	.67847	2.0800	.64031	2.0000	1.08866	2.0345	.90565
4. Living with Married sons/daughter								
Marital/family status	2.5000	.79349	2.5600	.76811	2.7500	1.10972	2.5172	.78471
Support system	2.1429	.75593	2.1600	.74610	2.7857	1.13389	2.4828	.68768
Health and wellbeing of the elderly	1.8571	.70523	2.1200	.66583	2.5714	1.06904	2.4138	.68229
5. Living with Nonrelatives members								
Cultural differences	3.3214	.81892	2.5200	.71414	2.6786	1.15642	2.3448	.72091
Community involvement	3.2143	.91721	2.4400	.65064	2.6071	1.16553	2.4483	.78314
Career	2.1071	1.34272	2.2000	.76376	2.5000	1.23228	2.2759	.79716

The findings above show about the structure that generations Living arrangements refer to the structure and composition of one's household. Choosing to live or stay with who we want is basically one of the main cores in household and there has a various structure type of living arrangement. The structure includes living alone, living with parents, living with spouse, living with married sons/daughter, and living with non-relatives' member.

The following attributes based on the level of preferences of living arrangement structure from the generation. On the first factors which is living alone, *problems with the activities of daily living* are rank as 1st factors that chosen by Baby Boomers. The mean (2.8571) is highest than level of dependency and connectedness. While Generation X and Y mostly prefer to living alone because of level of dependency with (2.0800) and (2.6071). Different with Generation Z, the factor for living alone is synonym with Baby Boomers with (2.3448). Next factors are living with parents. Baby Boomers have not so much different between the two factors: - responsibility and family formation because of the reading of mean is same with (1.6429). Generation X and Y get a same reading where Family formation is the best factor for living with parents as structure of living arrangement. Thus, responsibility is the best factors for Generation Z (0.93903).

For the third factors of structure of living, Baby Boomers more prefer as aging of householders while Generation X and Z is more like on geographic. Living with married sons/daughter as fourth factors stated that Baby Boomers, Generation X, and Generation Z more prefer on about marital and family status. While Generation Y prefer on support system. Last but not least, living with member factors consist of three items. Cultural differences are chosen among Baby Boomers, Generation Y, and Generation X. While Generation Z more prefer on community involvement.

4. Conclusion

Each generation in Shah Alam has a different preference for how their living arrangements should be structured and the factors that affecting in place attachment towards of their housing.

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Investigating Physical Inaccessibility Impacts by Exploring Structural and Psycho-Emotional Dimension of Disability through Go-Along (GOAL) Interview Method

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Abstract. Accessibility enables disabled people to have full participation in society that supposed to lead to social justice and equity, thus promote social sustainability. Public places and public buildings should be planned and designed based on the accessible manner to ensure that everyone could have access to the physical environment. However, literature show that physical barriers in the built environment hindered disabled people full participation in the society that resulted to marginalisation. Buildings and public spaces are commonly assessed using a checklist based on accessibility standards or guidelines. Little attention has been paid to disabled people's lived experience or psychological and emotional perspectives when negotiating built environment barriers. Therefore, the researchers adopted go-along interview method, to gain in-depth understanding of accessibility and inclusion issues with 20 mobility impaired participants. Generally, disabled people are still struggling for inclusion since there are so many impediments preventing them as evidenced in the go-along interviews. The disabling barriers are not only physical (structural) such as inappropriate ramp gradient, but also act through a psycho-emotional dimension. However, the way disabled people perceived barriers was different from one person to another based on their personal biographies, even though individuals may use the same type of walking aid and have the same kind of impairment. It is recommended that go-along interview method to be used extensively in adressing psycho-emotional dimension of disability.

1. Introduction

Physical barriers in the built environment hindered disabled people from fully participating in society, resulting in their marginalisation [1]. Traditional medical model views disability as a medical issue, emphasising that impairment or deformity of the body is the cause of their difficulties [2]–[4]. However, according to the social model of disability, an inaccessible built environment disables disabled people [4]. The impairment, such as a deformed limb, is not the reason a person is considered disabled. The 'barrier' is society's inability to make reasonable adjustments; therefore, according to the social model of disability, when barriers are removed, disabled people can be independent and have control over their lives.

An extended social-relational model of disability that includes structural (physical) and psycho-emotional dimensions was introduced in 1999 [5]. Reeve [5] explains that, being stared at, pitied, condescended to, and hated are psycho-emotional dimension of disability. Disabled people have diverse biographies and experience disability differently (e.g., gender, ethnicity, and how their impairment is embodied) [5]. However, recognising both the social and medical models of disability contributes to a more comprehensive understanding of disability [6].

Globally, buildings and public spaces are assessed using a checklist based on accessibility standards or guidelines (access audit) [1]. Little attention has been paid to disabled people's lived experience or psychological and emotional perspectives when negotiating built environment barriers. This ignores the fact that disability and the built environment are strongly linked, as disability encompasses structural and psycho-emotional dimensions.

Therefore, the researcher adopted go-along interview, a type of walking interview typically employed in ethnography research, to gain in-depth understanding of accessibility and inclusion issues among disabled people. Walking interview is an ideal technique for exploring issues around people's relationship with space [8],[9]. Evans and Jones [8] assert that '*walking interviews generate richer data because interviewees are prompted by meanings and connections to the surrounding environment and are less likely to try and give the 'right' answer*'.

2. Go-along Interview Method

A go-along interview is where the researcher walks alongside the participant while the interview is conducted in a given location [1],[10]. According to Kusenbach [10], the go-along interview method has the potential '*to access some of the transcendent and reflexive aspects of lived experience in situ*' with the combination of participant observation and conversation. In contrast to the conventional interview method, this approach permits the researcher to observe not only the participants' spoken responses, but also their faces, bodies, and voice tones as they communicate their experiences while accessing or attempting to access building and public space [9].

This research focuses on the disabled participants' views and experience in accessing Kuala Lumpur (KL) city centre in a natural setting '*for exploring and understanding the meaning individuals ascribe to a social or human problem*' [11]. In analysing situations that had psycho-emotional effects on disabled people while experiencing physical barriers (and facilitators) in KL city centre, needed in-depth exploration to be interpreted. The researcher walked alongside 20 disabled people or '*Orang Kurang Upaya*' (OKU, commonly used in Malaysia) in pedestrian walkways, buildings and public spaces, and ride-along with each participant using the participants' preferred mode of transportation. The journey began at participants' homes or a nearby meeting location.

3. Results

Generally, OKU are still struggling for inclusion since there are so many impediments preventing them as evidenced in the go-along interviews. The disabling barriers are not only physical (structural) such as inappropriate ramp gradient, but also act through a psycho-emotional dimension. However, the way OKU perceived barriers in both structural and psycho-emotional aspects was different from one person to another even though individuals may use the same type of walking aid and have the same kind of impairment.

With the on-going struggle in facing barriers, some OKU might just give up continuing their journey. The feeling of frustration and lack of security to continue the journey for example, are part of the negative effects from the psycho-emotional dimension of disability. Both the structural disability and psycho-emotional dimension of disability indicate a form of injustice by means of a detrimental or inadequate environment that has effects and consequences in terms of social exclusion.

OKU's inclusion are also affected by the negative attitude of the general public that can be witnessed in the go-along journey. The negative attitude among the wider public can be seen while they interact with disabled people or not interacting with them despite their presence. Negative attitude towards OKU evidenced that barriers faced by OKU are not only physical but also attitudinal [12]; those are socially constructed, as viewed by the social model of disability [4].

When wheelchair users needed to be carried by others in climbing up or down a staircase, they were compromising their safety. Fear and anxiety of having to face such barriers in the built environment affected OKU's emotions and bodily integrity. Moreover, being literally lifted by others to get to another floor level, makes OKU feel uncomfortable (e.g., for safety concerns and being watched by others); it also makes them feel inferior for not being able to do things independently. These feelings are among the impacts that could restrict OKU from enjoying social life. This issue also caused some of the participating OKU to feel they might just give up continuing their journey and prevented them from living to their full potential.

4. Conclusion

Learning 'with' disabled participants is more effective in understanding the disability-environment context compared to learning through research that is 'about' disabled people's experiences or by only conducting traditional interviews with them. There were so many precious experiences that the researcher would not be able to achieve through reading or listening, but gathered through the go-along journey. The researcher not only observed the participant but was involved with empathy in what the participant experienced in the journey as the researcher was directly faced the challenges with them, especially when they could not find any help from others (or help was offered late). Hence, other knowledge was also gained while conducting this method that could also contribute to an inclusive environment. For instance, on disabled people's emotions (and the caretaker or companion as well) within human-environment interactions.

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Analyses of Least Square Methods for Outlier(S) Detection in Cadastral Network Adjustment

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Abstract. As the Department of Survey and Mapping Malaysia (DSMM) moving towards positional accuracy improvement (PAI), the outlier filtering procedure has become a crucial element in cadastral network adjustment to enhance the positional accuracy of National Digital Cadastral Database (NDCDB). This is of greater concern when multi-classes of cadastral legacy datasets are still being used and that the human-intervene projection of land record is ineluctable. Relying on commercial adjustment software (i.e. StarNet) has limited the potential of Least Square Adjustment (LSA) to sensitively identify outliers in the cadastral datasets. Therefore, the aim of this study is to statistically evaluate the effectiveness of least square outlier(s) detection methods in enhancing the positioning accuracy of spatial data. To evaluate the efficiency of the methods from former studies such as Baarda, StarNet, Tau and Danish, this study utilised simulated traverse data with errors to examine the reliability of the developed program. This study then implemented six (6) certified plans (CPs) to identify the effectiveness of the proposed methods in real applications. Three (3) phases were designed to carry out data processing of this study: i) Computation of LSA, ii) Global test, and iii) Local test. The statistical test of standardised residuals was conducted in the final phase to determine the presence of gross error in the observations, and subsequently used to compare with critical value of each method determining if a method is sensitive to outlier(s). The findings reveal that the excellent performance of outlier detection when tested on both combination of similar and different survey's classes is demonstrated using Danish method.

1. Introduction

The integration from an old cadastral paper map into a new cadastral database (i.e. NDCDB) that merges various data sources, and techniques of measurement has contributed to the errors particularly in the digitizing process. Hence, outlier detection is an essential approach to preserve the positional accuracy of a cadastral database. In geomatics field, the datasets are rarely to be free of errors, and when there are errors in a data, a least squares adjustment will generate poor or invalid results. Consequently, the improvement in positional accuracy will be hindered because outliers can diminish the amount of information in survey datasets and making data analysis harder as well as potentially leading to a choice based on erroneous data [1].

Clearly, resurveying cadastral data may be the most efficient way to address PAI issues. On the other hand, the procedure of resurvey is complicated, requires a lot of workers, expensive and time consuming to construct a new control framework similar to reprocessing the field book [2]. Therefore, most of the techniques used to preserve the positional accuracy of spatial datasets are based on the least square adjustment (LSA) method [3]. However, given that the errors are inevitable in surveying measurements, further test (i.e. statistical test) is ought to be employed in order to detect potential gross errors in measurements [4]. Even so, former study has found that StarNet's test is less sensitive towards small outlier [5]. His finding proves that there is no hundred-percent guarantee that all potential errors have been eliminated using some statistical analysis. Therefore, this research will focus on the sensitivity of another existing methods for detecting outliers, such as Baarda's method, Tau's method, and Danish's method.

2. Methodology

2.1. Data acquisition

2.1.1. Simulation data of traverse

A set of traverse data with known error values has been simulated, allowing the reliability of the proposed methods to be verified by carrying out three sub-experiments (refer Table 1). The traverse data used had a linear misclosure and fractional error (precision) of 0.05789 and 1:57644, respectively, and was classified as a first-class traverse.

Table 1: Sub-experiments using simulated traverse data

	Sub-experiments	Augmented gross errors
i.	Single distance measurement	5cm, 1m, and 5m
ii.	Single bearing measurement	1', 5' and 10'
iii.	Distances and bearings in multi-traverse line	5cm + 1', 1m+5' and 5m+10'

2.1.2. Certified plans (CPs)

Six (6) sets of certified plans (CPs) were used to evaluate the sensitivity of four (4) different least square approaches in order to detect outlier(s) in cadastral network adjustment. These certified plans (CPs) were obtained from the DSMM (refer Table 2). The reason for integrating several survey classes is that in a common cadastral implementation, the latest CP must be referred if there are differences in boundary line distance or bearing measurements.

Table 2: Sub-experiments using CPs

Sub-experiments	**No. of CPs**	**Production date**	**Location**	**Discrepancies (Distance, Bearing)**	
				Line 1-2	Line 2-3
i. Two first-class measurement CPs	CP93164	March 23rd, 2009	Mukim Seriab, Perlis	29.556m 85° 39' 00"	37.298m 87° 07' 50"
	CP92873	April 7th, 2008		29.568m 85° 41' 10"	37.287m 87° 05' 50"
Positional error of bearing (m)				0.019	0.022
ii. First-class measurement and second-class measurement CPs	CP93387 (1st)	July 21st, 2009	Mukim Seriab, Perlis	21.148m 124° 36' 10"	75.273m 133° 16' 40"
	CP33758 (2nd)	September 28th, 1969		21.163m 124° 34' 00"	75.297m 133° 18' 00"
Positional error of bearing (m)				0.013	0.029
iii. Two second-class measurement CPs	CP90416	November 6th, 2003	Mukim Titi Tinggi, Perlis	6.220m 295° 47' 00"	115.670m 45° 06' 30"
	CP61325	Jun 28th, 1989		6.220m 295° 49' 00"	115.620m 45° 05' 00"
Positional error of bearing (m)				0.004	0.05

2.2. Data processing

2.2.1. Computation of LSA

The first phase is focusing on the adjustment of observations data based on LSA method. To do so, redundant observations are required in practising least square adjustment as they reveal discrepancies in observed values, and subsequently possible to obtain the most probable values (MPVs) [6]. The standard deviation for bearings and distances was fixed to 15" and 0.010m, respectively, and is applied to each

method in order to determine how much each observation in the dataset influences the final parameter estimations. The following equations are necessary for computing LSA, and are then used to compute local test (refer Section 2.2.3):

Functional model:

$$l + v = Ax \quad (1)$$

Weight matrix:

$$W = \sigma_0^2 \sum\nolimits_L^{-1} = Q^{-1} \quad (2)$$

Compute parameter:

$$x = (A^T WA)^{-1} A^T Wl \quad (3)$$

Residual:

$$v = Ax\text{-}l \quad (4)$$

A posteriori variance:

$$\hat{\sigma}_0^2 = \frac{V^T WV}{n\text{-}u} \quad (5)$$

Adjusted observation:

$$\hat{L}^a = l + v \quad (6)$$

Covariance matrix:

$$\sum x = \hat{\sigma}_0^2 N^{-1} \quad (7)$$

Where, l is the vector of the difference between observed values and corresponding computed values, v is residual, x is estimated parameters, W is the weight matrix, n is observations, and u is parameters.

2.2.2. Global test

The second phase is designed to carry out global test on the known a posteriori variance factor, $\hat{\sigma}_0^2$ [7]. A global test is an evaluation process that uses a least squares adjustment to determine the survey's overall quality. Beyond that, global test may also be used to detect outliers. Testing should be done with the Chi-square distribution and the two-tailed test is written as follows [8]:

$$\frac{rS^2}{X^2{}_{\alpha/2}} < \sigma_0^2 < \frac{rS^2}{X^2{}_{1-\alpha/2}} \quad (8)$$

Where, σ_0^2 is variance a prior = 1, α is significance level, and 1-α is confidence level.

However, it is commonly assumed that $\hat{\sigma}_0^2 > \sigma_0^2$ will be used to find outliers. Therefore, the null hypothesis and alternative hypothesis listed below will be utilised to discover outliers:

$$H_0: \hat{\sigma}^2 = \sigma_0^2 \qquad H_a: \hat{\sigma}^2 > \sigma_0^2$$

2.2.3. Local test

A statistical test (local test) is required because the quality of survey measurements is still affected by gross errors following the LSA procedure. Therefore, the third phase is focusing on the detection of outliers using local test (i.e. Baarda, StarNet, Tau and Danish). In this phase, the standardised residual for each observation were computed using developed program (MATLAB) to identify the presence of gross error in observations. Observations were considered to have significant gross errors if standardised residuals are larger than critical value allocated to each method (refer Table 3).

Table 3: Methods of local test

Methods of local test	Standardised residuals	Critical value, c

Baarda	$\bar{v}_i = \frac{v_i}{(\text{diagonal})\left(\sqrt{\sum v}\right)}$	3.29
StarNet	$\bar{v}_i = \frac{v_i}{\sigma_0}$	3.00
Tau	$\bar{v}_i = \frac{v_i}{(\text{diagonal})\left(\sqrt{\sum \text{Varv}}\right)}$	Tau (τ) distribution
Danish	$\bar{v}_i = \frac{v_i}{(\text{diagonal})\left(\sqrt{\sum \hat{L}^a}\right)\sqrt{r_i}}$	3.00

3. Results and discussion

The reliability of developed program was achieved by comparing the results of LSA to the existing software (i.e. STARNET). In addition, the developed program delivers more information than STARNET because STARNET does not provide important details for additional analysis after network correction, such as the covariance matrix [9]. Based on the significant relevance for East and North in Station 3 and Station 2, the adjusted coordinates differences between STARNET and developed program is 0.05mm. The homogeneous standardised residuals generated by the STARNET and developed program proved that the algorithms were written correctly.

3.1. The reliability of least square (LS) outlier(s) detection approaches

The reliability of least square methods was assessed using simulated traverse data once the developed programme had been thoroughly verified. In the first sub-experiment of the first objective, Danish and Baarda method demonstrated remarkable results because they were able to correctly identified outlier at 10cm, 20cm, 30cm, 40cm, 50cm, 1m and 5m. Even so, Baarda is less reliable than Danish when it comes to detect outlier at 5cm. Although Tau managed to detect outlier accurately at 30cm, there is no guarantee that the Tau approach will outperform StarNet when processing datasets with small errors because StarNet can detect outliers at 20cm.

Second sub-experiment was constructed to verify the first findings. However, due to its ability to detect the outlier accurately at 6', this experiment has revealed that Baarda is more robust than Danish. Despite the fact that Tau surpasses Danish in identifying outlier accurately at 6', Danish has consistently produced reliable outlier detection at all augmented error, whereas, Tau failed to detect an outlier at 1'. In contrast, StarNet is less sensitive to outlier detection and requires a large number of errors to be accurately detected (i.e. 9' of error).

Due to contradictory findings in previous experiments, another sub-experiment was designed by introducing error in bearing and distance in multi-traverse line (i.e. 4cm + 1', 5cm + 1', 1m + 5', 5m + 10'). This procedure was undertaken to determine the ability of the proposed methods to detect outlier(s) in four (4) observations, and subsequently used to evaluate the sensitivity of each method. Surprisingly, the outcomes from this experiment and the first sub-experiment equivalent as Danish is the most outlier(s)-sensitive method, followed by Baarda, StarNet, and lastly, Tau.

3.2. The sensitivity of four (4) different LS outliers detection approaches in detecting outlier(s) in cadastral network adjustment

While two (2) sets of CPs were utilised in each sub-experiment, there were four (4) observations in one (1) CPs, representing two (2) distances and two (2) bearings observations. However, according to the results accumulated at the end of this experiment, the maximum number of observations detected as outliers is five (5). The first sub-experiment in second objective indicated that by discovering four (4) out of eight (8) observations as outlier, Danish, Baarda and StarNet yielded results that were similar. Whereas, Tau could only detect gross errors in two (2) of the eight (8) observations. Tau's result was supported by the fundamental criterion of Tau method that is just focusing on a single outlier in the dataset [10]. To conclude, Danish, Baarda, and StarNet, can be used to discover outlier for bearings based on positional error discrepancies of 0.022m and 0.019m (refer Table 2).

Further investigation was carried out to differentiate the level of sensitivity towards outlier between Danish, Baarda, and StarNet by employing different survey classes of CPs. In this sub-experiment, Danish surpasses Baarda by detecting outlier in five (5) out of eight (8) observations. On the other hand, Baarda classified four (4) out of eight (8) observations as outlier. Meanwhile, StarNet and Tau were only able to identify two (2) observations as outliers. The analyses of the results indicate that, in contrast to Baarda, StarNet did not yield a similar trend for the total number of gross errors detected as in first sub-experiment. Moreover, it was discovered that the StarNet method would jeopardise the LSA result with errors of 0.013m and 0.029m (refer Table 2) as it could only identify outlier in two (2) observations. Baarda, on the other hand, is less sensitive than Danish since it can only discover outliers in four (4) observations. These results suggested that Danish was considerably superior to Baarda, StarNet, and Tau in detecting outliers when multiple survey classes were merged.

To strengthen the findings from previous sub-experiments, two second-class measurement CPs were merged (similar concept to the first sub-experiment). The results reveal that Baarda and StarNet were able to pinpoint outlier in four (4) observations. While no observation was discovered as a gross error by using Tau, Danish was the only method that could detect outliers in five (5) observations. The analysis shows that StarNet and Baarda produced a similar result from the first sub-experiment when similar classes for data quality were employed. Therefore, when data from multi-classes surveys were merged, it may be inferred that StarNet is less robust than Baarda and Danish. Based on the designed three sub-experiments, the summary of the level for each method based on its sensitivity to outliers is Danish, Baarda, StarNet, and lastly, Tau. The reliability of this conclusion was proved with the discovery of the highest standardised residual on bearing observations due to the significant error value (0.05m) (refer table 2).

4. Conclusion

In a nutshell, the objectives of this study have all been met successfully. Seven parameters (i.e. Baarda, Tau, Danish, RLSE, Ethrog, Zhang and StarNet) are identified to detect outliers in cadastral network modification based on academic articles that do comparable research. However, only four approaches are covered in this study because several of the specified methods are insufficient to undertake in-depth research. In general, reliable outlier identification results can be obtained without difficulty. Baarda and Danish can be used to discover and eradicate various large errors after Least Square Adjustment. The Tau solution, on the other hand, is based on its nature that focuses on only one outlier in a data collection. The main conclusion reached is that the tau (τ) statistic is the most sensitive in detecting the presence of gross errors with the highest value of error. The Star*Net method reveals the limitations of detecting outliers when data sets from multiple survey classes are used. Danish is superior method for discovering many gross errors and sensitive to the outliers that could be present in surveyed observations in both identical and different data quality classes. In conclusion, the findings suggest that the Danish method for detecting outliers is extremely reliable.

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Chronicles of the Rings: Tree Rings as Climate Discoveries

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Abstract. Dendrochronology is the scientific discipline of determining the relationship between tree growth and climate, and is determined using the annual growth rings. This provides a potential method for monitoring climate change. Climate usually acts as a major factor influencing the tree growth. Here, the effects of climate of a conifer species were assessed in relation to measured climatic variables. Tree cores of Scots Pine *(Pinus sylvestris*) were sampled from a forestry plantation at Hordron Edge, Derbyshire to determine the relationship between annual growth increment and four climate variables (maximum temperature, minimum temperature, grass minim um temperature and rainfall). Standard dendrochronological techniques were used to collect, prepare and measure tree–ring width increments. Tree-ring widths were as cross referenced to the climate data to enable growth dynamics of *(Pinus sylvestris)* to be investigated. In this study there was no significant correlation between growth and climatic variables; overall average mean sensitivity (m s) was 0.28 mm, only five of the 20 trees were sensitive to climate with the other 15 trees being complacent. There were no significant first-order relationships found between tree growth indices and any of the four climatic variables tested. This result suggests that climatic variables were not significant in controlling tree growth at this site.

1. Introduction

Forest ecosystems have been recognized as an essential component of the biosphere (Hooper et. al., 2005). One of the most widely distributed conifers tree in the world is Scots Pine (P. sylvestris) (Royal Forestry Society, 2014). It is found naturally in Great Britain mainly in the Scottish Highlands (Steven and Carlisle, 1959) but is planted extensively throughout the country. It is evergreen, reaching heights of 25 m to 45 m when mature, and is classified as softwood which makes it easy to extract tree cores. According to Ellenberg (1974), (P. sylvestris) has a very extensive eco- logical range and grows on very dry sites in semiarid climates as well on wet bog sites. It is subjected to continental Mediterranean climates which can undergo both cold winter temperatures and summer drought stress. Therefore, (P. sylvestris) is considered to have a wider geographical distribution than many other pine species (Ohlson, 1995; Richardson Rundel, 2000). The ecology of (P. sylvestris) may lead to biological responses in tree growth which may reflect in the wood structure by stress tolerance, allowing it to occupy habitatsthat are unfavorable to other species as a result of climatic or soil conditions, including low temperatures, extremes of acidity and alkalinity waterlogging and drought (Kelly and Connolly, 2000). Therefore, to achieve greater benefits from trees, it is essential to recognize the growth, forest management, environmental effect of the utilization (Downes et. al., 2002) through the global climate change of the earth.

1.1 Global Climate Change

The earth's climate is a dynamic system. Yet, concern about climate change is increasing due to many uncertainties which exist as regards to possible changes on the ecosystems in the current century (Franklin et al., 1991, Loele Le Blanc, 1996, IPCC, 2007). Bluemle (1999) stated the recent compilation of proxy data revealed that the global mean annual temperatures of the earth have experienced a global average increase by approximately 0.98(◦C) from 1866 to 1998. Moreover, data obtained from NASA's Goddard Institute for Space Studies (GISS) revealed the Earth was the warmest from 134 records in the year 2014. A major challenge in climate research has been the attribution of cause for this temperature trend (San- ter

et al., 1996). Globally, the earth's temperatures are expected to continue rising to at least the end of the present century (IPCC, 2013) and it is expected that human influence has been detected in the warming of the atmosphere and the oceans since the mid– 20th century. This may alter the current growth dynamics for tree species at different scales from the species to the community. Previous studies in China indicated that there is a strong relationship between terrestrial vegetation and climate variability (Kaufmann et al., 2003).

1.2 Relationship between climate and tree growth

During the early 20th century, the field of dendrochronology was born when it discovered that tree-ring width was dependent on climatic and environmental parameters (Fritts, 1976). Tree-rings are formed by the vascular cambium (Larson 1994), a cell tis- sue located between the xylem and phloem, which produces new xylem (wood) to the inside and new phloem to the outside. Differential activity in the cambium layer in response to climate produces xylem rings of different thicknesses and is in effect a measure of response to climate. According to Amato (1988), dendrochronological studies specified that chemical make-up of tree-rings also reflected the chemistry of the environment in which it is growing. This shows that radial growth can also be influence by pulse disturbance events such as volcanic eruptions, earthquakes and insect outbreaks (Fritts and Swetnam, 1989). The relationships be- tween growth decline and climate can be evaluated using correlation analyses between year–to–year variation in tree–ring width and seasonal mean temperature and total precipitation.

Dendroclimatology is the science of measuring annual tree growth – ring widths to infer environmental, usually that of climate (Ecktein, 1990) and the reconstruction of past climate changes and monitoring current one (Fritts, 1976). Such studies can provide indicators of environmental conditions which can be important for the evaluation of long-term impacts on forest health.

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The Sale and Leaseback Investments Framework for Real Estate Investment Trusts (REITs) in Malaysia

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Abstract. Sale and Leaseback investment has become one of the alternative ways for institutional investors such as Real Estate Investment Trusts (REITs) in purchasing existing properties with great value. It is the responsibility of the REITs managers to determine which properties are suitable to be invested in this type of investment since there is no proper guideline for REITs in conducting Sale and Leaseback investments. Therefore, the aimed of this project is to identify the factors that influence the property investment yield and a framework for the REITs managers as a guideline in conducting Sale and Leaseback investments. The data were collected through structured interviews with six M-REITs that practice Sale and Leaseback Investment in Malaysia. After the interview, the whole process of data analysis was assisted by computer software using QSR NVIVO 12 to conduct qualitative data analysis and followed by the content analysis method. The result of the study would be a useful guide to Real Estate managers in developing countries towards using Sale and Leaseback investment as one of the alternative ways of acquiring property that is likely to produce a higher yield.

1. Introduction

A Real Estate Investment Trusts (REITs) is an evolution alternative type of property investment in the market providing an opportunity for investors to invest in real estate property. REITs received income from their own property portfolio as their contribution to their unit trust. Each of the M-REITs have their own REITs manager, to manage and regulate the trust fund owns by the REITs under the approval of Security Commission. They are the responsible person in planning and running the operation of the REITs including in identifying potential property to be invest. Hence, as an investment company, REITs need to ensure that they need to have a strong property portfolio, in order to produce higher yield for their investor.

Due to current situation such as limitation of new property development, the alternative choice for REIT Managers to continue producing high income in their property portfolio is to purchase existing property through Sale and Leaseback investment. However, the difficulties in determining the property market fundamentals is to consider the risk and return (yield) achieve by the property (Lam & Tipping, 2016; Tik et al., 2015; Tipping & Newton, 2015)

Sale and Leaseback investments in the real estate market is not extensively practiced in Malaysia, Ang (2017). In reality, Sale and Leaseback investments is more complicated than it appears to be on the surface (Previndran, 2019), due to no proper guideline for REITs in conducting Sale and Leaseback investments.

1.1 Aim of the Study

Developing new property investment framework that incorporates the Sale and Leaseback investments arrangement that meet the needs of M-REITs.

1.2 The objective of the Study

a. To assist the investors to achieve the desired yield before acquired the property through Sale and Leaseback investment.
b. 2. To develop Guideline for Sale and Leaseback investment framework according to M-REITS practices.

2. Methodology

Firstly, this study adopts a qualitative method with case study design approach. Additionally, this research survey was conducted only on M-REITs companies especially those involved in Sale and Leaseback investments. Secondly, data were obtained through semi-structured interviews conducted directly with six M-REITs managers that have involved in the whole process of Sale and Leaseback investments arrangement. Once the M-REIT were identified, five M-REITs managers agreed to participate through face-to-face interview while one M-REIT manager were interviewed by telephone.

Thirdly, after the data interview survey completed, all the interview recording was subsequently transcribed and was imported into QSR NVIVO Version 12 for the process of content analysis. In this second step of data analysis stage, the content was analyse using word base analysis and converted into codes. Then, these codes were grouped into categories and themes were then developed.

Lastly, to ensure the findings of this study accurately reflects what is actually being practiced, validity and the findings from the data analysis is the main quality control of a study (Yin, 2011). Hence, the findings of this study have been validated by the M-REITs managers point of view in order to achieve the aim of this study in developing new property investment framework that incorporates the Sale and Leaseback investments arrangement that meet the needs of M-REITs. In Figure 1, it shows the methodology process of this study.

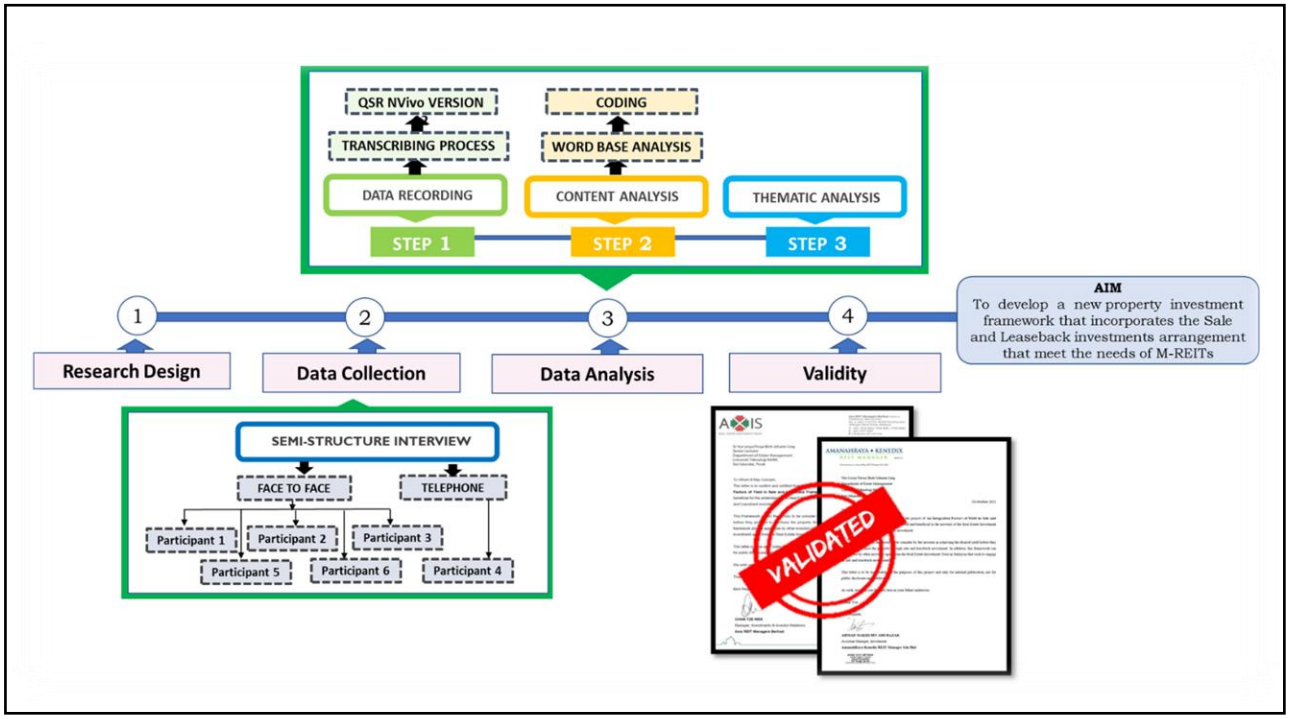

Figure 1: The Methodology process

3. Findings

The results show the property investment framework that incorporates the Sale and Leaseback investments arrangement that meet the needs of M-REITs were developed. Figure 2 shows the whole process of Sale and Leaseback investment being practiced by the M-REITs managers. There are three main flows, started from before the property being acquired, during the process of acquisition, and lastly is after the process of acquisition (completion). There are also shows different steps for each of the process under the Sale and Leaseback concepts .

Besides that, this framework can be a guide for the real estate investor to acquire high yielding assets especially in Sale and Leaseback investment, by looking into several factors that can influence the rate of the yield. There are seven factors affecting the yield that the investor could beware of the risk and return for that particular property before purchasing the property, namely, location, property type, tenant, price, rental, physical of the building and macro-economic cycle. This framework is useful to the property investor due to the limited quality property with higher yield.

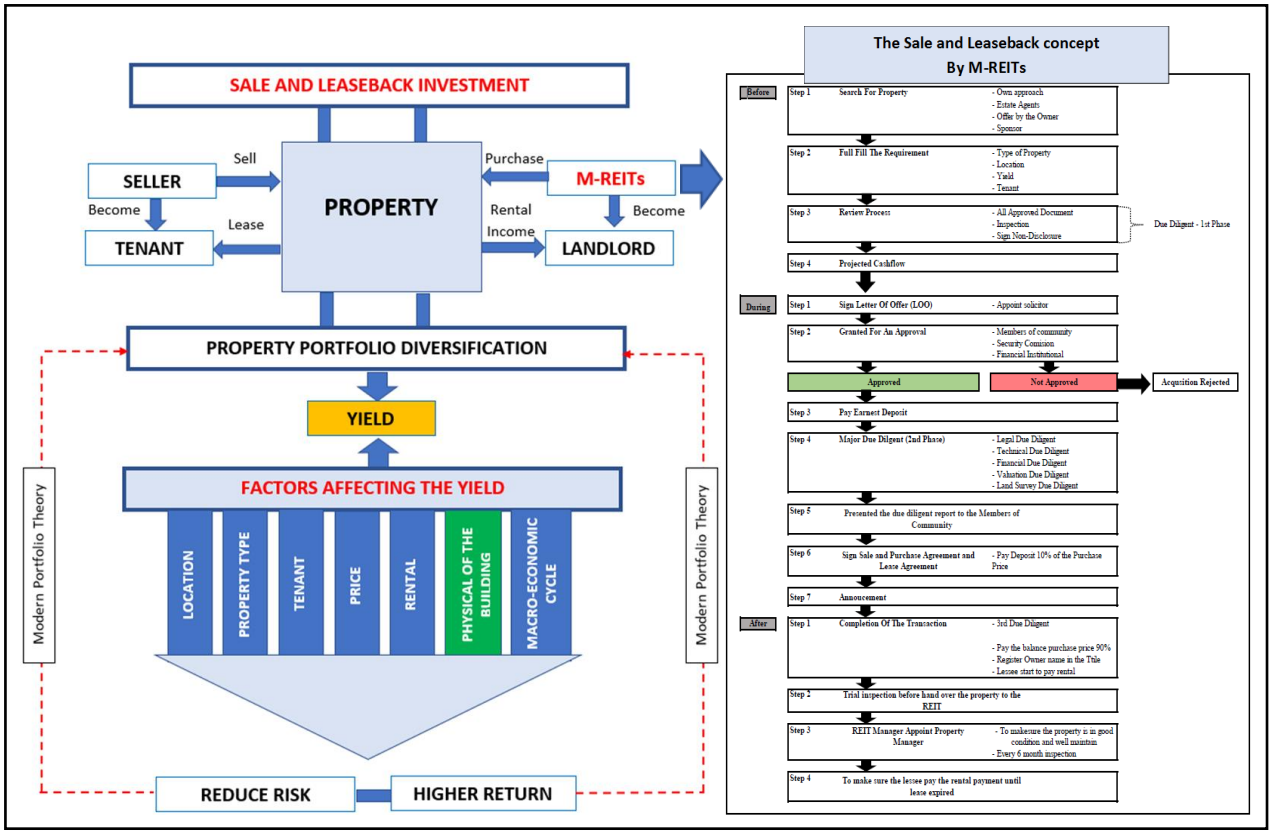

Figure 2: The Property Investment Framework That Incorporates The Sale and Leaseback Investments Arrangement That Meet The Needs of M-REITs

4. Conclusions

The development of Sale and Leaseback framework can be used as a Guideline for the existing or also other Real Estate Investment Trusts (REITs) companies, in formulating their decision-making in purchasing property through the Sale and Leaseback investments and also enabling the development of a framework that can be used by professional practitioners and investors in predicting high yields for portfolio building purposes.

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New Norm and New Form: Outdoor Abstract Sculpture Tolerate with Environment

Muhammad Fakhrurrazi Fatziruddin, Muhamad Aqil Ahmad Mahmod and Ahmad Irsyaduddin Maktar

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Abstract. This group project initiates through the residency program, where the artist conducted practice artistic research mode in the studio workshop with a senior artist's guide. Therefore, this project aims to develop an artwork where the progress is formed from ideas inspired by nature and made by nature than to the environment, specifically the park in UiTM Puncak Alam Campuses within the art to functionality. To ensure this project is delivered properly and guided with strategic intention, the objective is to develop an artwork from the natural properties of wood and stone that are formed and used in creating artwork. The artist chooses and selects natural sources, like hardwood, dismantled plywood, hardstone (granite and marble), copper, aluminium and other accessories of metal, in order to manifest and utilise this material into artwork. The process starts with searching for the availability of the material in the studio and utilising that material in the creative process. Working and dealing with ideas and choosing the material was the main process before the artwork was formed. However, technological machinery is the main assistant where the artwork was formed and improvised within the context of the project. The finding showed clearly, how the artwork was developed from the early process (preparing and constructing the piece of form, either the form of wood or stone), then moving into the next method of the assembled process to form the artwork, which finally will conclude with the finishing process and stimulation artist impression. The simulation model was developed, which developed towards how a new norm and new form: outdoor abstract sculpture, tolerate the environment.

1. Introduction

This project was developed and shared a potential outcome from the residency programme, the artist will engage in practice-based artistic research in the studio workshop with the assistance of a senior artist's guide. This will be the starting point for the group project. As a consequence of this, the purpose of this project is to produce an artwork in which the development is produced from concepts inspired by nature and made by nature rather than the environment, notably the park in the UiTM Puncak Alam Campuses, within the art of utility. The development of an artwork based on the natural qualities of wood and stone that are created and employed in the creation of an artwork is the goal of this project. This will ensure that the project is delivered correctly and is guided with strategic intention. How this project was delivered and developed, where the artist shares, manifests and utilises the selected potential material into artwork. The artist selects natural supplies like hardwood, disassembled plywood, hardstone (granite and marble), copper, aluminium, and other metal accessories. These natural sources can be found in the environment. The investigation into the availability of the material in the studio and the incorporation of that material into the creative process come at the beginning of the procedure. The most important activities that took place before the artwork was made were working on it, dealing with concepts, and selecting the material. On the other hand, technological machinery served as the primary facilitator during forming and improvising the artwork inside the framework of the project. The discovery made it abundantly clear how the piece of artwork evolved over time, beginning with the preliminary process (which involved preparing and constructing the piece of form, either in wood or stone), then moving on to the subsequent method of the assembled process to form the piece of artwork, and finally coming to an end with the finishing process

and stimulation of the artist's impression. The simulation model was constructed, which developed towards how an entirely new standard and form, namely outdoor abstract sculpture, can endure the environment.

2. Problem Statement

The current issue associated with the proper situation within the environment and art is always crucial to discuss. In other developed countries, abstract sculpture artwork is always relevant in many sectors; public spaces, museums, galleries, educational institutions, transportation systems, and even private industry can all be good places to look for public art (Sarriugarte, 2017; Guo, 2019). Opportunities to work across disciplines can help to blur the lines between culturally visual and performative art, design, and decoration, as well as technology (Thickett, 2023). In a broader sense, partnerships can involve private developers or funders, infrastructure consortia, museum and gallery networks, educational institutions, and other organisations. Therefore, this project focuses on how to develop an artwork from the natural properties of wood and stone that are formed with abstract sculpture artwork for the public.

3. Objectives

This project is to develop an artwork from the natural properties of wood and stone that are formed with abstract sculpture artwork for the public.

4. Methodology

A significant part of the creative process consisted of conducting artistic research in the studio workshop. The work was presented in the atmosphere of practise mode in the workshop, which begins with formulating an idea, developing it, preparing a structure, and fabricating artwork. This process continues until the finished product is fabricated. The particular material and technique were learned in order to manage the process of making appropriately within the allotted amount of time, which, at the end of the process, is focused on finishing and how to stimulate the whole model of abstract sculpture to the public.

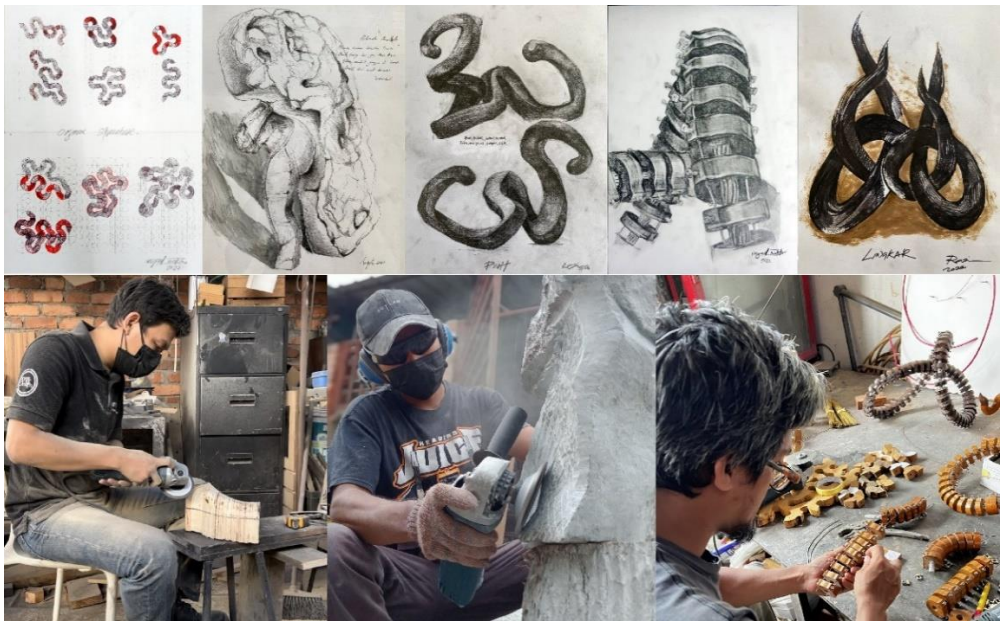

Figure 1: The process of abstract sculpture from sketches to final sculpture.

5. Findings

The project brought together the works of three artists: Muhammad Fakhrurrazi Fatziruddin, Muhammad Aqil Ahmad Mahmod, and Ahmad Irsyaduddin Maktar. Muhammad Fakhrurrazi is the first artist, and the developed work is a constant search for how to interpret the concept of sculpture language in my living environment and experience. This connection is what keeps me making sculptures. I discovered a cohesive form that used shape and texture to translate my intention to human organs for their anonymity in terms of overt meaning while carving and attempting to capture the natural essence of the stone in the choice of design. As a result, the abstract shape had numerous interpretations. They have previously worked with a variety of stones, including andesite and white marble. I was able to carve black marble during this residency and experiment with how to handle the stone until the final polish. The working process was enjoyed on both a small, intimate scale and on large garden sculptures.

The intention of the artwork is to develop a form of sculpture using discarded material from the environment in which Muhamad Aqil Ahmad Mahmod was working. as someone who worked in a sculpture workshop and discovered that discarded or unused materials were all around me. At the same time, the work was drawn to wood materials, and there were many unused wooden planks around me. It has the potential to be a mainstay in my sculptural work. Begin by glueing the wood layer by layer, making different patterns on the form. Nature indirectly inspires the sculpture. The floral character is very close to the wood material. The behaviour of floral forms, which are growing, creeping, and circular, inspires the creation of sculpture. It creates a dynamic, elegant, beautiful sculpture by combining patterns and form inspired by nature.

Ahmad Irsyaduddin Maktar's work is based on a precise mathematical calculation. The fascination with the intersection of math, science, and art through the use of a modular form as the design basis. The combination of standardised units to form a new complex form the majority of my sculpture is divided into modular sections that can be disassembled and reassembled to create a new form. Every module in my sculpture can be physically or conceptually linked. The piece depicts creating a form that connects complex, abstract mathematical ideas. As a result, the residency artist programme guided the process of creating artwork by beginning with a simple elemental form, a natural material bend, and then repeating and joining it into primary geometric constructions. The use of hardwoods such as Chengal, Merbau, and Belian to produce more wood block units. It is then combined and reconstructed into a new form. The selection and use of hardwood, with its various properties and durability, makes it difficult to work with in sculpture making. Industrial materials such as copper, aluminium, and stainless-steel bolts are combined. This ongoing and potentially transformative process connects me to the natural world.

Figure 2: Final abstract sculpture

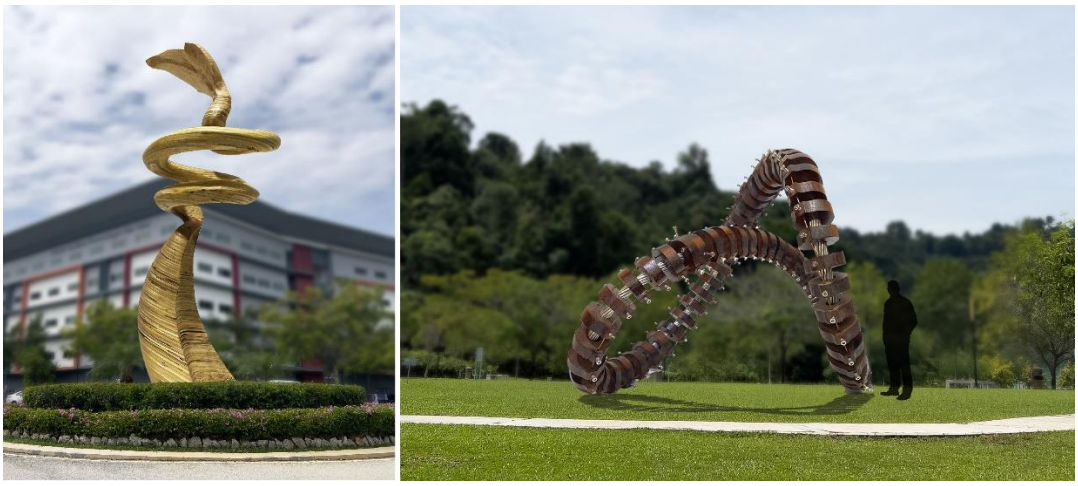

Figure 3: Artist's Impression in the Park.

6. Novelty

The public abstract sculpture art process requires the artist to collaborate and share a creative point of view. Work can resonate across the community, creating shared ownership and collaborative affinity. Artists' thinking, aesthetic contributions, and problem-solving strategies in the public domain influence-built environment projects towards SDG7 and SDG11 for the country.

7. Conclusion

In conclusion, indeed, the purpose of this collaborative endeavour was clearly successful in forming ideas and forming different pieces of artwork in which the development process was engaged through the process of forming from ideas that were inspired by nature and made by nature rather than the environment. Natural materials, such as hardwood, dismantled plywood, hardstone (granite and marble), copper, aluminium, and other metal accessories are some of the natural sources chosen and selected by the artist.

8. Commercialization

The concept of commercialization through abstract art sculpture has the potential to promote the features that make a particular location stand out from others, apart and apart from the other. The finest examples of public art are challenging, delightful, educational, and illuminating. Public abstract sculpture gives the cities, towns, and communities we live in and visits a sense of civic vitality. This is the most important benefit of public abstract sculpture.

9. Recognitions

The collaboration approach of artists, administrators, and curators need to interconnect better. Artists must reconcile the site's requirements, restrictions, and professions with their ongoing creative inquiry and deal with other fields.

10. Conference & Publication

Conference: International Conference on Wood and Eco-Products 2022 (ICWEP 2022).
Publication: Special Issue ICWEP 2022, Environmental Behaviour Proceeding Journal (EBPJ).

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The Correlation Analysis Between Training and Attitudes towards Building Information Modelling (BIM) Adoption in Malaysian Construction Industry

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Abstract. The adoption of Building Information Modelling (BIM) as a technological advancement in the industry has become a main concern among its stakeholders. Despite the level of BIM awareness improving, the rate of adoption is considered low. Research and expert advice has claimed that the BIM adoption rate can be increased by giving in-depth understanding in the importance and benefits of BIM implementation. Training is one of potential factors that could expedite the adoption of BIM. BIM training is a significant aspect in BIM implementation due to its role not only to expand the knowledge, but also as a means of facilitating BIM adoption. Therefore, the aim of this research is to investigate the influence of BIM training on attitudes to BIM implementation among Malaysian construction players by using extended technology acceptance model (TAM). The beliefs of ease of use, usefulness and employee resources were utilised as TAM variables for explaining the relationships between training variables and behavioral intention to use. In order to achieve this aim, an online survey was conducted among professional employees of government agencies. The findings demonstrated that extent of training was not related to TAM variables suggesting that a high amount of training would not positively affect the BIM adoption. In addition, TAM variables had significant positive relationships with behavioural intention to use. Finally, this study suggested the perspectives of ease of use, usefulness and employee resources should be taken into consideration by training organisers in organising BIM.

1. Introduction

Nowadays, the application of Building Information Modelling (BIM) for project delivery is rapidly becoming more popular in the Malaysian construction industry. The involvement of all project participants is essential to ensure a successful BIM adoption (Gu and London, 2010). Previous studies of BIM adoption in Malaysian construction industry focused on various kinds of professionals that consist of architecture (Mohd-Nor and Grant, 2014), engineering (Rogers et al., 2015) and quantity surveying (Keat, 2012). Moreover, in other context, the research of the BIM adoption in Malaysia has also covered on the application (Latiffi et al., 2013), challenges (Gardezi et al., 2014), organisational culture and people (Zakaria et al., 2013), organisation (Haron, 2013), barriers and strategies (Memon et al., 2014) and improvement process (Latiffi et al., 2015).

Taking all these into consideration, this paper seeks to examine the relationship between BIM training and BIM adoption in Malaysian construction industry and investigate the level of influence in BIM training on attitudes to BIM adoption. An extended Technology Acceptance Model (TAM) for technology development training developed by Marler et al. (2006) is used to attain the aim of this study. The impacts of perceived ease of use, usefulness and employee resources to the wider adoption

of BIM are analysed in order to eventually contribute to the improvement of BIM implementation in Malaysian construction industry.

2. Research Methodology

The appropriate research approach is chosen to answer the research questions and enable the collection of primary data to facilitate the process (See Figure 1). Since this research aim is to examine the influence of BIM training on BIM adoption in Malaysian construction industry, the experience and opinions of construction professionals are needed from the perspectives of those directly involved in the industry. In order to support the theoretical study and hypotheses, a large number of primary data is collected and analysed. The research comprises two key data collection elements: 1) secondary research – mainly involves a large body of literature review – includes particularly investigation of BIM adoption and training in Malaysian construction industry; and 2) primary research – in which the data is collected by face-to-face interview or a survey (Collis and Hussey, 2003). Hence, for the purpose of this study, questionnaire is used as a survey tool to collect adequate primary data. This method involves the design and management of an online questionnaire-based survey to professionals in construction industry.

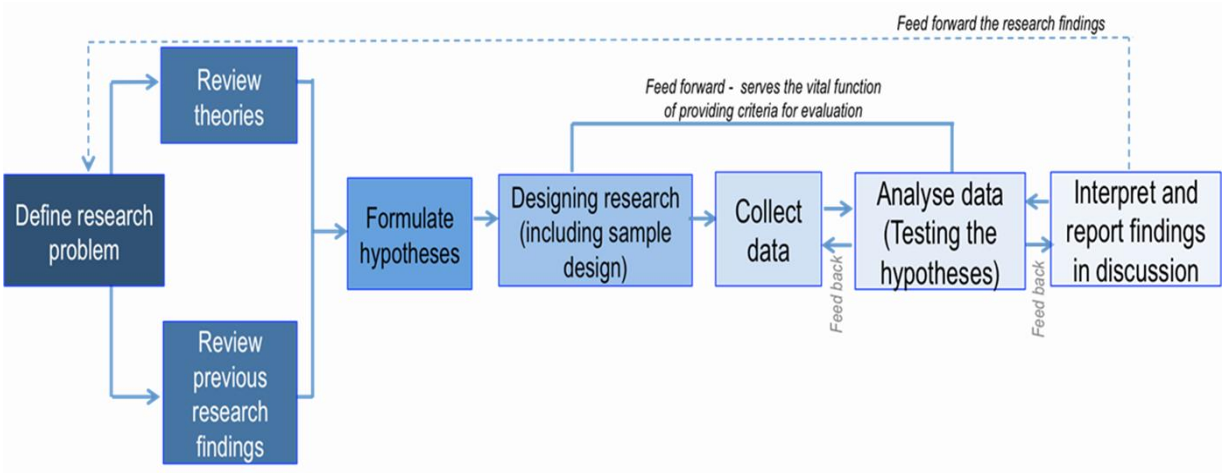

Figure 1 Research Design

Measuring the user acceptance and adoption of IT has become significantly important in information management system in the last two decades (Venkatesh and Davis, 2000). On the other hand, Agarwal (2004) has found that the technology acceptance research of information science has focused on the evolution of parsimonious models which describe the difference of behavioural intention to adopt new IT. Technology Acceptance Model (TAM) was initiated by Davis (1989) originated from the reasoned action theory (Fishbein et al. 1975) and has been widely used as a predictive model to measure and assess the user behaviour in the technology acceptance, adoption and use (Davis et al., 1989). TAM has been widely used to evaluate user adoption of new technology in the construction industry (Son et al., 2015). In BIM technology, many researchers are interested to use TAM to predict the user acceptance and adoption of this technology (see Figure 2).

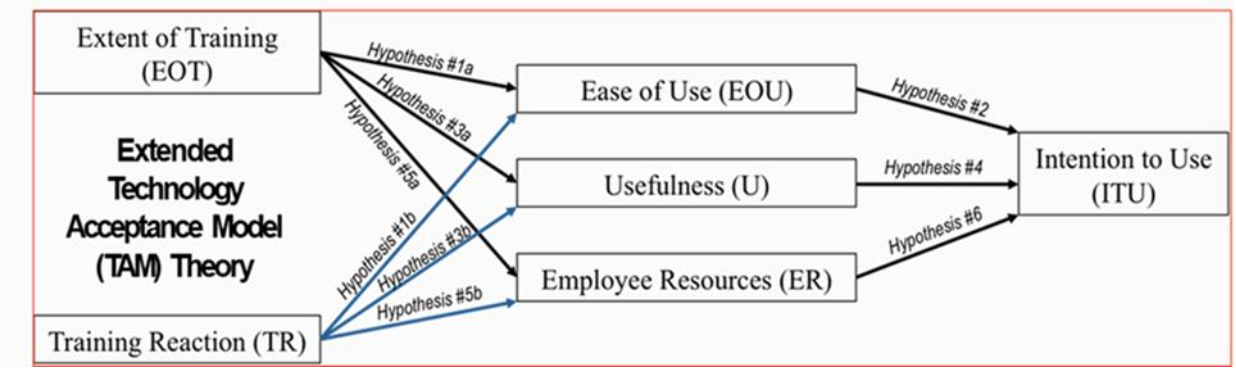

Figure 2 Extended Technology Acceptance Model Theory

3. Research Findings and Conclusion

The total of 204 online questionnaires was received and have been completely answered by the respondents. Personal information in the answered questionnaire showed that the respondents consist of various professional backgrounds in the following proportions: architecture (12%), civil and structural engineering (34%), mechanical engineering (18%), electrical engineering (10%), quantity surveyor (23%), building surveying (2%) and project management (1%). While, in term of respondent roles, there is slightly difference compared to their professional background as the followings: architect (12%), civil and structural engineer (30%), mechanical engineer (17%), electrical engineer (10%), quantity surveyor (22%), building surveyor (2%) and project manager (7%). The majority of respondents were from a range of low-medium level of working experience (1 to 15 years), making up 80% of the respondent. The demographic results are listed in the Figure 3.

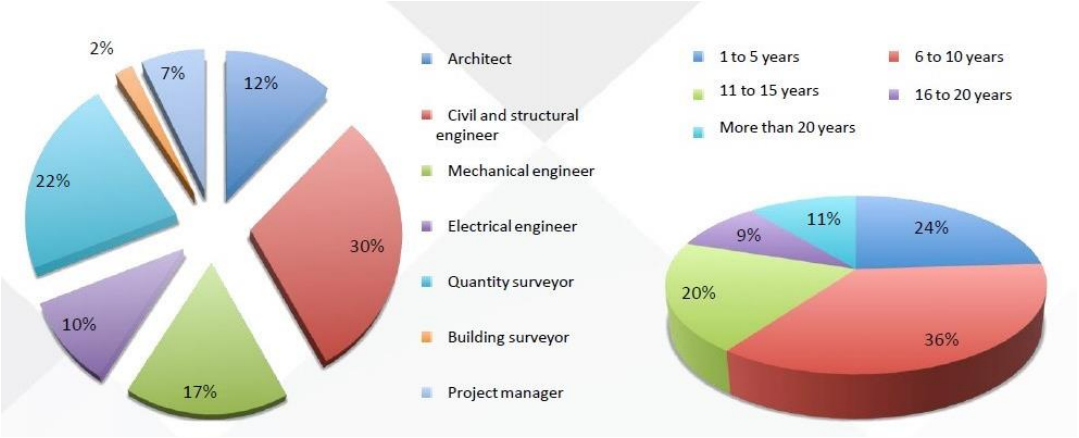

Figure 3 Respondents demographic

From the survey, the results indicated that the level of BIM awareness is very high where 95% of the respondents are aware of BIM. On the contrary, the usage of BIM is very low where only 8% of the samples are currently using BIM and 10% of the samples have used BIM. From the literature review, it is found that BIM awareness among architects is about 80% and found that quantity surveyors in Malaysia also have high level of BIM awareness ranging between 65% to 81% in different construction stages. Thus, these findings offer clear evidence that BIM is already a well-known technology in Malaysian construction industry. In use of BIM, the findings showed that the level of BIM use is very low (18%) as found in the previous study, which means Malaysian construction players are still struggling

to fully adapt to BIM implementation. Table 1 shows the relationship between EOT, TR and ITU.

Table 1: Relationship between EOT, TR and ITU

Variable	EOT	TR	EOU	U	ER	ITU
EOT						
TR	0.19					
EOU	0.17	.68**				
U	0.15	.58**	.68**			
ER	.30**	.49**	.50**	.57**		
ITU	.23*	.43**	.47**	.58**	.53**	

The relationship between training variables (EOT and TR) and ITU are via the TAM variables, this is reflected on significant relationships between ITU and TR (moderate) and EOT (weak).

3.1 Relationship between Extent of Training (EOT) and Intention to Use (ITU)

For EOT, a strong ITU might prompt someone to seek out and attend BIM training. Equally, relationships seen may be due to the measured variables both being related to an unmeasured third variable, for example, an employee who has been assigned to a BIM project might score highly on both EOT and ITU without the training having had any actual effect on intention.

3.2 Relationship between Training Reaction (TR) and Intention to Use (ITU)

For TR, the moderate relationship with ITU might indicate that the enjoyment, satisfaction and expectation of training have fulfilled the needs of participant in participating BIM training. These results might be explained by the fact that the training contents and experienced trainers are important elements in creating conducive training environment that may turn to be main psychological factors to influence participants to use BIM.

The findings from the study shows the extended TAM variables demonstrate positive influence to behavioural ITU, the BIM training organisers should be sensitive to the current needs of the potential participants and not just provide the training to fulfil their training schedule. Although there was a weak significant positive correlation between EOT and ITU, as compared to the relationship between EOT and TAM variables, the number of days training may not be able to contribute a strong positive impact on the participants because the knowledge and skills they have learned in training were still unable to help them understand and explore the uses and benefits of BIM. Therefore, it could be concluded that possibly there is a lack of training quality in terms of content and trainer.

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"A ELLE" TABLE: From Design Innovation to Appreciation

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Abstract. Regarding the Furniture Design II subject, the author was tasked with selecting iconic furniture from any designer and learning everything there is to know about it. The chosen furniture has distinct characteristics that must be preserved. In addition, the author was tasked with creating 1-to-1 scale furniture while maintaining the original creation's identity and philosophy. However, in order to retain originality, it cannot be created solely through the use of simple art. As a result, the author took the initiative to combine science and art in the creation of this side table. Following extensive research and in-depth studies, the author decided to implement tensional integrity, also known as tensegrity. Furthermore, the author used joineries to add artistry. The entire process, including ordering and purchasing the furniture components, took about two months. The author succeeds in transforming the original furniture into a one-of-a-kind product for the final product. The findings show that physics and art can work wonders.

1. Problem statements

The author considered the author's uniqueness and innovative techniques. The author's mind is preoccupied with the possibility of not achieving and completing this furniture. How can the author create a design that can float and be gravity-free while also playing with the viewer's senses? Is it true that floating furniture existed? How did people come up with the idea of making a floating object? Why does the audience like the idea of being weightless? Will the author meet the expectations and standards of a university student? Therefore, the author has decided to establish a new furniture design innovated from Miss Blanche chair design by Shiro Kuramata. The new furniture explores the potential to adopt the Miss Blanche design philosophy with a modern design element.

2. Methodologies

The author was assigned to create a modern furniture design based on the iconic furniture design's philosophy. The process started with in-depth research on the Miss Blanche furniture design. The author then produced a design development to explore on a method to interpret the old philosophy into new modern furniture design. The whole process took around three (3) months from initiation until completion of work. The new "*à elle*" side table has successfully been produced with the adoption of the free-of-gravity principle which was originally introduced by Shiro Kuramata for the Miss Blanche chair.

3. Conclusion

As a result, the new "*à elle*" side table has proven that the integration of old design philosophy and modern design elements is not impossible. The author believes that with modern technology and performance can revamp an old design style back in the modern century. This not only encourages more design innovation but also increase the level of appreciation for previous iconic design trendsetter.

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Exploring The Critical Success Factors of Value Management for Sustainable Public Housing In Malaysia: Findings From A Preliminary Study

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Abstract. Housing is becoming a global issue in urban development, particularly housing shortages for the urban poor in developing countries. The Malaysian government is aware of the situation and built low-cost housing. However, many issues and problems arise when it comes to the sustainability of the houses. In the National Housing Policy (NHP) 2018-2025, the Ministry of Housing and Local Government recently emphasised the importance of housing quality and sustainable enhancement. The sustainability factor will significantly increase the value of construction projects, particularly public housing projects. Hence, value management (VM) is one of the most effective tools for ensuring public housing's sustainable success. Despite establishing the framework for integration, the possibility of such integration within the Malaysian VM protocol for public housing projects remained unclear. Thus, this paper aims to contribute to a better & comprehensive understanding of the critical success factors (CSFs) of VM for public housing projects. A systematic literature review was conducted to understand the key topics better, and the findings were validated using a qualitative method involving semi-structured interviews with three personnel from a VM consultant in Malaysia. As a result, stakeholders & knowledge, effective workshop, and culture & environment play a significant role in CSFs to implement VM. The findings outlined in this paper could be vital for the future framework of VM that can act as drivers to provide sustainable public housing.

1. Introduction

Land scarcity has forced property prices to rise as the urban population increases, making housing increasingly unaffordable and less sustainable for people (CIDB, 2021). Providing decent public housing is a significant difficulty for all emerging countries as demand grows yearly (Mohamad et al., 2019). In Malaysia, affordable housing is an important issue in tandem with the country's urbanisation development. Even though 76.7 percent of affordable housing units had been constructed by the end of 2016, the housing crisis remains, particularly in the case of newly finished houses (Rahman et al. 2019). The government currently urges construction key players to promote sustainable development, especially in public housing projects (Lee, 2021). Recently, the National Housing Policy (NHP) 2018-2025 emphasised the need to improve quality and sustainability in a Malaysian housing development (MHLG, 2018). In the 12th Malaysia plan, the project delivery method needs to be improved to ensure on-time completion, value for money, and sustainability (Malaysia Economic Planning Unit, 2021). The need to increase sustainability are driving force that can also assist the widespread adoption of VM in the development (Fewings & Henjewele, 2019; Kineber et al., 2021). As a result, VM is one of the most effective tools for assisting the Malaysian construction industry in achieving sustainable public housing (Yu et al., 2018).

To make the VM implementation successful, it is crucial to identify the VM's CSFs to ensure project success (Thneibat & Al-Shattarat, 2021). Lin & Lin (2006) identifies CSFs as the area or factors that will lead to project success. Added by Gunduz & Almuajebh (2020) that identifying CSFs will lead to critical management preparation and action fields for ensuring the success of projects. Thus, it is vital

to identify the CSFs of VM to ensure the success of VM implementation in Malaysian public housing projects.

2. Methodology

This study mainly involved two stages of the data collection method. The SLR is done to gather all the CSFs from the previous survey by numerous authors. Analysis of CSFs in VM is critical to ensure the implementation of VM in Malaysian public housing projects. Supported by Sharma & Srikonda (2021), analysing VM CSFs will positively impact and contribute to successful VM applications. A semi-structured interview was conducted from January to February 2022 with VM experts. This study approach provides detailed information about VM CSFs in public housing and identifies any weaknesses in the questions that would be the major survey in future research. The interviewees' confidentiality and integrity were scrupulously upheld, and codes were issued to each of them which, include the senior quantity surveyor (R1), senior executive VM (R2), and project executive (R3). They are highly involved in the whole VM process and construction industry.

3. Result & Discussion

According to Shen & Liu (2003), 23 CSFs were listed based on a systematic literature review of VM studies in the construction sector. Farouk et al. (2021) further classified it into 4 sets of items; Stakeholder and knowledge, culture and environment, workshop dynamic, and standardisation which have the most critical impact on VM performance. The VM CSFs identified in the existing literature had been modified and enhanced based on interview suggestions. The CSFs gathered and altered from literature reviews and interview is classified into three sets; Stakeholder & Knowledge (SK) with 8 factors, Effective Workshop (EF) with 8 factors, and culture and environment (CE) with 6 factors respectively. The interviewees, therefore, add 4 suggestions for the CSFs to be included in the main questionnaire in the Malaysian public housing context. Public housing end-user participation, analyse function based on similar completed projects, VM feedback mechanism by experts and end-users, and creative and sustainable VM study plan for implementation is the four new factors suggested by interviewees.

From the methodology, a set of 18 CSFs were developed and considered suitable for implementing VM in housing projects. The qualitative approach consisted of 3 semi-structured interviews and was then used to review and modify the factors selected from the previous studies. As a result, four new factors were added from the experts interviewed, making 22 CSFs of VM.

4. Conclusion

Identifying and analysing the CSFs of VM is significant for the enhancement of VM implementation (Farouk et al., 2021). Based on the findings, it is discovered that all of the interviewees are an expert in VM and public housing from their organizations. All of them are familiar with the VM approach in the Malaysian construction industry. As for the preliminary study, the CSFs analyzed are categorized into 3 sets adopted through literature review and enhanced by the interviewees; SK, EF, and CE. Most interviewees agreed with the CSFs from past research and then added another four factors to suit the Malaysian public housing context. Malaysia has suffered problems with the quality and sustainability of public housing projects. According to Tanko et al. (2018), VM can create sustainable development while removing unnecessary costs, enabling the inclusion of sustainability into projects while staying within budget. Thus, Using VM as a sustainability driver will significantly benefit clients and end users in public housing.

The successful use of VM needs a wide range of knowledge (CSFs in VM) in conjunction with a sufficient understanding of VM from diverse stakeholders. Hence, this preliminary study paper aims to identify the CSFs of VM in Malaysian public housing projects to make them more precise and understandable. These findings could assist the government in providing better quality and sustainable

public housing in the Malaysian construction industry. Results could also be essential to promote sustainable construction, especially in public housing projects. This aligns with the Malaysian government's agendas to enhance the sustainability of public housing and give better satisfaction to end users towards public housing provided.

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Field Measurement Studies on Thermal Environment in an Air-Conditioned Café

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Abstract. The goal of this study was to assess the thermal comfort of air-conditioned cafes at the Universiti Teknologi MARA (UiTM) in Shah Alam, Malaysia. The research was conducted in three different cafes at UiTM Shah Alam, each of which had a unique impact on the temperature of the environment. Field measurements were taken using OHM Delta Thermal Microclimate HD32.3TC instruments during the weekdays in air-conditioned, closed-in cafes. The thermal environmental parameters measured in this study included air temperature, mean radiant temperature, relative humidity, and air velocity. The data collected were then compared to the standards and guidelines set by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) and the Industry Code of Practice on Indoor Air Quality (ICOP) 2010. Findings from these investigations showed that all three cafes had environmental parameters within ASHRAE and ICOP guidelines.

1. Introduction

The service of the cafe is slightly difference compared to the restaurant because they mainly offer beverages along with a limited menu food. These cafes have become popular social gathering spots as well as a "third space" for relaxation, socialising, and work, particularly among young customers [1]. This trend can also be seen on Malaysian university campuses, such as Universiti Teknologi MARA (UiTM).

Indoor thermal comfort is an important aspect in the establishment of comfort in a building. In the region of hot-humid climate such as Malaysia, where the average temperature ranges from 23.7°C to 31.3°C and the relative humidity ranges from 67% to 95% [2], it can be challenging to achieve indoor thermal comfort in the building such as cafe. The mechanical, ventilation, and air conditioning (MVAC) control systems have an impact on the temperature difference across various cafes, which can result in variable degrees of thermal comfort [3]. Rodrigueza and D'Alessandro [4] reported that the use of air-conditioning was effective in maintaining a comfortable indoor environment, with most occupants reporting a high level of satisfaction with the indoor thermal comfort of the building. However, the study also found that the air-conditioning system had a significant impact on energy consumption.

This article presents the initial results of a study conducted in an air-conditioned cafe in a hot-humid climate. The objective of this study is to evaluate the indoor thermal of an air-conditioned cafe environment.

2. Methodology

2.1 The study area

The study was conducted in three cafes at the Universiti Teknologi MARA (UiTM) in Shah Alam, Malaysia, referred to as Cafe A, Cafe B, and Cafe C. These cafes served as the measurement stations for the objective environmental measurements that were conducted as part of the study. Cafe A and Cafe C were located at Dataran Cendekia, while Cafe B was located near Kolej Mawar at UiTM Shah Alam. Cafe A is a rectangle-shaped building with an area of approximately 43.81 m^2, Cafe B is a square-shaped building with an area of about 47.53 m^2, and Cafe C is a rectangle-shaped building with an area of about 55.74m^2. All the cafes were enclosed and equipped with air conditioning systems.

2.2 Field measurement

The four thermal variables that were measured in this study, and which have an impact on human thermal comfort, were air temperature, air velocity, relative humidity, and mean radiant temperature. These variables were recorded using the OHM Delta Thermal Microclimate HD32.3TC instruments, which were properly calibrated before use. The data was collected at 10-minute intervals between 1100 and 1600 hours each day for a two-week sampling period. The instruments were positioned at a height of 1.5 to 1.6 meters, which is the head height of a standing person.

3. Findings

Table 1 lists the thermal parameters that were measured for various cafes. The mean air temperature for all cafes was highest at 25.9°C and lowest at 24.4°C. These data for the air temperature are within the recommended range suggested by the Industry Code of Practice on Indoor Quality of 23 to 26°C [5]. However, according to ASHRAE guidelines, these data are slightly higher compared to the recommended range of 20 to 24°C. For mean radiant temperatures, two cafes recorded within the ASHRAE-recommended range of 24°C to 27°C [6], except for cafe A. The surrounding features of the establishment, such as trees outside the building, can influence the indoor air temperature by blocking the cafe's glass walls from direct sunshine. This finding is consistent with previous research, which found that shaded areas with a significant number of trees have better thermal conditions than areas with little to no tree cover [7]. The mean value of air velocity and relative humidity for all the cafes were recorded within the permitted range as suggested by ICOP and ASHRAE.

Table 1 the summary of measured thermal parameters

Thermal Environmental Parameters	**Cafe**					
	A		**B**		**C**	
	Mean	**Standard Deviation**	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**
Air Temperature (Ta) (°C)	25.9	0.48	24.4	0.56	24.8	1.62

Mean Radiant Temperature (mTr) (°C)	26.7	0.66	24.5	0.57	25.5	1.61
Air Velocity (Va) (m/s)	0.02	0.03	0.02	0.03	0.29	0.25
Relative Humidity (RH) (%)	51.30	3.78	55.06	2.38	60.44	2.17

Novelty of this research:

The objective of this research to determine thermal comfort in the cafe UiTM Shah Alam through filed measurement. This research is important to improve students' satisfactions by providing guidance to cafe designer and operators on how to manage the internal temperature of cafe. Furthermore, this research will contribute to better knowledge of the benefits for improving the indoor environment and overall occupants' well-being. This research very useful in designing MVAC system in the cafe.

4. Conclusion

Field measurement of thermal comfort helps to assess the effectiveness of a cafe's MVAC system in maintaining a comfortable environment for occupants. Data on indoor temperature, relative humidity, and air velocity can be collected to identify and fix any thermal comfort issues. Findings from these investigations showed that all three cafes had environmental parameters within ASHRAE and ICOP guidelines. By following these guidelines and regularly gathering and analyzing data on thermal comfort, cafe designers and operators can work together to create a comfortable and effective environment for cafe occupants.

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Flood Vulnerability Assessment Using A Gis-Based Multi-Criteria Approach Case Study : Tangkak, Johor Darul Takzim

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Abstract. Flood nowadays become a common issue in every resident in Malaysia, whether in urban or rural areas. Floods are a natural disaster as a result of a poor drainage system or caused by a natural reaction of nature. It has many negative effects on the population affected by the floods. The issue of flood cannot be solved simply just only by providing drainage but it needs to be properly planned where the area is suitable for future built-up area. Thus, it need a strategic approach in managing flood issue and make everyone aware about it. This research aim to investigate the suitability of gis-based multicriteria approach in determining flood vulnerability areas. This research is based on data obtained from data collection from agencies such as Majlis Daerah Tangkak to get the shapefile for overall data in Tangkak. The data such as proximity to river, types of soil, types of landuse, slope, elevation and annual rainfall was analysed to evaluate and determine the location of flood vulnerable area. Several methodologies were employed in this study as a result of previous research and expert validation. At the end of this study, the researcher will propose some recommendation that can help the government and the community in controlling this flood issue for future development.

1. Introduction

Incident floods have a huge impact especially from the social and economic aspects to the people especially in developing areas and having high population densities where it results in loss, destruction of property and even loss life. Flood can be defined as a rising and swelling the body of water cause overflow and inundation the area that does not normally covered by water (Aizal, 2017). Floods are a natural disaster as a result of a poor drainage system or caused by a natural reaction of nature. The factor such as climate change, unplanned fast urbanisation, changes in land use patterns, inadequate watershed management and declining groundwater recharge due to the development of impermeable surfaces in urban areas are all expected to make flooding more severe and frequent in the future (Hajar Nasiri, 2016).

2. Literature Review

Flooding's impact on populations may be multi-faceted and wide-ranging. The impact of flood can damage three impact such as property loss, economic disruptions, and impact on human health that will cause injury and loss of life. This impact will give a major influence on one's life as well as the country. (Queensland, 2018).

2.1 Flood Vulnerability Conceptual Framework

Floods affect water resource systems due to three components such as exposure, susceptibility, and resilience. Understanding each concept and examining particular indicators may assist in evaluating the

vulnerability of various systems and allowing specific actions to be identified to reduce it. Basically, the vulnerability of an urban area represents the city's exposure and susceptibility to flooding as well as its resilience to cope with and recover from the flood's damage (Salami, 2017).

2.1.1 Vulnerability Components.

Based on the figure, exposure, susceptibility, and resilience are viewed as components of vulnerability in the majority of frameworks, which are based on an integrated assessment approach. One of the vulnerability framework was proposed by Turner et al. in 2003. The framework also outlines the contributing elements and connections that have an impact on how vulnerable a space's human and environmental systems are. A vulnerability framework is offered for evaluating connected human-environment systems. (Turner, 2003)

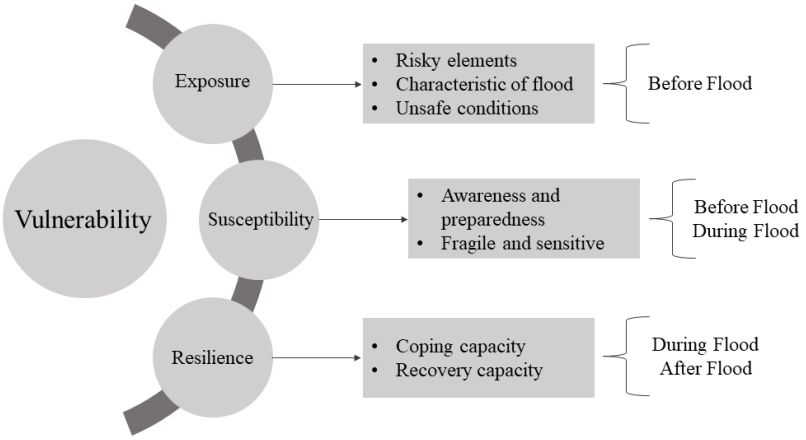


Figure 1 : Components of Vulnerability
Source : (Flood Vulnerability Indices, 2011)

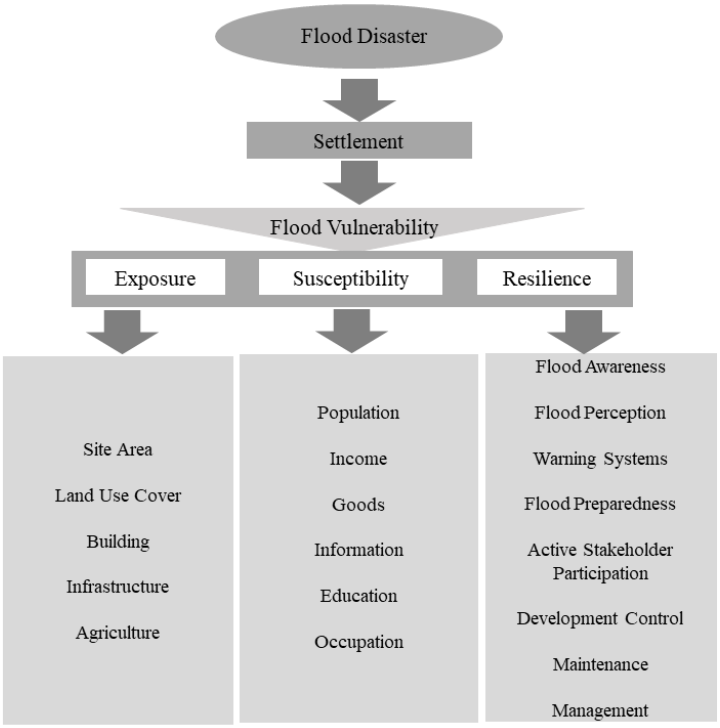


Figure 2 : Flood Vulnerability Conceptual Framework
Source : (Salami, 2017)

3. Data Analysis and Findings

This study aims to extract useful information from the raw data that could be important to the study's objective. Every research finding will be more thoroughly discussed in data based on study methods using MCDA and AHP to release the final research outcome. This issued method has been recognized and given validation from the expertise officer from DID. This validation is crucial to determining whether the methods and aspects of the research that students are using are accurate and suitable for this study.

3.1 Data Analysis Methods

Data analysis is the process of obtaining, modelling, and analysing data in order to obtain insights that may be used to make decisions. There are two main method in this research such as MCDA and AHP.

3.1.1 Multi-Criteria Decision Analysis (MCDA).

MCDA is a useful method that may be used to make various complicated decisions. It is especially useful for solving issues defined by a choice between options. It focuses our attention on what is important, logical, consistent, and simple to use. At its core, MCDA is effective for breaking down a choice into smaller, more understandable parts, analysing each part, and integrating the parts to produce a solution. (Ncsu.edu, 2011)

3.1.2 Analytic Hierarchy Process (AHP).

AHP is actually one of the MCDA method. AHP is a mathematical and psychological approach for organising and evaluating complicated decisions. It was invented in the 1970s by Thomas L. Saaty and has been refined since then. AHP provides a solid structure for a needed choice by quantifying its criteria and alternative possibilities and relates those parts to the overall purpose. (Passage Technology, 2022)

3.2 Flood Vulnerability Assessment Analysis

This process starts from the process of obtaining data from agencies. The data get from websites that can release raster data such as the DEM on the USGS website to release slope data as well as elevation data. Then, the annual rainfall data found on the CRU website. From these data, it will reclassify according to the class that has been set. After that, all layers will be overlayed using the raster calculator method to obtain the results of the study, which is the flood vulnerability map.

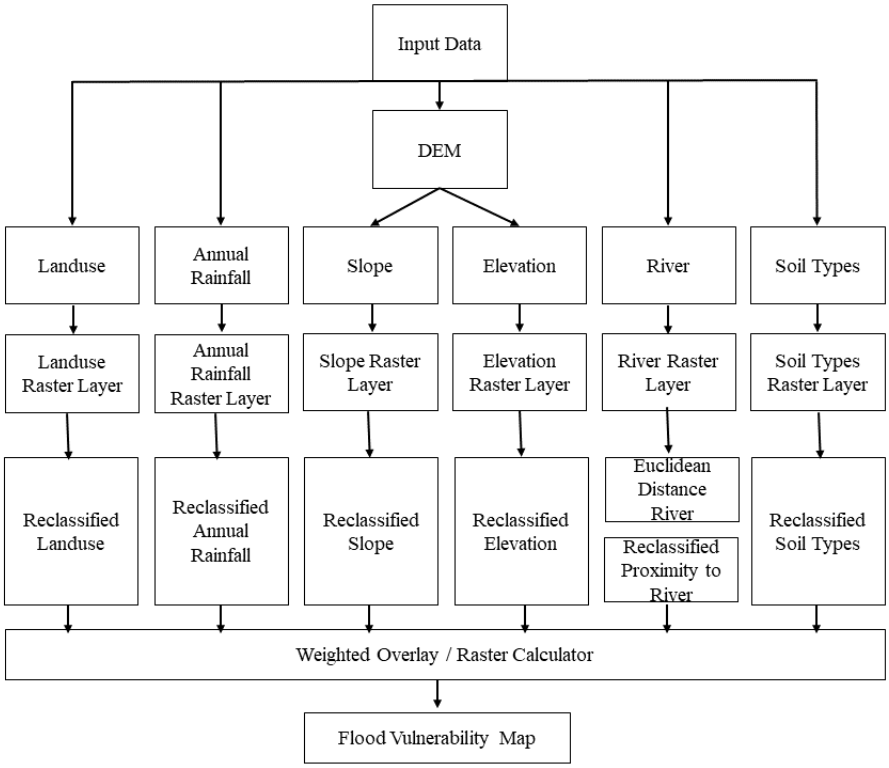


Figure 3 : Process of Produce a Flood Vulnerability Map

These criteria were selected based on the process of reviewing previous studies, taking into account several aspects and obtaining validation from the agency. These criteria are broken down according to classes that each have a level of vulnerability to flooding.

Table 1 : Criteria and Classes Against Flood Vulnerability

Criteria	Classes/Types	Level	Area Percentage (%)
Slope	1. >45º	Very Low	1. 0.03%
	2. 35º – 45º	Low	2. 0.31%
	3. 25º – 35º	Moderate	3. 2.43%
	4. 15º – 25º	High	4. 6.12%
	5. <15º	Very High	5. 91.11%
Elevation	1. >1000 m	Very Low	1. 0.24%
	2. 750 – 1000 m	Low	2. 0.79%
	3. 300 – 750 m	Moderate	3. 5.74%
	4. 150 – 300 m	High	4. 2.97%
	5. <150 m	Very High	5. 90.26%
Annual Rainfall	1. <297 mm/year	Very Low	1. 0.04%
	2. 297 – 300 mm/year	Low	2. 4.99%
	3. 300 – 303 mm/year	Moderate	3. 49.64%
	4. 303 – 305 mm/year	High	4. 32.86%
	5. >307 mm/year	Very High	5. 12.47%
Proximity to River	1. >700 m	Low	1. 44.52%
	2. 300 – 700 m	Moderate	2. 30.48%
	3. <300 m	High	3. 25%
Land Use	1. Forest Land	Very Low	1. 10.96%
	2. Agriculture Land	Low	2. 79.73%
	3. Open Space	Low	3. 0.10%
	4. Vacant Land	Moderate	4. 0.94%
	5. Infrastructure & Utility	Moderate	5. 0.76%
	6. Public Facility	Moderate	6. 0.58%
	7. Residential	High	7. 0.98%
	8. Commercial	High	8. 0.22%
	9. Industrial	High	9. 0.38%
	10. Transportation	High	10. 3.16%
	11. Water Body	Very High	11. 2.19%
Types of Soil	1. Loam Soil	Very Low	1. 38.17%
	2. Lateritic and Saline Soil	Low	2. 9.19%
	3. Peat Soil	Moderate	3. 0.41%
	4. Alluvium Soil	High	4. 12.45%
	5. Clay Soil	Very High	5. 39.78%

3.2.1 Pairwise Comparisons of The Factors.

Paired Comparison Analysis helps in determining the relative relevance of several options. This makes it simple to select the most critical problem to tackle or the most effective solution.

Table 2 : Pairwise Comparison Using More and Less Important Objective

	Slope	Elevation	Rainfall	River	Landuse	Soil	
Slope	-	1	1	1	1	1	5
Elevation	0	-	1	1	1	1	4
Rainfall	0	0	-	0	0	1	1
River	0	0	1	-	1	1	3
Landuse	0	0	1	0	-	1	2
Soil	0	0	0	0	0	-	0

1 = More Important Objective

0 = Less Important Objective

Table 3 : Pairwise Comparison of Six Criterion Matrix

	Slope	Elevation	Rainfall	River	Landuse	Soil
Slope	1	3	7	5	5	9
Elevation	1/3	1	5	3	3	7
Rainfall	1/7	1/5	1	1/5	1/3	3
River	1/5	1/3	5	1	3	5
Landuse	1/5	1/3	3	1/3	1	5
Soil	1/9	1/7	1/3	1/5	1/5	1

Table 4 : Fundamental Scale of Absolute Numbers

Importance Scale	Definition
1	Equal Importance
3	Moderate Importance
5	Strong Importance
7	Very Strong Importance
9	Extreme Importance
2,4,6,8	Intermediate values between the two adjacent judgements
1/3,1/5,1/7,1/9	Values for inverse comparison

Table 5 : Pairwise Comparison Decimal Matrixes

	Slope	Elevation	Rainfall	River	Landuse	Soil
Slope	1	3	7	5	5	9
Elevation	0.33	1	5	3	3	7
Rainfall	0.14	0.2	1	0.2	0.33	3
River	0.2	0.33	5	1	3	5
Landuse	0.2	0.33	3	0.33	1	5
Soil	0.11	0.14	0.33	0.2	0.2	1
Sum	**1.98**	**5**	**21.33**	**9.73**	**12.53**	**30**

Table 6 : Normalized Pairwise Matrix and Determined Relative Weights

	Slope	Elevation	Rainfall	River	Landuse	Soil	Criteria Weight
Slope	0.50	0.6	0.33	0.51	0.40	0.3	0.44
Elevation	0.17	0.2	0.23	0.31	0.24	0.23	0.23
Rainfall	0.07	0.04	0.05	0.02	0.03	0.1	0.05
River	0.10	0.07	0.23	0.10	0.24	0.17	0.15
Landuse	0.10	0.07	0.14	0.03	0.08	0.17	0.10
Soil	0.05	0.03	0.01	0.02	0.01	0.03	0.03

To ensure that the criteria weight is acceptable, there is a formula that is the CR that needs to be carried out. CR less than 0.10 indicates that the comparison outcomes are acceptable.

$$\text{Consistency ratio (CR), } \text{CR} = \frac{CI}{RI}$$

CR = Consistency Ratio

CI = Consistency Index

RI = Random Index

$$\text{CI} = \frac{\lambda - n}{n - 1}$$

λ = Maximum Eigen Value

n = Total Criteria

Table 7 : Random Index

n	1	2	3	4	5	6	7	8	9	10
RI	0.00	0.00	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49

λ = (0.44)(1.98) + (0.23)(5) + (0.05)(21.33) + (0.15)(9.73) + (0.10)(12.53) + (0.03)(30)

λ = 6.68

CI = $\frac{6.68 - 6}{5}$ = 0.13

CR = $\frac{0.13}{1.24}$ = 0.10

Table 8 : The Eigen Vector Weights

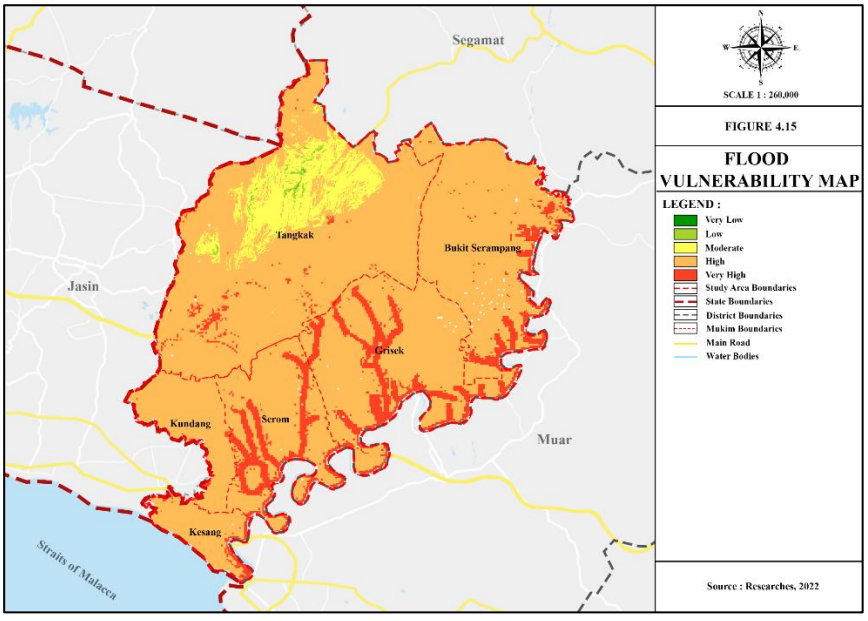
Flood Factor	Normalized Weighted	Influence (%)
Slope	0.44	44
Elevation	0.23	23
Annual Rainfall	0.05	5
Proximity to River	0.15	15
Landuse	0.10	10
Soil Types	0.03	3
Total	**1.00**	**100**

3.2.1 Result.

It shows that the study area which is in Tangkak are at high to very high level of flood vulnerability. This is due to the number shown is more than half of the entire study area. The criteria given might also provide an initial review of flood vulnerable area. MCDA method and the analyst hierarchy process make it facilitate for researchers to produce final results. The pairwise comparison approach makes it easy for the researcher to assign a weight to each criteria.

Table 9 : Flood Vulnerability Level Area Coverage and Percentage

Flood Vulnerability Level	Area (Hectare)	Area Percentage (%)
Very Low	4.33	0.001%
Low	389.89	0.41%
Moderate	6,960.98	7.28%
High	78,526.92	82.18%
Very High	9,674.06	10.12%



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Green Roof System in Malaysia: The Construction Practitioners' Perspectives

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Abstract. A green roof implementation is a vegetated roof designed to provide an urban greening for buildings construction in some developing countries. This system has been popular across Europe over the past few decades. Usually, a green roof is a flat rooftop designed to support vegetation. Some benefits of implementing them are improved stormwater management, reduced energy usage for cooling and reduced urban heat island effects. The aim of this research is to investigate the green roof system implementation from the construction practitioners' perspectives. The objectives of this research are (1) To study the development of green roof system in Malaysia (2) To investigate the awareness of green roof system among construction practitioners and (3) To study the challenges of Green Roof System implementation in Malaysia. SPSS have been used as a tool for data analysis. 75 numbers of questionnaires were distributed to the registered Quantity Surveyor companies in Johor Bharu. The response of 49 numbers (65%) was achieved. The findings of the research found that the level of awareness is still moderate and many challenges has been the obstacles of the implementation. Thus, all parties in the industry and government body have the responsibility to promote Green Roof System as one of the approaches for green technology application in the country.

1. Introduction

Green Roof System is one of the methods that can sustain the environment. It is also a vegetated system where plants are planted on the roof using an engineered growing medium laid on certain layers of the system [1]. Another definition, green roofs are turfed as open spaces that are positioned atop buildings with artificial landscaping and greenery surrounding them. These spaces are suitable for a variety of outdoor activities and leisure pursuits [2]. From a global viewpoint, the green roof industry began in Germany in the early 1970s and in Central and Western Europe in the middle of the 1980s. Singapore, Eastern Europe, and the United States began using green roofs in the early 2000s, while Hong Kong, Manila, and China did not begin using them until the mid-2000s. Recently, green roofs have gained popularity in Malaysia [3].

Globally, green roofs are recognized as one of the most effective and impactful green building techniques for reducing carbon footprint in fully developed urban areas [4]. Instead of being welcomed as a potential component of an accessible public area, green roofs are currently seen as a unique architectural feature for sustainable development strategies in Malaysian cities. However, material resources, product design, and manufacturing process delivery are a few of the challenges that Malaysia's construction sector must overcome to install Green Roof Systems [5]. In addition, it is crucial to identify the reasons for concerns with public disengagement with the green roof and strategies that may be modified to allow a more accessible green roof for the public.

Thus, this paper aim to investigate the Green Roof System implementation from the construction practitioners' perspectives. The objectives of this research are to study the development of Green Roof System in Malaysia; to investigate the awareness of Green Roof System among construction practitioners and to study the challenges of Green Roof System implementation in Malaysia. The

integration of aim and objective will lead to clear direction of the future for Green Roof implementation in Malaysian urban areas.

2. Literature Review

Due to rising urbanisation and increased investments in the housing, transportation, and energy sectors, the need for both horizontal and vertical infrastructure is gradually growing on a global scale. A significant burden has been imposed on resources and the environment as a result of this increase. A third of the world's carbon emissions, which are expected to increase by 34% over the next 20 years, are attributable to the construction industry [6].

Additionally, the construction industry accounted for 20% of the global energy consumption on average in recent years, and this figure is anticipated to rise by an average of 1.3% per year [7]. The push for greater efficiency and sustainability in the building industry is fuelled by these figures and projections.

A truly sustainable rooftop has been considered as one of the key contributing components to a building's sustainability performance. To face the low sustainability performance of the built environment, greening the roofing (GR technology) continues to catch the attention of building professionals [8]. The numerous contributions to creating a more comfortable environment for residents reducing energy consumption, lowering greenhouse gas emissions, and reducing urban heat islands, this technology has grown even more crucial in urban areas[6].

3. Methodology

To acquire the answer for each objective in this research, sets of questionnaires were distributed to the registered Quantity Surveyor companies in Johor Bharu via Google form through email and WhatsApp's, the questionnaires were distributed to the companies with total of 75 sets of questionnaires. According to the company background, there were 75 numbers of practitioners in the company. However, out of 75 sets of questionnaires that has been distributed, only 49 of them responded to the questionnaires. The response rate of these questionnaires is 65% where it is good enough to be analysed.

4. Result and Discussion

4.1 Objectives 1: The Development of Green Roof System in Malaysia

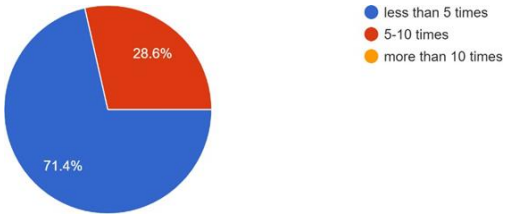

Figure 1: The experience in Green Roof System

Based on the Figure 1, Malaysia has less than five times experiencing with Green Roof Systems as it does without them. Less than five times in their lifetime, most respondents said they would prefer to see a building with a green roof. Statistics account for 71.4% of the respondents' responses, making them a significant response. It demonstrates that Malaysia still lacks structures with green roofing systems installed.

4.2 Objectives 2: The Awareness of Green Roof System Among Construction Practitioners

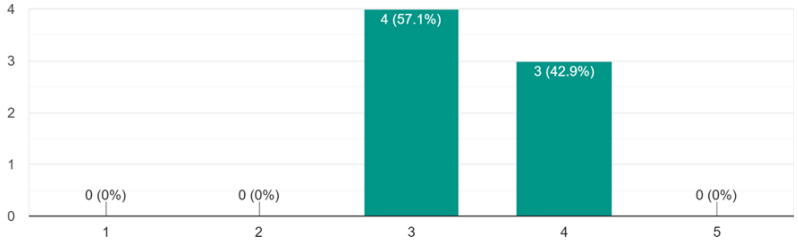

Figure 2: The awareness of Green Roof System in Malaysia

From the bar chart Figure 2, it shows that most respondent have medium knowledge about green roof implementation which is 57.1%. It follows by 42.9% of them have a higher knowledge in green roof implementation. This analysis shows that even a practitioner themselves do not have a deep knowledge in Green Roof System. Therefore, study has been made to create awareness for them to learn about this system for future uses.

4.2 Objectives 3: The challenges of Green Roof system implementation in Malaysia

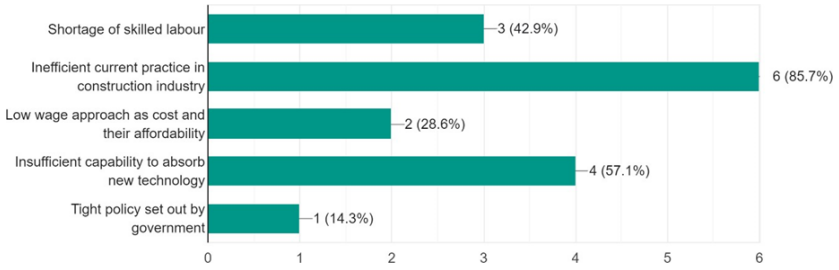

Figure 3: The challenges of implementing Green Roof Systems

Figure 3 demonstrates how the Malaysian construction sector is most negatively impacted by problems with ineffective existing practise. It says that 85.7% of respondents concur that this problem has harmed the sector and made it difficult for them to deploy Green Roof Systems. The following three problems have also had an impact on the building industry in Malaysia, with a combined percentage of 57.1%. The greatest difficulty here is that Malaysia has fewer concerns with present practise. When they tried to use the Green Roof System, this issue caused them to run into a bigger issue.

5. Conclusions

Despite Green Roof Systems diverse and widely reported benefits for our environment and society, its adoption in Malaysia is still not widely used. It remains challenging for various reasons. Besides, due to certain barriers including lack of knowledge and technical expert, expensive cost of green roof and green roof application techniques are not widely disseminated or spread among professionals led to less interest to use the system. Malaysian professionals involved in the construction of green roof need to import construction materials from abroad the western countries. However, the cost of green roof construction could be decrease if we have our own green roof supplier and manufacturer in the country. Thus, all parties in the industry and government body have the responsibility to promote Green Roof System as one of the approaches for green technology application in the country.

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Impact and Challenges of ICT-based Information Sharing Tools in Malaysian Construction Industry

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Abstract. Currently nearly most industries are venturing into a new modern era where digitalisation has become one of the key elements in most operations. The construction industry is now transitioning from a paper-based information sharing method into a newer method that takes the use of information and communication technology (ICT) mainly for communication, sharing information, collaboration, and coordination. However, the Malaysian construction industry's adoption is slow. Thus, this paper aims to highlight the impact and challenges faced on the implementation of ICT based information sharing and communication tools used in construction industry. Literature review and survey were carried out from Malaysian construction participants in order to investigate the existing impacts and challenges faced in adopting the ICT-based information sharing tools. 74 respondents participated in the survey, revealing the impacts and challenges faced from quantitative questionnaires. ICT tools are beneficial to project performance in terms of accuracy of information delivery, reporting work progress and on-site productivity. Moreover, factors that affect the adoption of ICT tools are the speed of internet connection, inadequate IT specialist and availability of internet connection. Nonetheless, this study proposed for the betterment of ICT adoption in Malaysian construction industry by improving the internet connection, providing seminars and workshops, and providing technical support.

1. Problem Statement

Most industries are moving towards the use of technological advancement by using information and communication technology (ICT) including construction industry (CI) Malaysia has implemented electronic procurement system known as eP in 1999 introduced by the Finance Ministry which allows the government and suppliers to conduct transactions electronically and in September 2000, CIDB also introduced the National e-Tendering system (Jaafar et al., 2007). The government and CIDB are trying to assimilate the ICT application into the CI. However, most companies did not exploit the ICT, and only use basic functions like email (Gaith et al., 2009). Generally, lots of ICT applications in the CI that can be differentiated by their purposes, ranging from design, planning, administration, scheduling, and databases. The general software used in CI firms is word processor, spreadsheet, email, administration software, databases, and self-developed programs (Gaith et al., 2009; Onyegiri & Nwachukwu, 2011; Onyegiri, 2017). There are also numbers of technical construction software currently e.g., Procore, PlanGrid, Oracle Primavera, and a lot more. For this study, these most common ICT applications are categorised into computer-aided design (CAD), scheduling/resource planning, cost calculation/estimation and geographic information system (GIS).

In Malaysia, there are 12 emerging technologies mentioned in the outline of Construction 4.0 Strategic Plan 2021-2025 (2021) including Internet of Things (IoT), Building Information Modelling (BIM), 3D scanning, photogrammetry, augmented reality, virtualisation, big data, predictive analytic, and cloud and real time collaboration.

Based on Construction 4.0 Strategic Plan 2021-2025 (2021), digital technology adoption for Malaysia's CI currently is low and connectivity driver is poor. Thus, one of the highlighted emerging technologies that is planned to be implemented soon is cloud and real-time collaboration where it will

provide a swift flow of information within the construction participants with the use of ICT tools and Internet (CIDB Malaysia, 2021). However, is the Malaysian CI ready to implement the big changes in the current conventional practice? Hence, this research could provide essential information to aid the current scenario faced by the Malaysian CI, which is low digital technology adoption and poor connectivity drivers (CIDB Malaysia, 2021).

2. Objectives

The adoption and involvement of ICT in construction industry shall be beneficial in order the masses to accept the practice. This research aims to determine the impacts of the application of ICT-based information sharing tools on the construction project performance.

In addition, this research is conducted to identify the challenges faced by construction participants on the application of ICT-based information sharing tools in construction project performance.

3. Methodology

3.1. Data Source

Primary source and secondary source were exercised throughout the study. Primary sources i.e., conducting surveys to obtain data from construction participants would result in a variety of outcomes and it will be a strong support for overall results as it is original in nature. The target participants in this survey are those involved directly with construction projects and a total of 74 respondents were collected.

Furthermore, secondary data helps in gathering more concrete information from previous research studies from reliable sources which will eventually avoid time consumption due to no extra sampling and data collection needed if the specific data has been collected before.

3.2. Sampling Technique

Size of the sample will be mediated according to the capacity of available time. Internet-based surveys could potentially save cost, easy to administer, better response rate and better accuracy at the end result (Fricker, 2012).

This research survey implements the cluster sampling method under the probability sampling method where the sample is taken in a group or cluster of individual units (Fricker, 2012).

3.3. Data Collection Method

Online questionnaire surveys have been found to be globally reachable, fast and less time consuming, and able to reach large samples (Evans, & Mathur, 2018).

The questionnaire as prepared via Google Form and shared to the respondents via emails, social networks especially Facebook, LinkedIn, and WhatsApp to increase the response rate. Five-point Likert scale and multiple-choice questions are used for opinion-based questions and demographic questions respectively. All answer choices were taken from literature review conducted from previous research studies.

3.4. Data Analysis

The collected data was analysed in the Statistical Package for Social Sciences (SPSS) software version 26. Descriptive statistical analysis is used to identify the collected data into a more refined findings, aligned with the research objectives.

4. Data Analysis and Findings

4.1. Impacts from the application of ICT-based information sharing tools in construction projects

In Table 4.1, ICT-based information sharing tools are positively impact project performance. The accuracy of information delivery and work progress reporting are ranked first the in the ranking of impacts of ICT-based information sharing tools with an equal mean ($\bar{x}$=4.80) followed by improving on-site productivity ($\bar{x}$=4.07).

Table 1: Advantages of ICT on project performance

Ranking of impacts of the application of ICT-based information sharing tools			
	Mean	Std. Deviation	Rank
Accuracy of information delivered	4.80	0.405	1
Improve reporting work progress	4.80	0.405	1
Improve on-site productivity	4.07	0.689	2
Save time	3.55	0.527	3

4.2. Challenges on the application of ICT-based information sharing tools in construction projects

This research seeks for the challenges faced on the application of ICT-based information sharing tools. In Table 4.2, the speed of the internet ($\bar{x}$=4.23), inadequacy of IT specialists ($\bar{x}$=4.07), and availability of internet connection ($\bar{x}$=3.95) are the top three challenges faced by the CI. Two out of the top three challenges were due to internet connectivity. In another scope of view, these top challenges were due to external factors and not due to the self-resistance attitude of the construction personnel itself.

Table 2: Challenges on the implementation of ICT in CI

Ranking of challenges of the application of ICT-based information sharing tools			
	Mean	Std. Deviation	Rank
Speed of internet connection	4.23	0.803	1
Lack of IT specialists	4.07	0.648	2
Availability of internet connection	3.95	0.617	3

5. Conclusion

The construction participants are highly aware of the benefits from the application of ICT tools. The information delivered from one end to another is highly accurate as there is no possible way for information discrepancy unless it is due to language barrier and from virtual exchange e.g., facial expressions and body language.

There are multiple inhibitors that lagging the full implementation of ICT-based information tools in the Malaysian CI, specifically the speed and the availability of internet connection. The amount of ICT tools that rely on the internet is high, even the simplest ICT tool, for instance, the email. However, for sending and receiving a huge size of documents for instance, full-scale drawings or live video calls, the speed of connection really matters. The government should improve the coverage with the aid of internet service providers especially at underdeveloped areas as there is limited to no connectivity.

Furthermore, the government bodies and CIDB should take initiative on the adoption of newer ICT tools. This study highlighted the lack of IT specialists as one of the top ranked barriers in adopting the ICT tools. In order to combat this problem, the related bodies should provide construction participants with workshops or seminars and the like in increasing the knowledge of the masses that work directly in the CI. The result shows that respondents are willing to learn the necessary knowledge in order to sharpen the skills and proficiency in ICT tools. This is also a good sign that the current construction participants are accepting and aware of the newer ICT tools.

Lastly, the exposure of latest ICT tools is not limited to only the current personnel in the working world, but to future construction players as well. This being said, the current and upcoming construction participants must be equipped with knowledge of the latest ICT tools. Improving the syllabus for students is a great way to prepare the future construction players alongside providing them with extra workshops or seminars to at least acknowledge the upcoming technologies.

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Revamp the Iconic *Berlin Chair*: The Born on *Berlin Zijtafel*

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Abstract. The *Berlin Zijtafel* side table was designed as a companion piece to the famous Berlin Chair, keeping the same proportion and colors. The following table was inspired based on the designs of Gerrit Rietveld. The *Berlin Zijtafel* version was easily identifiable as a linked visual on the significance characteristic built with six separate planks with avant-garde design and iconic lines of the chair that represent Rietveld's basic principles. The design innovation process has shown that despite the iconic chair being created in nearly the past century, the design philosophy will never have an expiration date to be developed for modern furniture used.

1. Problem statement

Iconic furniture was well known for its authenticity of design and philosophy which was established many years ago. This can be seen in the famous 'Berlin Chair' that was designed by Gerrit Rietveld in 1923. Even though the chair has been produced almost a century ago, the furniture has still been significantly valued in the recent modern design era. While the chair remained iconic in this era, there was an idea of whether similarly designed furniture could be reformed by modern designers in recent days to enhance the integration of iconic furniture aesthetic value and modern architectural elements.

2. Objective

The commencement of this design phase was to transform the iconic furniture design philosophy into a modern design of furniture. This transformation was aimed to revive the glory of the iconic furniture value in modern design innovation.

3. Methodology

The newly inspired furniture design was conducted as part of the final project for the Furniture Design subject at Universiti Teknologi MARA, Puncak Alam. The author had chosen the Berlin Chair designed by Gerrit Rietveld as the subject matter for the design transformation. The innovation of this design process embedded the iconic furniture design philosophy into the new furniture which are the monochrome color scheme, the basic geometric form, and iconic lines representing the De Stijl movement [1]. The author decided to innovate the Berlin Chair's philosophy into newly bedside table to be paired with the iconic chair which can be accommodated in any kind of building architecture [2].

The design process started with initial research on the iconic chair to understand the significant design elements of the furniture. The design development then took place to establish a new furniture design. The proposed side table innovated the Berlin Chair's design philosophy with a pinch of modern design twist to ensure the transformation could meet the modern design trends while still preserving the originality of the iconic furniture elements. Reflecting on the iconic chair philosophy, minimal use of furniture construction material has made the fabrication process could be complete in a short period. The whole process of making the new furniture took around 4 months to be completed.

4. Conclusion

In general, the *Berlin Zijtafel* table is a quite unique design for the present time and shall expect criticism but the design will significantly improve in the future. It is not just a new furniture transformation but also a form of art that can express designer innovations and gratitude towards the previous designer's philosophy. While Rietveld furniture itself used to be described as 'a abstract-real sculpture of our future interior' [3], living in a fast-moving design trend required a designer not only to explore the modern design method but value the ancient design elements which will allow for a new hype in the modern design movement.

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The Relationship between High-Density Residential and Mental Health

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Abstract. Urbanization has exerted pressure on housing provision for urban dwellers, and more high-density residential is built to accommodate the migration of people to urban areas. This study aims to understand further the relationship between high-density residential in urban areas and mental health to create a better environment and improve urban well-being. To understand the relationship between high-density living and mental health, an in-depth interview with the experts from mental health non-governmental organisations (NGO's), an urban planning expert and a medical expert is conducted based on the characteristics of density and open space provision. Responses are analysed using thematic content analysis. The results suggest that most people living in an high-density residential may risk developing mental disorders. It has an indirect effect that can become a factor that contributes to the mental health problems of the urban high-density residents.

1. Introduction

High-density residential is highly associated with urbanization trends. As people move to urban areas for job opportunities and better lifestyles, it causes an increase in urban population numbers. Urbanization is vital in urban planning, especially to health challenges in the 21st century [1]. The effects of rapid urbanization and uncontrolled high-density residential can produce urban stressors or environmental stressors, and the stressors may vary for each individual. The urban stressor is the situation that represents the level of mental health of the urban inhabitants facing the daily dullness that are incompatible with their life [2]. Urban stressor includes poor quality housing, high-density living conditions, excessive noise, high levels of pollution, crowding, cultural differences, constant changes, and others that can cause one to affect their daily life. Mental health can be affected by this stressor faced by the urban dwellers depending upon adaptation and the degree of choice people feel over the aggressor.

2. Mental Health and High-Density Residential

Mental health problems such as depression and anxiety are expected to be a significant problem among Malaysians [3]. Based on Malaysia National Health and Morbidity Survey [4], one in every five people is depressed, two in every five are anxious, and one in every ten has stress problems in Malaysia. The increasing numbers of people having depression, anxiety, and stress worldwide are alarming. The World Health Organization, the United Nations, and Malaysia's government have started emphasizing the figure and formulating relevant policies to reduce the number. The root causal and drivers of these problems need to be identified to reduce the prevalence. There is much research conducted to find the associations between various environments characteristics and mental disorders since the year of 1970s until to dates such as Tao et al.[5] studies on the built environment, perceived disorder, social interaction, and mental health in Beijing and Qiu et al.[6] studies on the linkage between neighbourhood

environment and mental health in Guangzhou, China. However, in the Malaysian context, the Sustainable Development Goals have become the starting point for the government to emphasize mental health well-being in Malaysia (Goals number 3 and 11). The number of the person having depression, anxiety, and stress in Malaysia is very worrying, and the lifestyles and cultures in Malaysia itself may also affect these figures.

High-density residential is a type of built environment; according to Croucher et al. [7], the built environment includes aesthetics, connectivity, proximity, functionality, and accessibility. A shred of evidence shows that the floor area ratio and building density have been positively associated with mental health [6]. Rohe [8] found that several studies showed a direct relationship between high-density residential associated with decrements in mental health measures. Besides that, living in a high- density residential with lower socioeconomic status will cause in-house crowding where residential unit size is smaller with higher households.

3. Methodology and Findings

3.1. The qualitative data is collected through interviews with urban planners, medical practitioners, psychologists, and NGOs. The interview questions are divided into two types. The first question is for urban planners, consisting of 10 questions. The second questions are for medical practitioners, psychologists, and mental health NGOs, consisting of 10 questions. The urban planners are from government services such as PlanMalaysia and local authorities. Urban planners are the person or organisations responsible for enacting the legislation, guidelines, and development controls. For the medical practitioners and psychologists, the samples are from government services from the Ministry of Health Malaysia and clinics that mainly handle patients with mental health problems, especially in urban areas. For the NGOs, several NGOs for mental health are actively advocating and helping mental health patients. The analysis of qualitative data from the interviews, including the transcription analysis, coding or indexing, and identifying the patterns and connections, were conducted using thematic analysis. Atlas ti.9 software was used to analyse the qualitative data, including transcription and coding of the answers.

3.1 Findings.

Based on the result, it is found that high-density living needs to be looked at with other supporting factors. And these supporting factors, such as green spaces and density, are highly related and create a chain connection link. Thus, the findings show that when a person lives in a high-density living, many factors could contribute to mental health problems, and when these factors are linked, it may worsen the person's conditions. The in-house environment, especially when living with a bigger number of households, will create stress and limited spaces; it will worsen when the community is not supportive and not even bothered by the surroundings or the place has a negative neighbourhood environment, then the neighbourhood does not have any green or recreational spaces for the stressed person to calm themselves, and eventually, they will lose their personal control and may lead to mental disorders. Thus, it is important to ensure this system is in good condition.

4. Conclusion

Mental health well-being is crucial as it affects the everyday life routine of a person. Living in a high-density residential environment is not the only factor for mental health well-being; it is related and interlinked with the other urban stressors within neighborhood environment. Thus, urban planning, as a form of primary prevention and contributor to health outcomes, and social and physical environments play a significant role in community health, including planning a good quality of high-density residential area.

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Internet of Things (IoT) Application in the Malaysian Construction Industry: The Types and Challenges during the Construction Stage

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Abstract. The Internet of Things (IoT) can be defined as a technological device that can be controlled and operated automatically from afar by using the internet. Since the world ismoving towards the Industrial Revolution 4.0 (IR4.0), IoT has become the basis of the new transformation. The Malaysian government encourages the use of IoT in the construction industry to facilitate construction projects, especially during the construction stage. However, a few problems have been raised during the implementation of IoT, where there is lack of IoT skills and knowledge among the construction practicioner, lack of security and safety, and lack of robustness in transferring the data. Therefore, this research aims to study the challenges in implementing IoT during the construction stage by contractor class G7 in Klang Valley. The objective of this research is to identify the type of IoTused and the challenges of adopting IoT during the construction stage. This study used the quantitative approach, and the data was analysed through the IBM SPSS software. From the dataanalysed, it is found that the type of IoT used in the construction stage is drone technology, Building Information Modelling (BIM), and Big Data. There are also many challenges in adopting IoT during the construction stage that has been discovered, including financial constraint, lack of skills and knowledge, and technical issue. Thus, this research will contributeto the enhancement of IoT usage and digitalisation.

1. Introduction

Construction Industry Development Board (CIDB) has already introduced the Construction 4.0 StrategicPlan for the year 2021 until 2025, focusing on the IR4.0 to meet the standard of future development that is predicted to be more technological advance. Based on the Construction 4.0 Strategic Plan (2021-2025), there will be an addition of the Internet of Things (IoT) tools that will be introduced to the Malaysian construction industry, such as Augmented Reality (AR), Big Data, etc. This is in line with the importance of the Sustainable Development Goals (SDG) to obtain technological solutions based on IoT. These IoT tools would encourage modern digitalization, thus indirectly boost the industry's productivity. Even with these advantages, the implementation of IoT in the construction industry is still low, as there are many challenges faced by the construction players during the implementation of IoT (Gamil & Rahman, 2019), especially in the construction stage.

The construction stage is the most crucial in the construction process. Any issues arised during construction would result in time and cost overrun, leading to project failure and abandonment. To realize the government's aspirations in moving towards technological advancement, it is an urgent need and a wholesome effort by contractors to understand the type of IoT used and the challenges in

adopting IoT during the construction stage. Thus, this research will contribute to the enhancement of IoT usage and encourage modern digitalization, which indirectly boosts the performance of the contractor's practices in the Malaysian construction industry. Thus, this research will contribute to the enhancement of IoT usage and encourage modern digitalization, which indirectly boosts the performance of the contractor's practices in the Malaysian construction industry.

2. Literature Review: The Importance of Internet of Things (IoT)

In the globalization of the new era, the world keeps on moving towards modern technology, innovation is constantly introduced to ease the burdens of humans in daily life. The world is transforming into a new transition known as the Industrial Revolution 4.0 (IR4.0). The IoT is widely defined as a technological device that can be controlled and operated automatically from far by using the internet. During the construction stage, a few IoT tools are introduced to facilitate the construction process, such as Building Information Modelling (BIM) and drone technology (Yahya et al., 2021; Gamil & Rahman, 2019). These tools can share and manage the information of the projects without the need for any construction personnel to be available on-site. Thus, the IoT in the construction industry, specifically during the constructionstage, can be described as a tool that uses the internet to communicate with other construction personnel to transfer information and data regarding the projects. Even though the implementation of the IoT has proven to bring many advantages to the construction industry, the adoption of IoT bythe construction personnel is still low: Lack of skills and knowledge, Lack of security and safety, and Lack of robustness in connectivity are the main problems (Jesse, 2018; Humayun, 2021 & Gamilet al. 2020). Moreover, many issues arise during the construction stage: design-related problems, faulty by the contractor, poor material management, and poor collaboration among construction parties involved in the same project. To ensure a timely construction period due to the design-related issue during the construction stage, BIM can be implemented since the execution of BIM is proven to reduce the error and mistakes made by the construction team. Furthermore, to avoid frequent design changes by the client, Augmented Reality (AR) can be used to visualise the actual design before the construction commences on site. However, the significant challenges in the implementation of IoT in the construction stage: Lack of skills and knowledge, lack of awareness and support, privacy and security issues, financial constraints, and technical issue. Thus, with the rapid changes in modern technology, the construction industry needs to keep updated with the current technology that might be helpful to the overall productivity and performance of the construction industry.

3. Methodology

The early phase of the research began with an extensive literature review from relevant recent researcharticles, journals, theses, published newspapers, magazines, books, or internet sources such as websites and online journals. Then, the aims and objectives are set up based on the current and relevant issues related to the selected topic. Subsequently, a quantitative approach with a questionnaire survey was conducted with G7 contractors in Klang Valley. Thequestionnaire was made through Google Forms and distributed to the targeted respondents through online platforms such as e-mail, LinkedIn, Facebook, and WhatsApp. Data is analysed through IBM SPSS software and tabulated in the form of mean value and frequency, percentage, average score, bar graph, pie chart, and standard deviation.

4. Results and Discussion

4.1 Demographic Study

Most of the respondents come from various age classifications, with the most significant number of respondents aged between 20 to 29 years old. Hence, most have work experience between less than 5 years and 6 to 10 years. Nevertheless, the third most frequent in the classification of work experienceis more than 21 years. Most respondents also have at least a degree in education before starting employment. From the findings on the general information of the respondents, the data collected is validsince the respondents have comprised most of the organizational roles available in the contractor firm. From the age classification and work experience, IoT implementation is more familiar to the younger generation.

4.2 The Type of IoT Used During the Construction Stage

Previously the literature review has discussed the problem that usually occurs during the construction stage, which is design-related problem, faulty by the contractor, poor material management, and poor collaboration among construction parties. From the mentioned issue in the construction stage, several IoT tools can help to solve the issues, such as the execution of drone technology, Radio Frequency Identification (RFID), BIM, AR, and Big Data. The analysis shows that the respondents agree that BIMis used during construction, followed by drone technology, Big Data, AR, and RFID. However, the overall mean can be classified as agree. Therefore, the respondents used all types of IoT mentioned during the construction stage; nevertheless, each type's usage varies.

4.3 The Challenges in Adopting the IoT During the Construction Stage.

Based on the data analysis, the respondents find that lack of skills and knowledge is the main challenge in adopting IoT during the construction stage, followed by financial constraint, lack of awareness and support, technical issues, and privacy and security issues. Through the mean score, all respondents agreeon all the challenges mentioned. The challenges in adopting IoT in the construction stage depends on thetype of IoT used at the construction site. This is because different type of IoT has different challenges. This shows that the second objective has been achieved.

5. Conclusion

Based on the data that have been analysed, several IoT tools can help to solve the issues, such as the execution of drone technology, Radio Frequency Identification (RFID), Building Information Modelling (BIM), Augmented Reality (AR), and Big Data. However, there are also many challenges in adopting IoT during the construction stage that has been discovered, including financial constraints, lack of skills and knowledge, and technical issues. Therefore, the research outputs seek to understand better on the IoT used and the challenges during the construction stage. In future studies, the researcher can enlarge the scope by focusing on and emphasizing different locations, comparing the reasons behind the differences, and comparing the challenges of implementing the IoT between the older and younger generation in the construction industry.

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Spatial Planning on Wet Market Normalization During Post Covid-19 Pandemic

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Abstract. In Southeast Asia, wet markets that sell both fresh and prepared foods play a vital role in sustaining an urbanizing populace. Despite the convenience of traditional market consumers, the influence of Covid-19 viruses spread swiftly over the world, having drastic effects on the wet market economy. Wet market merchants and the factors that influence their spatial planning during the post-Covid-19 pandemic wet market normalization Profitability is mostly determined by adequate demographic spatial planning, spatial location, and stall arrangement improvements. It also has to do with larger food safety at the district level, as with food safety during preparation, keeping food fresh within the area, and ensuring that sellers prioritize safety during the Covid-19 Pandemic. Therefore, As a result, the purpose of this study is to obtain the optimal and successful approach to new spatial planning and the implementation of new guidelines that will ensure user comfort and safety in the future. This research uses qualitative method through on-site observation and expert interview, while quantitative method uses for questionnaire. Nonetheless, this research helps to maximize the understanding of spatial planning on wet market normalization during post Covid-19 Pandemic.

1. Introduction

Numerous wet markets in Eastern countries play a dominant part in food safety. To transform wet markets into supermarkets unsuccessful, because well known as low priced for fresh foods. Although is a part of urban redevelopment, wet markets and supermarkets supply fresh foods to the customers. The wet markets supplies for meat, aquatic products (in particular squid and live fish), fruits and vegetable markets (Qi, Si et al. 2019) .

The outcome of the Covid-19 has led to major changes throughout the day, plus around the world. The range of experiences and emotions all over the life shifts that frequently accompanied. This gives impacts towards local economic in wet markets, consequently may be of social interactions and tensions or helps social involvement benefits towards the community in daily lives (Mele, C., et al. 2014). This research appoints, the influence of spatial planning on new wet market normalization.

1.1 The Wet Market Revolution in Developing Countries

For the past two decades, arising countries share experienced a wet market revolution. In the early 2000s, statistics reveal that the high development seen before in China, Malaysia, Thailand, and Indonesia maintained, despite India and Vietnam expanding even faster in developing countries. The transformation, innovation in transformation, and distinctive development strategies are all factors that influence revolution countries in Asia (Reardon, T., et al. 2012).Apparently, the majority of previous studies, focused on the operation of wet markets from the perspective of consumers, but then only a few looked at the profitability of wet market vendors throughout the development (Qi, Si et al. 2019).

1.2 The Proper Spatial Planning During Post Covid-19 Pandemic

The proper circulation, spatial location, spatial planning, characteristics of the vendors and business strategy, has an impact through food retailing based on the prior review that has been indicated. When it comes designing a food system plan and circulation, traditional planners are primarily concern with how to arrange food retailing to increase the availability of food. In order to improve retail environment, the implications and future opportunities should be understood towards new wet market normalization throughout the outcome of proper planning circulation by location and audience size (Qi, Si et al. 2019).

To develop beyond along with environmental, includes three dimensions conditions: ambient conditions, spatial layout plus functionality, and signs symbols. Unique environmental, ambient conditions of spatial planning factors may have important influence on experience of the users reviews, and hence on consumer pleasures according to the services and retailing researchers on theoretical grounds (Huang, Tsai et al. 2015). Now at interaction between food safety and human individuals, there must be countless parallels with pandemic preparedness for the virus Covid-19 (Shah, A. U. M., et al. 2020).

The way equipment technology, furnishings, physical machinery, and the arrangement and even the apparent furniture of comfort, accessibility and layout impacts the users decisions is regarded to the spatial planning location. The capability of all of these physical elements, is to improve and simplify the service exchange process can innovate the individuals support in ergonomic manner considered to as functionality of spatial location. (Rosenbaum, M. S., et al. 2011). To lessen the chances of a Covid-19 outbreak, marketing and location strategies were also significantly changed (Webster, R. G. (2004)

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Public Abstract Sculpture in The Park From Abundance to Important Environment

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Abstract. This project is associated with how I respond towards the management of vegetation in the city limit. Therefore, this project aims to develop a wooden public sculpture, where the formation was stylised from the four-legged animal form. Then, the objective of this project is to utilise an abundance of tree trunks for the creativity of abstract sculpture construction in the art studio. The animal character features were chosen and functioned as a metaphor for the situation that responds to the actual habitual of humans in organizing the vegetation management in a certain area like a highway and byway road site. The method began through the reacting process of observation, then the process of manipulating and creation was developed through sketches and drawings, where later, through drawing, the formation of scale model was formed from the material of wood collected from the real location in the Shah Alam area. In the studio, the procedure of making with the appropriate tool and constructing with a joiner wooden technique that supports with accessories such as screws and nails. The finishing and cleaning were delivered, and the use of wood stain was to preserve the wooden material, and for artistic purposes, the enamel paint was utilised before the sculpture was stimulated or relocated at the real location using the artist's impression technique, and the project was established as 'running forest' series. Significantly, this project was symbolic; we used the art approach to convey the message to the community politely.

1. Introduction

This project aims to develop a public sculpture made of wood, the formation of which will be stylized after the form of a four-legged animal. The characteristics of the animals were selected and used as a metaphor for a situation that responds to the actual habits of humans in organising vegetation management in a specific location, such as a highway and byway road site. The metaphor was chosen because the animal character features respond to the actual habits of humans. The process method began with the reacting process of observation, then the process of manipulating and creating was developed through sketches and drawings, and finally, through drawing, a scale model was formed from the material wood collected from the real location in the Shah Alam area. In the workshop, the process of manufacturing with the appropriate tool and constructing with a joiner wooden technique that supports accessories such as screws and nails is carried out. Before the sculpture was activated or relocated to the real location using the artist's impression technique, the finishing and cleaning were delivered, and the wood stain was used to preserve the wooden material. Additionally, enamel paint was used for artistic purposes. The project was established as a series called "running the forest." This project was symbolic in nature, and we chose an artistic approach to deliver the message to the community congenially.

2. Problem Statement

The pleasantness of the natural scene is diminished by public sculpture, but the pleasantness of the urban scene is not affected by the sculpture. The aesthetic value of public art had a greater impact on the surrounding landscapes than the degree to which it was harmonious with the surroundings. The ratings for pleasantness and the visual properties related to pleasantness legibility ranged from artwork

to artwork in public spaces (Motoyama & Hanyu, 2014). The majority of contemporary public sculpture, beginning with Rodin, is founded on the strongly held personal values of the artists, which frequently clash with the values of the public that the artists choose not to celebrate. Rather than depicting the values essential to progressive modern societies, modern sculptors have actually put those values into action. One example is how the modern use of freedom of expression should be disciplined and constructive. The battle artists have fought to persuade the general public of the validity of their principles and ideals is still ongoing (Elsen, 1989). In a few different situations, the question of public sculpture's legal standing and preservation comes up. In November 2012, the Draped Seated Woman by Henry Moore, created between 1957 and 1958, was purchased by the London Borough of Tower Hamlets. Moore made the deal in the 1960s to sell the bronze cast to the predecessor of the London authority, which is now known as Tower Hamlets, with the “understanding” that it would be installed in East London (Lydiate, 2012). Richard Serra is regarded as the most influential sculptor of the 20th century. He is well-known for developing innovative sculptures (abstract sculpture compositions existed before him, having been opened by the constructivist vanguard at the beginning of the 20th century). Henry Moore, Vladimir Tatlin, and Osip Tsadkin were artists who worked before Richard Serra. Serra is famous for his ability to translate the accents of his works from the works as they are to the environments in which they are placed. He claimed that the sculpture assisted him in better understanding urban space. His rusted metal sheets and profiles, which can be rectangular or curved, approach architectural design. Richard Serra positioned them next to architectural constructions as an intermediary scale checkpoint between street furniture (lampposts, booths, fountains, and seats) and buildings, especially modern ones. In particular, Serra was interested in the relationship between the scale of street furniture and the scale of buildings (Rappaport, 2007). Context and the social ramifications of an artist's work are two factors that influence whether an artist’s work is considered "political" or "single-minded" or "marginal." The issues of gender, ethnicity, socioeconomic status, and the environment can be linked to political art on a variety of scales, including the personal, the local, the regional, the state, and the global. The author of this study uses a public art and sculpture project supported by memory and geography to re-contextualize one of the largest industrial disputes that have ever occurred in Australia. Workers who fought for union members' rights and working conditions are recognised and honoured by the monument. The open-ended design brings the combination of the psychological and the social, resulting in a hybrid piece of work. In this study, memories and occurrences from that era are re-examined, and the authors argue that political art can enhance the creative process and give prolonged cultural meaning by recalling, discussing, and acting upon historical events (Wollmering, 2012). Therefore, the whole idea and the concept of making are derived and paradigm through the real project, which is associated with public sculpture, and the place that will be located or intended is a park in any suitable places in Shah Alam.

3. Objectives

The objective of this project is to utilise an abundance of tree trunks for the creativity of abstract sculpture construction in the park.

4. Methodology

The artistic research process guides the methodology (Balkema & Slager, 2004; Hannula, Suoranta, & Vadén, 2014). As a result of the recent review of the artistic approach, the proper direction must be followed and reflected in practice. The visit and observation process was managed several times; I went to a specific location where the tree had been cut, and the tree trunk was plentiful. I approached the worker (wood-cutter worker) and requested permission to obtain the abundant tree trunk in order to use and construct it as the main material in my sculpture studio. The process of developing a method from sketches and improving it through drawing and small-scale models. The work was made from collected wood, which was formed according to the abstract character to be formed. Making with the appropriate tool and constructing with a joiner wooden technique that supports with accessories such as screws and nails in the studio. The finishing and cleaning were completed, and the wood stain was used to preserve

the wooden material, and enamel paint was used for artistic purposes before the sculpture was stimulated or relocated at the real location using the artist's impression technique, and the project was named the 'running forest' series.

5. Findings

The “running the forest” project that is depicted in Figure 1 is an actual piece of artwork that is going to be installed in a particular location in Shah Alam. Artwork that the green movement of the 21st century has never been so passionate about before, especially in light of the growing media coverage of global warming and the devastating effects that it has had on this planet in recent years. As an artist whose primary medium is wood and timber, one of nature’s precious resources, I have expressed my reaction to such situations that are happening right now in my most recent design for a sculpture that will be entered into this competition. The title “Running the Forest” sculptures give the impression that the natural world is in motion right from the start. I interpret it as a collection of five animal-like wooden sculptures arranged to give the impression of a gathering. The natural quality of these semi-abstract works is highlighted and embellished with body stripes and spots, anatomical characteristics inherent to the animal kingdom. They range in size and personality, with the largest being 150 centimetres in eight, but they all have the characteristic of being creatures with four legs. Their demeanour gives off the impression of being calm and composed while also being on high alert and prepared to flee at the first hint of danger, which may come from humans, urbanisation, or deforestation.

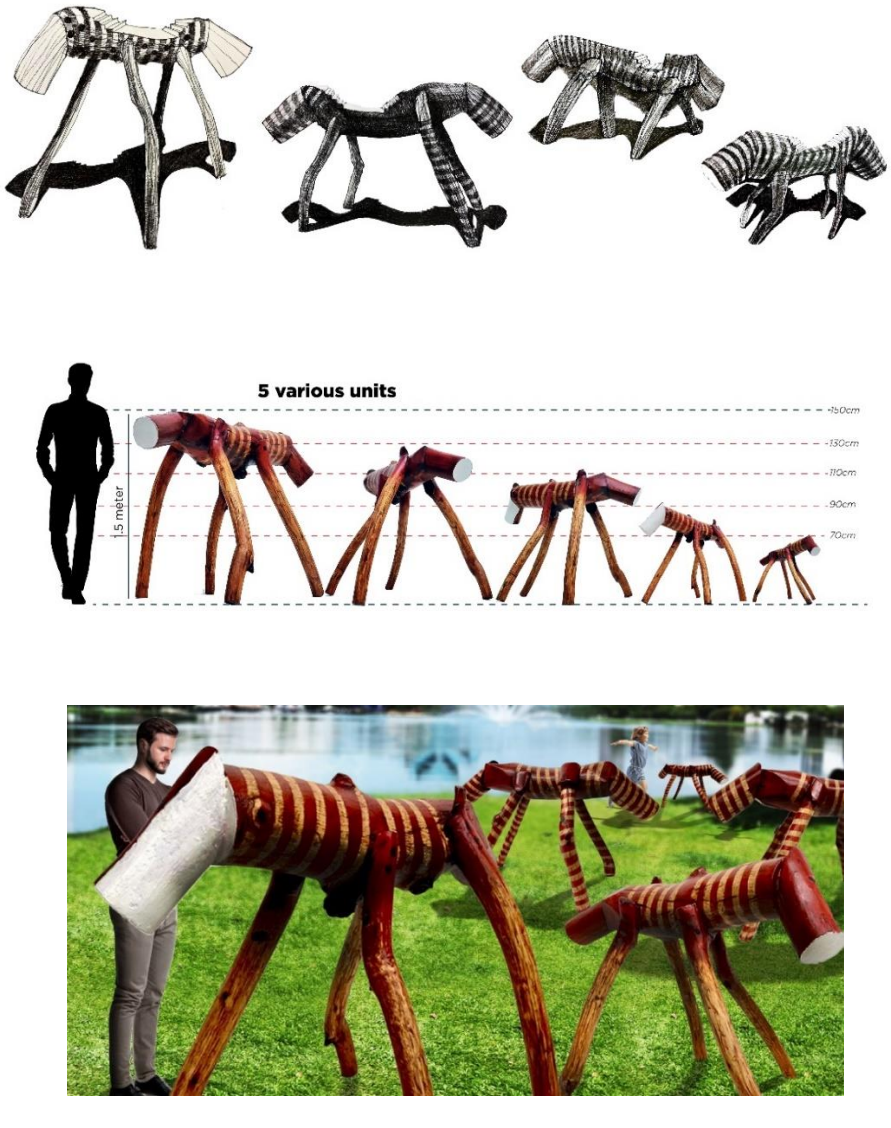

Figure 1: The “Running Forest”, Variable Size, Wood, Bitumen, Wood Stain and Wax, 2008.

6. Novelty

The interaction with the public abstract sculpture and the coordinated change with the environment is more important in public environmental art abstract sculpture. The sculpture is one of the elements that embody and express the connotation of works as an affiliate of environmental elements to the community. This project explores the relationship between abstract sculpture and the environment through an examination of space environment characteristics.

7. Conclusion

To sum up, this project's response to the management of the vegetation within the city limit is connected to this project in some way. The characteristics of the animal were selected and used as a metaphor for a situation that responds to the actual habits of humans in organising vegetation management in a specific location, such as a highway or byway road site. This metaphor was chosen because the animal character features respond to the actual habits of humans. Wood was gathered from the actual site in the Shah Alam region so that it could be used in the creation of the sculpture.

8. Commercialization

Artists and their unique creative perspectives are invited to participate in the city's decision-making process thanks to public art. A non-sanctioned work may be the result of an artist-initiated project, an invitation from an official entity, or no official involvement at all. The presentation of alternative viewpoints through public art has the potential to challenge preconceived notions, held beliefs, and core community values.

9. Recognitions

Public abstract sculpture adds value to cities on multiple fronts, including the cultural, social, and economic spheres. The addition of artwork to public areas brings a sense of humanity to the surroundings and revitalises public places. It creates a point of connection between the past, the present, and the future, as well as between different fields of study and ideas. Our culture is reflected and revealed through public abstract sculpture art, reflecting and revealing our culture.

10. Conference & Publication

Conference: International Conference on Wood and Eco-Products 2022 (ICWEP 2022).
Publication: Special Issue ICWEP 2022, Environmental Behaviour Proceeding Journal (EBPJ).

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Above-Ground Biomass and Carbon Stock Estimation of Harumanis Using Artificial Neural Network and Random Forest

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Abstract. Climate change is decreasing crop yields, the nutritional quality of major cereals, and decreasing livestock productivity. Agriculture sector is a major part of the climate issue. This sector currently creates 19-29% of total to greenhouse gas emissions and worrying as it affects the food production. In order to balance feeding the planet with decreasing worldwide emanations, yearning plans have been put in place. Precision agriculture practices, which can help farmers make superior educated choices, have advanced altogether over recent years, with the worldwide market presently evaluated to reach $43.4 billion by 2025. The utilize of drones within the agriculture industry is relentlessly developing as portion of a successful approach to sustainable agricultural administration that permits agronomists, agricultural engineers, and farmers to assist streamline their operations, utilizing vigorous information analytics to pick up viable experiences into their crops. The aim of this research is to develop the model for above-ground biomass and carbon stock 3 estimation of Harumanis using Unmanned Aerial Vehicle (UAV) multispectral data and insitu data collection. The objectives for this research are as follows: (1) To determine the relationship between tree parameter with weather variable, and multispectral data for Harumanis tree plantation for above-ground biomass and carbon estimation, (2) to classify tree crown delineation using Object Based Image Analysis and (3) to develop model for above-ground biomass and carbon stock estimation using artificial neural network and random forest. The expected outcome is a carbon stock map for Harumanis in UiTM Perlis plantation.

1. Introduction

Increased temperatures, weather variability, shifting agroecosystem boundaries, invasive crops and pests, and an increase in extreme weather events are just a few of the negative effects of climate change that are already being felt. On farms, climate change is diminishing animal output, the nutritional value of main cereals, and crop yields. To sustain existing yields and enhance production and food quality to satisfy demand, significant adaptation investments will be needed [1]. In order to prevent this issue becoming more serious, some essential effort need to be performed. as the world moving into a modernization, the latest technology should be applied in agriculture sector to improve the crop, maintaining health and monitor the development of crop. Nowadays, many farmers use drones for their farms as many of them are moving into precision agriculture (PA) which is a great decision as PA helps farmers to manage crops to ensure that inputs like water and fertilizer are used effectively and to increase productivity, quality, and yield. The phrase also refers to reducing sickness, unwelcome inundation, and pests. UAVs have significantly diminished working hours, resulting in increased stability, estimation accuracy, and efficiency. UAVs are not only less costly than most other agricultural machines, but moreover they are effortlessly worked. Besides, their applications have contributed to the extension of

numerous areas of agriculture, counting bug spray and fertilizer prospecting and spraying, seed planting, weed recognition, fertility assessment, mapping, and crop forecasting [3][4]. However, for Harumanis, the use of drones still not as famous as the other plants but some Harumanis's farmer start using drones to monitor their trees.

2. Material and Methodology

The material used to carry the data collection for UAV multispectral data was ardupilot quadcopter drone on 10th December 2021. The drone flied and covered the farm's plot which had been chosen; Plot B, C and D. Figure 1 shows the parameter of the flight, UAV ardupilot quadcopter and sensor used.

Detail	Ardupilot Quadcopter
Sensor	MicaSense RedEdge
Overlap	75% horizontal and vertical
Altitude	75m
Spatial resolution	5cm gsd

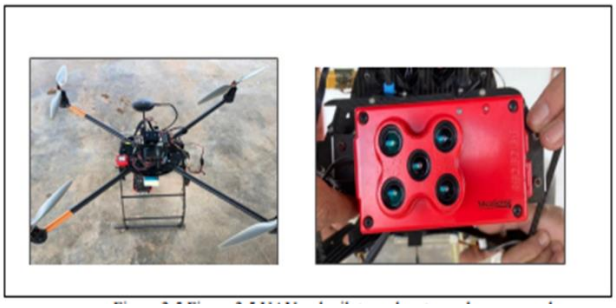

Figure 1: Parameter of the flight, UAV ardupilot quadcopter and sensor used.

The methodology for this study starts with the data acquisition which carried on 6th October 2022. The data collected were height, diameter at breast height (DBH), age, greenness index, canopy size, bole height, crown depth, and tree coordinates). Phase two is pre-processing which consist of allometric equation for above-ground biomass (AGB) and carbon stock and image processing of aerial image captured.

AGB was calculated using allometric equation (1) and (2) adopted from Brown (1997) and FAO (1997) as shown below. This equation used the tree DBH as predictor. The equation used are as follow:

$$AGB_{est} = exp\{-2.134 + 2.530 \times \ln(D)\} \quad (1)$$

$$AGB_{est} = 42.69 - 12.800(D) + 1.242(D^2) \quad (2)$$

where AGB_{est} is the estimation of AGB while DBH is the diameter measured at 1.30 m of breast height in cm. This equation was chosen for AGB calculation of the Harumanis tree as it is the most used equation for mango plantation[5].

Next, phase three is Object-based image analysis (OBIA) processing. OBIA methods outperform the pixel-based approaches in terms of accuracy. There are few steps in performing the image analysis such as image segmentation, image classification and refinement which include removal of undesired objects. Image classification is the process of assigning land cover classes to pixels. Image segmentation is classified on the basis of one or more statistical properties of the contained pixels. After image classification, refinement will be done. In this phase, the watershed transformation algorithm will be used to separate the tree clusters into an individual tree. Last but not least, phase four is Machine

Learning processing for Artificial Neural Network (ANN) and Random Forest (RF). Figure 2 shows the flow of methodology applied for this study.

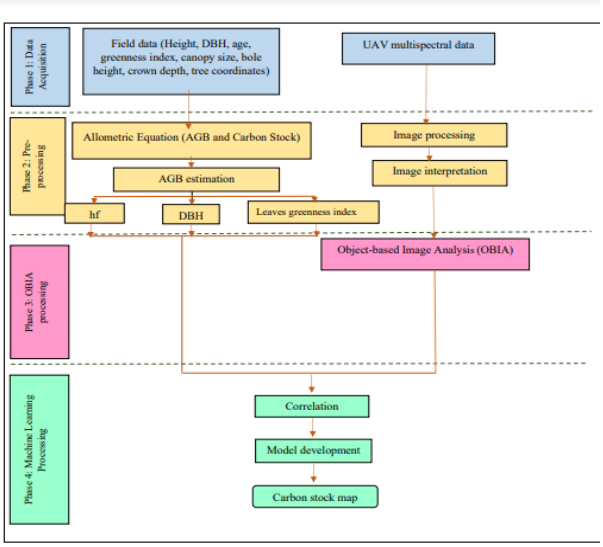

Figure 2: Flows of methodology for this study

3. Results and Discussion

The expected outcome for this study is carbon stock map for Harumanis plantation in UiTM Perlis. The value of carbon stock of the trees was then visualized into a map as shown in Figure 3 (a). After converting AGB to carbon stocks using a conversion factor of 0.45, a total estimated amount of 5750.386 kg of carbon stocks was determined for the entire research area. The estimated carbon stock is divided into five classes to show which tree has the lowest value through to the highest value. The CPA's darker shade, as seen in the figure, corresponds to a higher concentration of carbon stocks [5]. The scatter plots of anticipated versus observed AGB were analysed to see if the models are suitable for AGB predictions. For model validation (n = 20 stands), the relationships between observed and predicted AGB are provided in Figure 3(b) [2].

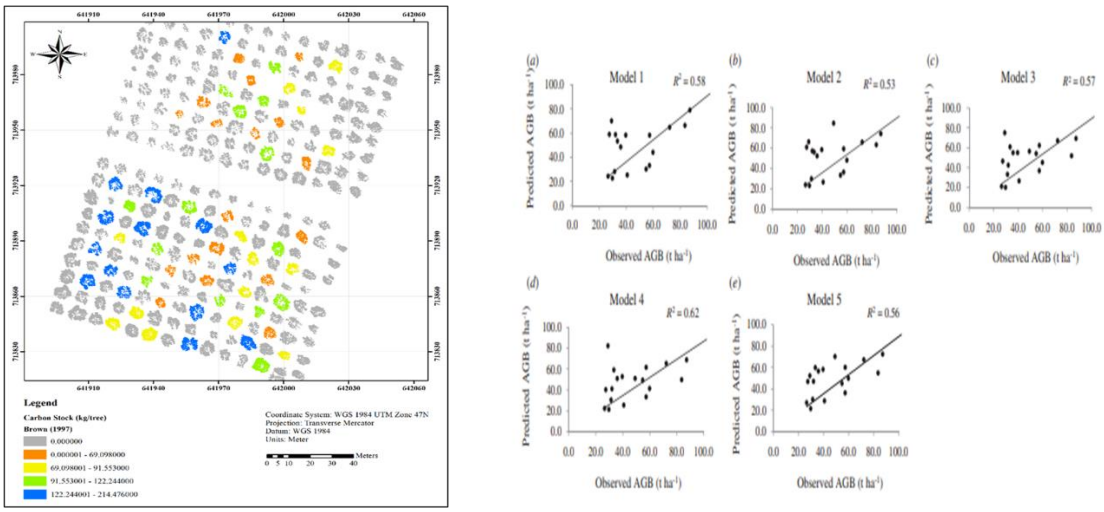

Figure 3: (a) Carbon stock map and (b) scatterplots
(Source: (Shahidan,2022), (Mohd Zaki et. Al, 2018)

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Child Safety Car Reverse Parking System

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Abstract. Recently, there has been increased awareness of the issue of small children being hit by reversing cars. Because of the circumstances and the car's blind spot, this accident usually happens on private property which is in a residence. In order to limit the blind zone behind the car, the Child Safety Vehicle Reverse Parking System is being presented. To warn the driver to the presence of a child or other impediments behind the car within a predetermined preset range, this system uses an Arduino as its controller. The system will activate the output, which consists of a buzzer and an LED, if the space between the vehicle and the item behind it is within a predetermined range. The Arduino UNO will serve as a microcontroller for this system's construction, managing all of the other components. This project was carried out with the goal of having six different distance setting ranges.

3.1. 1. Introduction

Every year, many kids are killed or suffer significant injuries every year because of drivers backing up and failing to notice them [1,2]. While a car is reversing out of a driveway or parking area, a back over event frequently occurs. Several of these accidents take place on private land and are consequently not included in statistics on traffic accidents. In Malaysia, the victims are typically members of their own family. Tragedies permanently alter the lives of parents, families, and communities [3,4]. This accident always occurs on private property or home due to the situation and blind spot of the car [5]. Even the best vehicle had a “blind area” of more than 2 meters behind it. By proposing the car reverse parking with sensor and buzzer, the blind zone behind vehicle can be reduced.

The purpose of the project's car reverse parking sensor is to alert the driver and those nearby when the vehicle is being reversed. There are six different levels of output feedback for this project. The buzzer will sound, and the LED will light up as a result of this output. The sound frequency and amount of LED lights will vary depending on the preset distance. The buzzer will sound louder, and more LED lights will illuminate in reverse proportion to the distance between the automobile and the item behind it.

2. Methodology

3.2. This project is focused on two main areas. The Arduino Integrated Development Environment is used for the first part, which is software development (IDE). The creation of the system's hardware is the second element.

3.3. System diagram

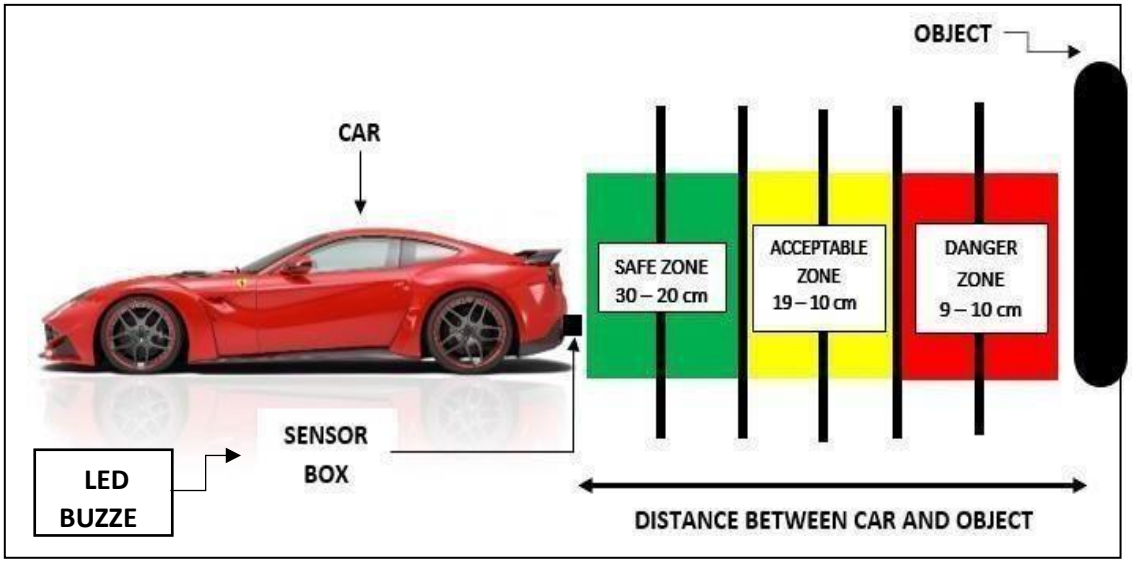

Figure1: System Diagram of Child Safety Car Reverse Parking System

3.4. The system diagram shown in Figure 1 shows how an ultrasonic sensor is used to determine how far behind the car something is. The Ultrasonic Sensor will transmit the signal to the object behind the car and then return it to the Arduino UNO, which will use it to decide the output's outcome. The Arduino UNO will act as a microcontroller in this case, managing the output outcome. The output of this project is an LED and a buzzer. The Arduino UNO will have six distance setting ranges put into it, as seen in Figure 2.1. There will be six different outputs from this set of six unique distance settings. The more LED lights up and the more frequently they blink, the farther the vehicle is from whatever is behind it.

3.5. Block Diagram

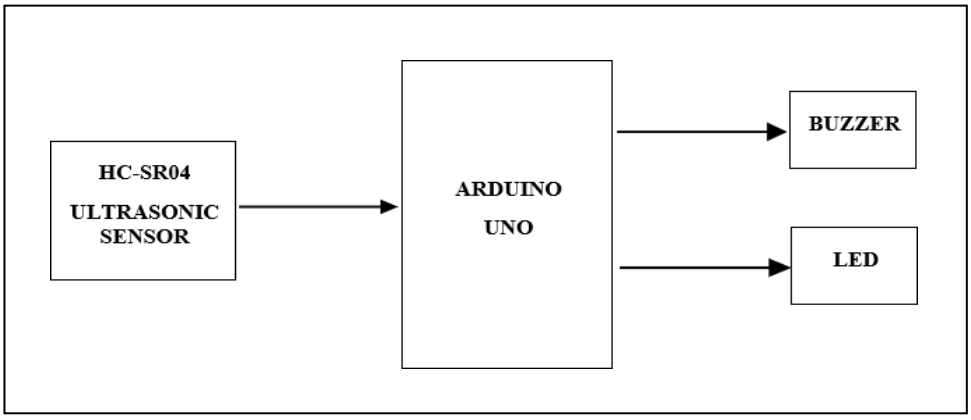

Figure 2: Block Diagram of Child Safety Car Reverse Parking System

A block diagram of the system is shown in Figure 2. The system's main objective is to gauge the distance between the vehicle and whatever is behind it in order to alert the driver and anyone close when the vehicle is being reversed. The HC-SR04 Ultrasonic Sensor serves as the system's input, and this sensor is used to determine the distance between two objects by sending and receiving signals. In this illustration, the HC-SR04 will transmit the signal and subsequently transmit back the received signal, which has already informed the Arduino UNO of its location. The system's output will subsequently be controlled by the Arduino UNO acting as a microcontroller. A buzzer and an LED are the system's output devices. Arduino only responds to a specified preset range measurement of the distance between cars.

3.6. Flowchart of System Operation

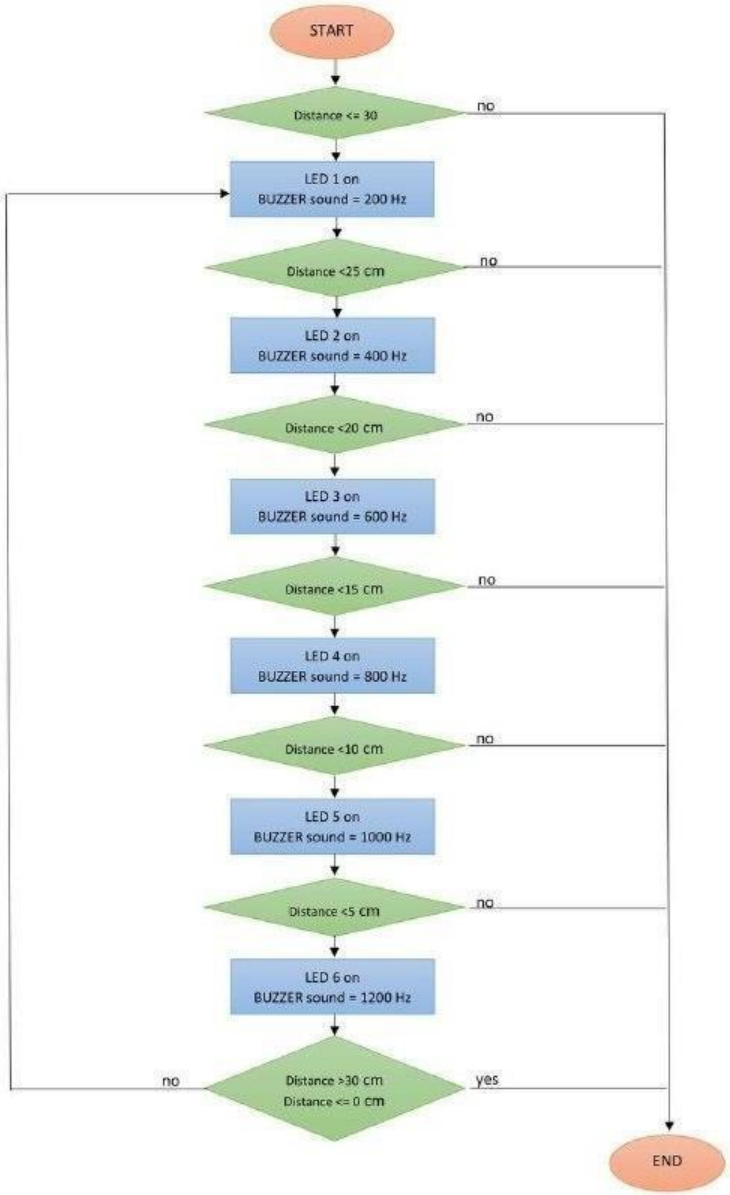

Figure 3: Flowchart of Child Safety Car Reverse Parking System

The project's workflow is depicted in the flowchart in Figure 3. LED 1 will illuminate, and the buzzer will make a 200Hz tone if the distance between the automobile and the object behind it is between 30 cm and more than 25 cm. Then, a 400Hz tone will be created by the buzzer and LED 2 will light up for a distance range of 25 cm to more than 20 cm. LED 3 will illuminate, and the buzzer will play a tone of 600 Hz at a distance of between 20 cm and more than 15 cm.

The buzzer will thereafter be activated and emit an 800Hz tone when it detects a distance of between 15 cm and more than 10 cm from the device. Then, a buzzer will be activated and emit a tone of sound at a frequency of 1000Hz for a distance range between 10 cm and more than 5 cm. LED 5 will also light up at this point. Last but not least, when positioned between 5 cm and more than 0 cm, LED 6 will illuminate and the buzzer will make a tone at 1200 Hz. If the distance between the vehicle and the object behind it is beyond the previously indicated distance setting range, that is, if the distance is greater than 30 cm and less than or equal to zero, the system will not activate.

3. Result

3.7. 3.1 Simulation Result

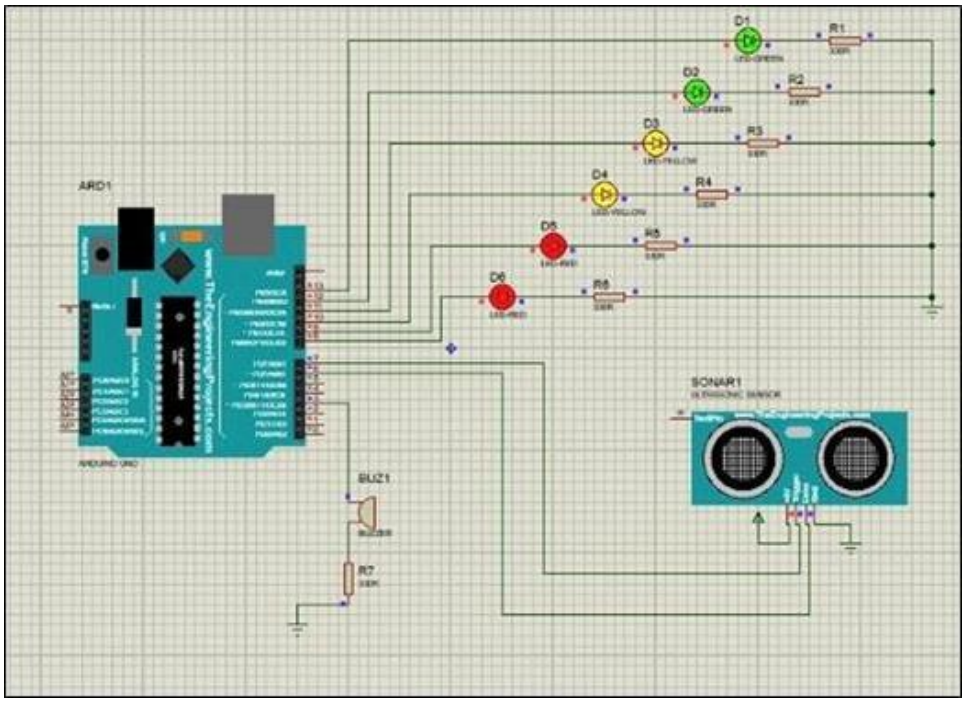

Figure 4: Schematic diagram

Figure 4 depicts the simulation result after being simulated with Proteus 8 software. The graphic depicts the LED turning on. The LED will light up based on the distance between the object and the sensor, and the buzzer will sound louder as the distance between the object and the sensor increases. If the distance between the objects and the sensor is 30 cm, the first LED will illuminate, and the buzzer will sound 250 times. When the distance between the items and the sensor reaches 25 cm, the second LED will illuminate and the first LED will remain illuminated, while the buzzer sound will increase to 260. This will continue until the distance between the items and the sensor is 5 cm, at which point all LEDs will light on and the sound will reach its maximum volume of 300.

3.2 Hardware Result

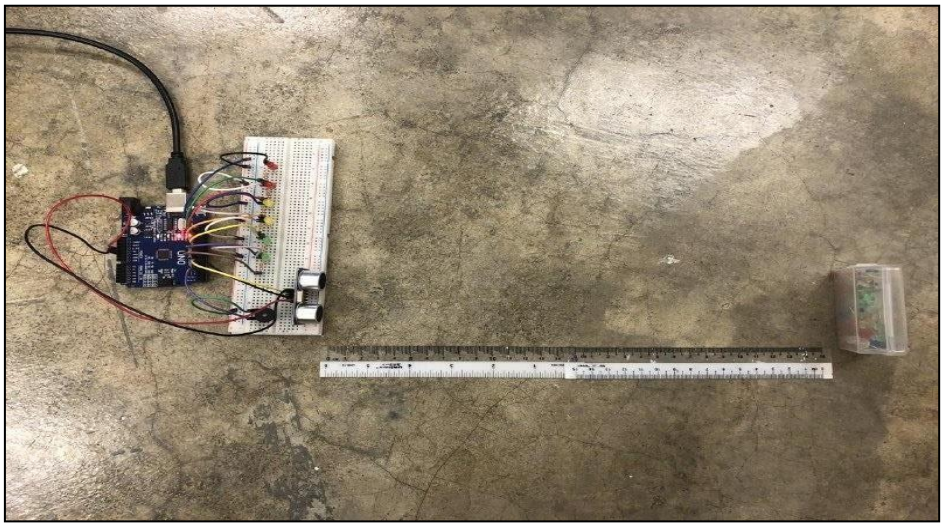

Figure 5: Hardware testing

Hardware result is as follows: if the distance is between 30cm and 25cm, LED 1 (green) will illuminate; if the distance is between 25cm and 20cm, LED 1 (green) will turn off and LED 2 (green) will illuminate. This process will be repeated until the last LED, LED 6 (red), in a distance setting range of 5cm to 0cm, goes ON while the remaining 5 (five) LEDs turn OFF. The buzzer coding was then modified to generate a tone sound of 200Hz for LED 1 (green) and LED 2 (green) by subtracting 200Hz from the previous setting range (LED 1). This process was repeated until the final LED, LED 6 (red), delivered the highest tone of sound, 1200Hz.

4. Conclusion

Child Safety Car Reverse Parking System aims to be one of the one of the alternatives to help the driver alert if any obstacles behind the vehicle. The system will activate the ultrasonic sensor that is installed on the back bumper of the car so that it can measure the distance between the car and the object behind it, as well as to activate the buzzer sound and light up the LED when the distance between the car and the object behind the car is within a certain setting range.

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Developing A Strategic Approach to Facilitate Sustainable Facilities Management Practice for Universities in Developing Countries

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Abstract. Sustainability practices in facilities management (FM) are vital in reducing the impact of buildings on the natural environment. While sustainability practices in FM are being adopted in universities organisations globally, different levels of commitment are experienced in developed and developing countries. It is considered that developed countries are more advanced, and, by contrast, the practices within developing countries are still emerging. This research aims to determine the feasibility of adopting sustainability in FM practices in developing countries on lessons learned from developed countries. In particular, the objective is to develop a strategic approach which can facilitate the adoption of sustainable FM practices for universities in a developing country from lessons learned from a developed country. This study utilised a case study approach using Australia and Malaysia as examples of developed and developing countries. Data were collected using three research stages. Firstly, websites from all 39 Australian and 20 Malaysian universities; secondly, a questionnaire survey with 108 participants. Finally, 26 interviews were conducted with FM managers. Overall, the study showed significant differences between developed and developing countries. This study has demonstrated that sustainable FM performance is significantly associated with drivers and barriers embedded in the university organisation. Several drivers led to sustainable FM practice in universities: top management commitment, pressure from stakeholders, policy and strategy in place, availability of knowledge-enhanced programs, collaboration and partnership, and reporting. However, among the top barriers that need to be eliminated are lack of knowledge and understanding, financial constraints, negative organisational culture, lack of awareness, lack of resources and lack of top management's commitment. Therefore, based on the research findings, a strategic approach has been developed that categorises the motivational factors (drivers) and how they are connected to sustainability performance (outcomes). This proposed strategic approach might be helpful for other developing countries in measuring their capacity, performance and progress towards sustainable FM. This is important in the context of bringing developing nations together for the achievement of sustainable development goals.

1. Sustainability

The concept of sustainability generally refers to efforts to adopt or optimise environmental, economic and social dimensions, as well as practices [1, 2] and is sometimes referred to as the triple bottom line [3]. The focus of these dimensions is to decrease the present-day ecological impacts in order to preserve the environment for future generations, provide positive economic growth and promote social capital issues for a better quality of life [4, 5]. The focus of this research is on the link between sustainability and the built environment and relates to the sustainable development approach.

The terms 'sustainability' and 'sustainable development' have been highlighted in various debates worldwide [6] and have been recognised as essential themes by multiple parties, such as governments and the private sector. While both concepts are related, they differ slightly and should be understood in different ways. According to Parkin [7], sustainability is an objective or goal for quality of life, while

sustainable development is the process of achieving that goal over time. In another connotation, 'sustainability' is seen as the endpoint of the process called 'sustainable development' [8].

The emergence of the sustainable development concept has arisen due to the global aspirations of preventing the rapid depletion of resources and reducing human activities that create an unfavourable environment, especially climate change [9, 10]. The concept has become more crucial in the built environment area, not only for new buildings but also for managing existing buildings which are in the overwhelming majority [11]. So far, a wide range of studies has been undertaken about sustainable development and its connection with the built environment [12]. However, there are still significant challenges in this area. It has been reported that the built environment consumes one-third of total energy use [13], uses 40% of materials in the global economy and generates 40-50% of global greenhouse gas emissions [14]. As facilities managers are responsible for dealing with large buildings over a long period of time, their role is significant, and they are well placed to influence the move towards sustainability goals.

Sustainable development approaches are becoming more critical as the need to achieve the goal of sustainability becomes more pressing. Organisational efforts to put sustainability into practice have been reported in numerous publications. However, most of this literature says on the situation in developed countries (i.e. North America and Europe), and evidence from developing countries is much less common. The facts about the adoption of sustainability in the built environment in developing countries need to be better explored. Moreover, there are varying commitments to sustainable practices between both developed and developing countries [15, 16]. Although research has been carried out about sustainability practices in the facilities management field, more needs to address the comparison between developed and developing countries.

In addressing this knowledge gap, there needs to be research on the extent of sustainability adoption into FM practices and an examination of the commitment of both developed and developing countries toward sustainability. This study is significant, especially to developing countries, as they need new knowledge to accelerate their effort to improve sustainable practices in FM and expand their organisational sustainability outcomes.

2. Differences between developed and developing countries towards the concept of sustainable development.

Globally, the concepts of sustainability and sustainable development have received significant attention [17]. These agendas have been adopted by numerous organisations, institutions, industries and communities [18] using various approaches. However, the commitment to these agendas differs between developed and developing countries [15, 16]. While the majority of Western countries set priorities on the implementation of sustainable policies (i.e. environmental policy) into their national agendas [2, 19-21], the situation needs to be clarified in developing countries. Developing nations are faced with other significant challenges, including political barriers, weaker governance, economic uncertainty, cultural barriers and lack of transparency [22, 23]. These factors have generally put developing countries behind developed countries in moving towards sustainability. It would be easier to achieve the ultimate goal of global sustainability with the participation of stakeholders from both developed and developing countries.

The terms 'sustainability' and 'sustainable development' have been highlighted in various debates worldwide [6] and have been recognised as essential themes by multiple parties, such as governments and the private sector.

3. Focus on universities.

Universities are regarded as crucial research settings and are able to play a fundamental role in achieving sustainability goals [24]. According to the Association of University Leaders for a Sustainable Future (ULSF 1999) Van Weenen [25], universities can be involved in sustainable development, such as in management, planning, development, education, research, operations, community service, purchasing, transportation, design, new construction, renovation and retrofit. Thus, the findings from these organisations can be used as a benchmark in measuring the commitments of other major building owners and occupiers in adopting sustainability.

4. The importance of sustainable practice in facilities management

The literature about the advantages of adopting sustainability in FM is growing [26, 27] and the benefits of sustainability practices are well established [28]. In this context, sustainable FM practices would provide more sustainable benefits such as reducing the consumption of resources (such as water and energy), having better building design, reducing greenhouse gas emissions, expanding the value of the investment, minimising operating and maintenance (O&M) costs, increasing health and safety, lowering the incidence of 'sick building syndrome' and increasing the comfort of occupants [18, 29, 30]. For example, sustainable FM may reduce organisational costs by improving the comfort that influences productivity. According to Hodges [30], there are three related costs involved in managing an organisation, namely, the labour cost (up to 92% over its lifetime), the operation and maintenance workforce cost of the facilities (approximately 6% of an organisation's costs) and the design-and-build cost of facilities (around 2%). Thus, a slight increase in the workforce's productivity would significantly influence organisational expenses and have a more significant economic impact. Moreover, in a study on a sustainable initiatives renovation project in Southern California by the United States Green Building Council [31], various positive outcomes were documented, such as a 59% energy reduction, a 47% decrease in employee absenteeism and a 5% increase in employees' productivity. Another example was a retail store which adopted a sustainability initiative in which installing skylights to create natural lighting led to a rise in sales of up to 40% [32].

Sustainable practices in FM are not only crucial for the management of new assets but, at the same time, they are essential for managing existing assets. Various commercial organisations have shown their concerns about the existing building stock by focusing on resource efficiency, primarily in energy, water and waste [10]. As the number of existing buildings is substantial [11], sustainability practices for such buildings are thus vital as they can positively impact the transformation towards achieving a sustainable society [26]. This is consistent with Rick Fedrizzi, CEO of USGBC, as cited in Mayton [33], who suggested that the market of existing buildings is 16 times larger than that of new construction, and thus it has a crucial impact on climate change. A study of commercial buildings estimated that 80-90% of climate change impacts are caused created during the operational phase of existing buildings [34]. Thus, sustainable practices in FM for existing assets would provide better results. For example, initiatives such as energy-efficient retrofits, recycling programs, better management of preventative maintenance programs and other initiatives which can help facilities to run more efficiently would reduce the negative impact on the environment and provide more productive environments for employees [30].

Moreover, sustainability practices for existing building stock are essential because this involves the operation and maintenance (O&M) stage, which is the most extended phase in the asset life cycle dealing with both embodied (used for manufacture) and operational energy (used for operation). This building stage uses as much as 45% of generated energy to produce power and heat [35], and these energy components need to be managed appropriately. Pullen [36] argued that approximately 25% of the life-cycle energy consists of embodied energy. Indeed, the embodied energy of buildings that deals with indirect energy in manufacturing building materials needs to be considered when seeking to achieve sustainable practices in managing existing buildings and assets [37, 38]. This means that it is critically important to manage assets with sustainable practices to optimise energy use and minimise the use of resources.

The above discussion indicates that a sustainable development approach in FM is needed to support the goal of sustainability. There is no doubt that sustainable practice in FM will benefit an organisation. The right path for achieving the highest environmental, economic and social sustainability goals is influenced by a balanced approach to designing, constructing, operating and maintaining organisational assets and facilities. Therefore, further research would be valuable since FM has been recognised as one of the most significant influences in the sustainable development approach [20, 39].

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Trail Standard for Hikers at Gunung Berembun and Gunung Telapak Buruk

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Abstract. This paper delves into the utilization of Gunung Berembun and Gunung Telapak Buruk in Jelebu, Negeri Sembilan. Each trail follows its own system of guidelines that must be adhered to ensure that hikers have the best trail experience. The hiking trail has its own system of guidelines that must be followed in order to prevent complications. Gunung Berembun and Gunung Telapak Buruk each have their unique specializations, and there are forest education programs that can help hikers learn more while on the trail. This study intends to identify the trail standard at Gunung Berembun and Gunung Telapak Buruk, as well as the trail quality that can influence hikers' presence at Gunung Berembun and Gunung Telapak Buruk. This study suggests that trail standards be fully implemented on the Gunung Berembun and Gunung Telapak Buruk trails. Hikers and the forest department collaborate to maintain the trail. Technology applications in terms of trail standards to improve visitor experiences when hiking at Gunung Berembun and Gunung Telapak Buruk.

1. Introduction

The tropical rainforest of Malaysia is considered the oldest in the world and is a major attraction for those who love outdoor adventures to explore the mysterious natural beauty of the forest which is still well preserved. This study area is Gunung Berembun and Gunung Telapak Buruk it is at 1193 meters above sea level and is one of the highest mountains in the state. The peak is the demarcation point between two of the Negeri Sembilan districts Jelebu and Seremban. There are two hiking routes to the wreck, the northern route is shorter, but requires a four-wheel drive to get to the trail head. The southern route is longer and more challenging which about a 20-kilometre round trip through rugged terrain crossing Gunung Berembun, and the trail starts near the village of Kampung Pantai Baharu. Most would option to ride on a truck to save time while more adventurous ones would endure long trekking hours to reach the peak of the mountain. Some hikers walk their way up only to the first checkpoint or station which is natural waterfall and after enjoying their time in waterfall, they fall back to the base. However, most hikers will hike to the peak of the mountain to gain the most satisfying experience.

In reserve forest, trails are accessibility for visitors to reach to natural area which is positively to become well known place. Trail safety begins with insightful design and preparation according to Park Association and National Recreation the person well-being must be the trail service the most critical need from requests for proposals by building and structure. Some of the Gunung Berembun and Gunung Telapak Buruk trails are not properly followed and managed by Forest Department, they just only maintain at the beginning of trail. Trail conditions in the recreation centre will continue to decrease without the improvement of routine support and maintenance of building highlights. Thus, the user wants to use another path, which is natural path, to affect the natural resources along a road as well. Corrupted paths diminish the atmosphere of the leisure centre, making it difficult and unsafe for walkers to be safe. To order to build the critical trail standard, the park manager or local government must emphasize this safety aspect.

The purpose of this research to identify the trail standard for hikers' at Gunung Berembun and Gunung Telapak Buruk is an important role in defining the access is attributed to specialists who design and manage the infrastructure, which set standards for access systems. Furthermore, this study also focuses to determine how trail standard can affecting hikers' arrival at Gunung Berembun and Gunung Telapak Buruk.

2. Trail Philosophy

The design and layout of each trail must be fitted with four goals, the first of which safety and the well-being of visitors, second access to the area or the connectivity, and next the area and visitor diversity. Safety and well-being for visitors are most important because vehicles and trucks should be limited according to Downing et al., 2009, close by or traverse a trail. If the trail runs parallel to a road, a bike and an individual are favored on foot, except when there are few vehicles and there is low speed of travel. Higher traffic speeds and volumes reduce customer safety and generally demoralize less experienced users. The positioning of Gunung Berembun and Gunung Telapak Buruk near the small city is complicated by how much space it is for people to put their car during their walks. Inception is particularly relevant at crossing points with roads and in normal areas, but criteria for aversion schemes on a wide range of trails need to be updated.

In terms of trail philosophy, a part of that response to location was also emphasized. Area response means that the design of the trail responds to environmental conditions, imperatives and character. In some cases, effects for natural fragile areas and untamed life can be preserved by moving trails or adjusting the size of the trails and the materials to restrict customer types or restricted by them. Nonetheless, intermittent water prospects can avoid harming customer trails to the water. The width of the trails, slope and track material can also change to fit the next improvement, vegetation, water drain, designs of the vehicle path and so on. Private property effects should be ignored or reduced. Despite the fact that the trails are less straight, the changes give life to a general understanding of the route and match various quarters and settings.

The trail configuration should be tailored to different modes and to various mobility tools, sprinters and hiking trails, bikers and rollers, wheelchairs, carriages and babysitters, where possible. Nevertheless, not all clients could be obliged in many places. While trail offices are often efficiently shared, it is also important to have a number of spots where explorers do not have to be overwhelmed by off-road bike, where mountain bikers are conscious that no climbers and trails should be there.

2.1.1 Types of Trail

Most trekkers know that there are as many different sorts of hiking trails as there are different types of roads. While knowing the difference won't make hiking them any simpler, it will help you learn how to carefully prepare a journey, improve navigation, and avoid going onto a trail that should never be on.

There are 10 types of trail:

1. Trail Type A – Hiking (High Challenge
2. Trail Type B – Hiking (Moderate Challenge)
3. Trail Type C – Hiking (Accessible)
4. Trail Type D – Walking
5. Trail Type E – Exercise/Fitness (Resilient Track)
6. Trail Type F – Biking
7. Trail Type G – Mountain Biking
8. Trail Type H – Equestrian
9. Trail Type I – Hiking & Mountain Biking
10. Trail Type J – Hiking & Equestrian

2.1.1 Factor Affecting Hiker's Arrival

According to Parsons et al., (2000), a visitor's decision to use certain reserved sites and affected by

individual flavor, good accessibility and safety at the site. For this reason, increasing interest and knowledge about the factors influencing their choice of visiting the reserved areas are influenced by the characteristics of the site and the individual's preferences. Based on Annerstedt et al, (2013) the number of visitors is the basic data used to manage parks, forest and open spaces. Hiker's data serves as a basis for considering the operational management plan, budget, facilities, and maintenance. It can also be used as a measure to determine the level of appropriate use for environmental and social effects is unnecessary, and objective information can be used to assess the cultural, economic, and political.

Attraction is a dynamic field as it varies according to the number of factors related to the safety, location, the destination country, and the markets from which the tourists appeared, and markets the destination. They also reviewed destinations by investigating accessibility and attractions they provide or any other way to attract tourists. Trail standards lead to improvement in trail quality and guarantee a steady way of dealing with the arrangement of trails, which both improve the well-being and satisfaction of all trail customers. All associations and forestry departments engaged in trail improvement or managing are expected to use the guidelines at Gunung Berembun and Gunung Telapak Buruk.

3. Location of study

The study area can be access by two entrances, one from Gunung Berembun trailhead Kampung Pantai and telecommunication tower Gunung Telapak Buruk. The hikers need to apply permit before can access the area and RM 5.00 per person. The first campsite and water spot, Lata Berembun. It takes about 30 minutes to get to the Lata Berembun from the head of the trail and the trail is wide mostly flat and clearly marked. About every 50 m you can find laminated paper marks on the trees. Lata Berembun is a beautiful waterfall that hikers can take bathing.

The next is Gua Kambing, it is a rather interesting campsite, with a source of water a tiny waterfall and a sheltered rock cave. In the past, frequent hikers have decorated the site with chairs. Before the hikers continue the steep inclination ahead, it's a great place to rest and have a nice cup of tea. Another pit stop is Gunung Berembun peak but the hard inclination that's really steep right after Gua Kambing can slow many people down. For assistance, some parts have rope mounted, but hikers preferred to catch roots if any.

While Gunung Telapak Buruk study area located in Negeri Sembilan state. Gunung Telapak Buruk is the highest point in the mountains of Berembun and the peak is the demarcation point between two of the Jelebu and Seremban districts of Negeri Sembilan. The peak can be reached by vehicle because there is a communication tower operated by telco companies. The area's famous bird watching, and plane wreckage were discovered in World War II. However, the place was cool and peaceful, with trees and nature covering. In the way of hikers is going to be surrounded by trees, with dipterocarps poking their crowns over the main canopy and along the road provide a panoramic view of the countryside and Seremban in the distance. The view from the top is indeed spectacular with much of the mountains to the south and west clearly visible. The hikers will be surprising that the forest acts as a sanctuary for many rare flora and fauna species and is slightly different from anywhere else.

4. Methodology

Quantitative techniques used to determine the important of accessibility trails for hikers at Gunung Berembun and Gunung Telapak Buruk to complete exploration. Interviews were arranged was delivered and collected between the Jabatan Perhutanan Negeri Sembilan of about Gunung Berembun and Gunung Telapak Buruk keeping in mind the ultimate goal to gather all information and data about the nature of administration. The technique coordinated audit of article writing diary and track different sources. The survey has been provided by the elections.

a. Research Design

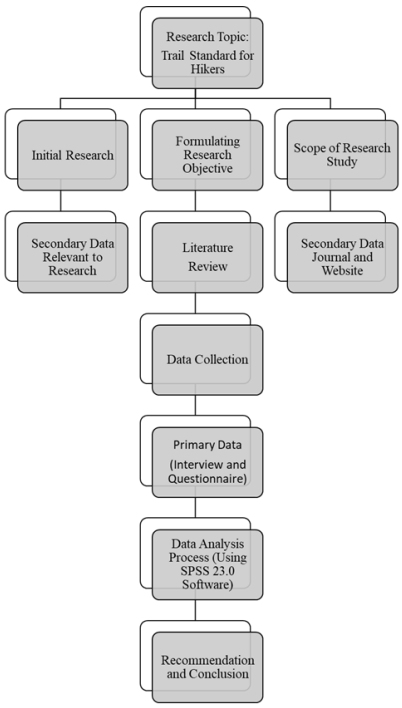

Figure 1: The flow chart of the Research Design

A technique which is a collection of quantitative information is used. Researchers build demand based on the view that collects various types of information that best provide worry about the issue of exploration. Quantitative information gathering techniques generate views using large-scale research. The investigation begins with a thorough study of the mind the ultimate goal, to conclude, as a result of the respondent's visitors and after concentration by arbitrarily selecting respondents to answer the questionnaire items made of various types of masks or quantitative.

b. Data Collection Method

- PRIMARY DATA

  As Salkind said, (2010) the primary source of data is the original source data in which the researchers collect data directly for the project. Primary data, since the results of the research, experiment or observation, are correct, invalid and true, are important in all areas of research.

- SECONDARY DATA

  Secondary data refers to data collected or immediately available to researchers by individuals or organizations. The essence of the problem is investigated in the secondary data guide. Secondary data are the basis for comparing the various data available for researchers in many research projects.

c. Sampling

- PROBABILITY SAMPLING

  Respondents were selected using an arbitrary basis. This is based on the grounds that the basic strategy of impunity, each respondent among the hikers have the possibility to choose from to match. Thus, the findings are based on probability sampling can be transmitted to the target population with a certain confidence level.

- SIMPLE RANDOM SAMPLING
  The researchers used a simple random sampling for a sample taken from the target population so that every member of the population has the same chance and called the subject sample. The selection of each unit is independent of the choice of any other unit. Selection of one unit does not affect the chances of any other unit.

d. Sample Size

The actual respondents in this study should be 367, but because a few constraints researcher faces during data collection, the researcher only collects 83% of the actual respondent. According to Saldivar, it is considered a good and adequate response rate of 80% and above.

e. Questionnaire

To collect data, a questionnaire on the questionnaire itself is based on the two goals of this research were previous studies. Primary on-site data were collected by observations and interviews with walkers who review Gunung Beremblun and Gunung Telapak Buruk. In order for the interviewees to understand the questions and to split it up into three parts, the questionnaire is given in Part A is the Demographic data. Part B of the questionnaire concerning the first objectives and the key to determine the trail standard for hikers at Gunung Berembun and Gunung Telapak Buruk, Jelebu while Part C is to the trail standard can affecting of hikers arrival at at Gunung Berembun and Gunung Telapak Buruk, Jelebu.

f. Data Analysis

- PILOT TEST
  The beginning of the study, the pilot test was checked for the respondents. In order to complete a pilot test 30 respondents were selected randomly by the researcher. This method allows interviewees to share their opinion of the survey. These pilot tests also help researchers improve the hard words in question, etc. It can also help researchers to identify the relevant questions and not the research.

- RELIABILITY TEST
  Reliability analysis it is one of the largest classifications to be carried out to ensure that the scale results consistently or vice versa. Reliability refers to the extent to which this scale produces steady results, according to Statistical Solutions (2017), when the estimates have been discussed in various circumstances. The reliability analysis is therefore known as the analysis of reliability.

5. Findings and Discussion

A set of data was collected and analyzed using the approach chosen. The benefits of including the trail standard provision must be measured and calculated. The reliability test is used to use the questionnaire to examine. Depending on the Alpha outcome of Cronbach, reliability is sufficient and reasonable for respondents if we obtain more than 0.7.

Table 4: The result for Reliability Test

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of items
.820	.821	59

The alpha score for the Cronbach element is.821 that, as described in the Rule of Thumb (2007), it is considered acceptable. Therefore, 300 respondents are qualified to use the questionnaire.

The 300 respondents are the number of printed questionnaires that are circulated to 300 and that collect the positive respondents. Features including gender, sex, age, marital status, educational level and monthly occupational incomes. Both walkers issued the questionnaire. When conducting research, the researcher will face this condition because he or she is under normal circumstances.

Table 5: Demographic Characteristic

Variables		Frequency	%
A.1 Gender	Male	177	59.2
	Female	123	40.8
	Total	300	100.0
A.2 Race	Malay	201	66.5
	Chinese	48	16.3
	Indian	45	15.4
	Others	6	1.8
	Total	300	100
A.3 Age	20 years and below	32	10.6
	21-29 years	148	49.4
	30-39 years	53	17.7
	40-49 years	36	12.0
	50-59 years	22	7.3
	60 years and above	9	3.0
	Total	300	100
A.4 Education Level	Primary	3	1.0
	Secondary	53	17.7
	University and college	230	78.3
	Others	9	3.0
	Total	300	100
A.6 Profession	Government	33	10.8
	Private Sector	93	33.5
	Self-employment	43	14.3
	Retired	18	6.2

	Student	113	35.2
	Total	300	100
Income per month	No income	103	34.0
	RM1001 -RM2000	110	36.2
	RM2001 -RM3000	37	12.3
	RM3001 -RM4000	30	10.2
	RM4001 -RM5000	15	5.6
	RM5001 and above	5	1.5
	Total	300	100

A normalization to identify what are the trail standard of Gunung Berembun and Gunung Telapak Buruk such normality, standard deviation, skewness and kurtosis the factors affecting hiker's arrival for recreation at Gunung Berembun and Gunung Telapak Buruk, Negeri Sembilan. Standard deviations show the characteristics of a typical observation distance from a center of distribution or medium value. Thus, there has been less variability in the low standard deviation, whereas high standards indicate a greater distribution of data.

Table 6: Normality Test

Normality Test (N=300)				
Statement	Standard Deviation	Skewness	Kurtosis	Data Distribution
A map showing a clearly defined route with a start and finish point, and a 'you are here' pointer	.64830	-.269	-.705	Normal
Information on the trails grading (difficulty rating) including a definition of the grades	.91107	-.515	-1.142	Normal
The length of the trail and the evaluated time to finish	.74735	-.242	-.309	Normal
A warning about the open/ exposed terrain risks involved should there be a change of weather	.71527	.015	-1.036	Normal
A contact number for users to provide	.75403	-.933	.401	Normal

feedback and/ or report incidents or issues on the trails.				
An advance warning sign should highlight any specific hazards along a trail	.75800	-.778	.707	Normal
There must be unrestricted and permitted access to and from the trail at the start and finish, and at any defined access points along the trail	.82937	-.629	-.607	Normal
All areas of the course should be unhampered and acceptable.	.67683	-.705	1.300	Normal
Given a route stamping at each intersection at trail	1.04103	-.955	-.255	Normal
Consolation markers must be giving roughly every 500 meter and no less than each 1 km	.57712	-.206	.063	Normal
A similar structure of marker and stamping standard must be utilizing reliably through a whole course	.74958	-1.333	1.789	Normal
Markers must be hued or numbered contrastingly for each trail with the end goal that each course can be plainly pursue	.66526	-.205	-.765	Normal
All ways imprint and signs must be safely raising or connected, effectively adjusted and clean	.57051	-.164	-.685	Normal
The trail surface at slope area must be provide with proper step	.60926	-.108	-.436	Normal

The trail has accessibility for all and clear	.82183	-.203	-.383	Normal
Easily to find the trail and do not get lost in mount area	.74124	.059	-.019	Normal
The relationship between public transport and the trailhead are very good	.59301	-.520	.325	Normal
The relationship between public transport and the trailhead are very good	.59447	--.591	1.111	Normal
It has an intensive care about the hiking trail	.60654	.013	.615	Normal
This hiking trail are very clean. It is regular maintenance carried out	.53813	-.256	.212	Normal
Feel safe when in these hiking trail	.72506	-.490	1.554	Normal

6. Conclusion

The result is that the walker is more aware of the trail standard that the experience and its rights were presumed. The advantage of using standard road operations will enhance the best experience of visitors using the trail. Gunung Berembun and Gunung Telapak Buruk are already well-known trails for hiking. Before being open to the public, the hiking trail is required to follow the standard. On the basis of the observation, question should be raised as to how the standard marking and warning sign on the Gunung Berembun and Gunung Telapak Buruk trail applies to the hiker. The advantage of using standard road operations will enhance the best experience of visitors using the trail.

7. Acknowledgements

This attempts the input about the trail for hikers around this area. The collected data can be used for future study as secondary data reserve forest in Negeri Sembilan area. Furthermore, these data and result can help determine the trail standard for hikers and also the trail standard can effect of hikers' arrival at the Gunung Berembun and Gunung Telapak Buruk.

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The Preliminary Study on The Effect of Digital Word-of-Mouth Among Tourists' Perception Toward Restaurants in Melaka

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Abstract. Digital word-of-mouth is an effective communication medium among social media users. The presence of social media has changed the pattern of consumers purchasing decisions due to the emergence of positive and negative statements. The aspiration of this study is to determine the effects of digital word-of-mouth in influencing perception among tourists toward the choice of restaurants. A quantitative research method has been applied to collect the data by using a convenience sampling method from 367 respondents that have experienced dining in viral restaurants in Melaka through an online questionnaire research tool. The descriptive and linear regression analysis has been used to prove the relationship between the digital word-of-mouth and tourists' perception by adopting the three characteristics of effective viral marketing. Based on the findings of this study, the three characteristics of measuring the effects of digital word-of-mouth on tourists' perception overall are significant. This study would assist the tourism stakeholders in understanding how electronic communications influence the tourists' perception. As a future recommendation, the future study should investigate the effectiveness of digital word-of-mouth on tourists' perception with specific types of restaurants.

1. Introduction

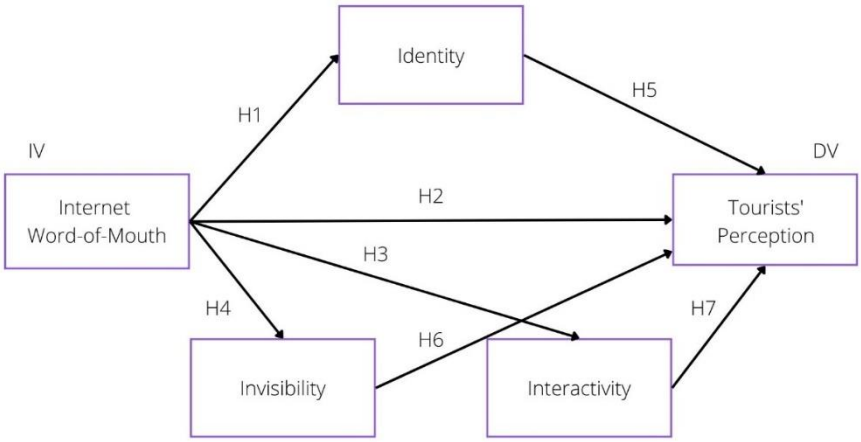
The restaurant industry has developed over the past decades, from providing simple services to complex combinations of services with different characteristics to satisfying customer needs and wants. Over the past decades, there has been great influence from new trends in the industry. Consumers can assist restaurant owners in marketing a product or service offered to the target audience by using social media platforms, which are primarily exploited by industry. With this platform, the food and beverage industries begin a new chapter as a motivator for tourists to travel.

According to Matiko et. al. (2022), by using various marketing methods that persuade customers to purchase food and beverage products, the food and beverage sector attempts to gain a competitive edge over its rivals in the dynamic business climate. Customers' expectations for food services are constantly increasing and they are now more informed to choose better restaurant options based on what they can get out of their decision.

As reported by Mushamir Mustafa in World of Buzz (2022), in a Facebook and Twitter post that has gone viral, a Malaysian woman describes being smugly shouted at for 'coming late' when there is no more food and for being too 'poor' to get fried eggs. Kwan (2018) reported that a diner recently spotted maggots on the fish and "swimming" in the kuah at a restaurant specialising in Asam Pedas in Kota Laksamana, Melaka. Since the customer was so repulsed and decided to record a video and post it on Facebook, which quickly went viral.

Sue Idris and fellow friends had decided to visit this restaurant while on vacation in Melaka since it reportedly has positive TripAdvisor reviews, but the girls paid an outrageous RM120 for their lunch. Furthermore, the customers claimed that the food wasn't even particularly good (Elankovan, 2018).

2. Literature Review



Here is the conceptual framework that was adopted from previous researchers as cited in by Puriwat, and Tripopsakul (2021). Three significant factors must be considered to measure the effect of internet word-of-mouth among tourists, which are identity, interactivity, and invisibility towards restaurants in Melaka which are the mediating of the study framework.

The justification the three variables identity, interactivity, and invisibility as mediating, according to a study by Qiu, Liu, and He (2017) found that consumer brand as part of the variable for identity. For the interactivity, a study by Zhang, Zhang, and Fan (2015) found that the level of interactivity of an IWOM can influence the impact of sales. Kim and Lee (2014) found that the level of interactivity as a mediating role in the relationship for sales. Similarly, a study by Dellarocas and Narayan (2007) found that invisibility can influence the impact of IWOM on sales by reducing the influence of extrinsic factors, such as social pressure, and increasing the influence of intrinsic factors, such as the quality of the product.

2.1. 2.1 The effectiveness of word-of-mouth among tourists' perception toward restaurants.

An earlier study that was carried out by Anastasiei et al. (2021) found that word-of-mouth is an essential component of the activity of e-commerce due to the fact that customers are very responsive to the opinions of other people.

2.2 The perception of tourists toward restaurants

In a study that looked into a similar topic using a different research approach, Wang et. al. (2015) came to a conclusion that, in the context of gastronomy tourism, positive word-of-mouth on the internet positively influences tourists' intentions, and that tourists heavily rely on the internet to research and plan their trips.

2.3 The effect of social media exposure toward restaurants.

For destination marketing, visitor satisfaction is essential since it plays a role in destination selection, the purchase of goods and services, subsequent visits, word-of-mouth promotion, and loyalty to the destination.

3. Methodology

The questionnaire investigated the effectiveness of word-of-mouth among tourists' perception toward restaurants to determine the perception of the tourists toward restaurants and, finally, to examine the effect of social media exposure on restaurants. the majority of the influence in this area comes from visitors, and users of social media who have been to restaurants in Melaka and have agreed to participate

in this study as a sampling have been invited to participate. Convenience sampling is a type of non-probability sampling that is commonly employed in qualitative research.

The data were collected following the standard procedure whilst most of the sampling collected was tourists that had been to Melaka and were sent through on Google Form, and it has been distributed through Instagram, Twitter, Facebook, Telegram and Whatsapp platform.

4. Discussion

Based on this research objective of this study, this research has successfully explored the effectiveness of word-of-mouth among tourists toward restaurants. People are influenced by what they hear from their family and friends because they trust them, and they form an opinion based on that information.

Next research objective of this study carried out to measure the perception of the tourists towards restaurants is most significant of the model. It seems that customer reviews and relationships play an important role in the overall evolution of the tourists' perception towards restaurants.

To understand the effectiveness of digital word-of-mouth in the gastronomy industry is to assess the effects of social media exposure toward restaurants by using hypothesis testing. Based on the results obtained from this study supports that social media is the most effective platform for restaurants to get high exposure from audiences.

5. Conclusion

In conclusion the digitalization era has turned social media into an important medium of communication and spreading information to consumers' daily basis. Therefore, by this shifting, it is very important to understand how this medium can change the user's perception of receiving information that it also would bring effect to purchasing decisions.

Future research recommended to extent study to other cultures and geographic region. This can help to determine the universality of the findings and understand the cultural and regional differences that may affect the results. As a recommendation, the future study should focus on the specific study setting by distinguishing the type of restaurants to investigate the effectiveness of digital word-of-mouth on tourists' perception. In the gastronomy field, there are several types of restaurants that offer different dining experiences that would influence the tourists' perceptions towards the restaurants.

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Vibration Simulation & Analysis Teaching Tool (VSATT): An Interactive Learning Tool Based on MATLAB Simulink and GUI

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Abstract. This study presents a Vibration Simulation & Analysis Teaching Tool (VSATT) interactive learning tool which is developed in MATLAB Simulink and Graphical User Interface (GUI). A Matlab program as a teaching tool for analysing Single Degree of Freedom (SDOF) forced vibration problem, using an interactive novel GUI. This tool is developed to improve students' interest and understanding of vibrations subject in mechanical engineering course. The tool consists of two sections which are Simulink block diagram, GUI and m-file programming. Using this tool, students are able to learn the time response behaviour and observe the effect of parameter variation of vibration element such as mass, spring and damper as it can be repeated several times.

1. Product description

The use of a Graphical User Interface (GUI) as an interactive teaching tool has been increasingly popular in many areas of study. A MATLAB-GUI program as a teaching tool in engineering courses would not only improve the learning experience but could also improve student understanding of the subject itself. An example of a simulation of a Single Degree of Freedom (SDOF) forced vibration system is given to demonstrate the role of all the different parameters of the model, so students can get a real interactive experience. Students can also simulate two cases simultaneously to look at the difference in displacement behaviour due to parameter changes. The GUI can also be applied potentially in research as researchers can make quick assessments and calculations of conditions.

The program based on MATLAB-GUI, namely 'Vibration Simulation & Analysis Teaching Tool' (VSATT) was specifically designed for the undergraduate course, Vibration (MEC521), at the College of Engineering, Universiti Teknologi MARA. Based on the specified course outcomes, the students should be able to apply the concepts and fundamental principles of vibration in mechanical systems, analyse a wide range of simple vibration-related problems and evaluate vibration-related problems using available techniques. Therefore, to emphasise on the students' understanding about the fundamental concepts of vibration, this MATLAB-GUI simulator presents an interactive single DOF forced vibration simulator for vibration analysis.

2. Problem Statement

The current practice of teaching involves mainly visual and auditory stimuli, where lecturers present the concept to the student during lecture sessions. In passive learning settings, students sit in lecture halls and take notes whilst listening to the lecture. The use of GUI in learning enables an active learning setting, where students can develop higher-order critical thinking and analysis skills. This is because active learning requires students to engage in meaningful activities and think deeply about the concepts they're learning. It is believed that when students engage in active learning, they are more likely to retain what they've learned.

To address this issue, the current program Vibration Simulation & Analysis Teaching Tool (VSATT) was developed and introduced to promote interactive learning environment for better understanding of the forced vibration problems. This simulation would analyse and display vibration behaviour under various conditions as input by users (students). The simulator would allow the user to test different input parameters and observe how this would affect the respond behaviour. Also, the introduction of VSATT could offer a different learning experience to students.

3. Objectives

VSATT, a MATLAB Program (R2017b, The MathWorks, Inc) execute-file, has been developed as a teaching tool for Chapter 3 on the topic of Single Degree of Freedom (SDOF) in course of Vibration (MEC521). This course enrols by semester 5 students (third year). Besides the emphasis given of the program to practical applications and potential situations for its use, the GUI development also emphasizes on ease of use, neat visual appearance and fast computation time to ensure successful content delivery.

4. Special Features

4.1. Simple and easy to use –The program is employing an analytical approach (exact solution), with direct input and can produce results with good accuracy. The interface has been constructed to be user-friendly. The choice for inputting parameters includes an editable text area, a drop-down menu, and click on buttons.

4.2. Concurrent results for on-the-spot comparison – The basic program provides the possibility for the user to change parameters and observe how different parameters would affect the respond of the vibration system.

4.3. Visual representation – The visual representation of displacement offers the user a better understanding the respond of the vibration system.

4.4.

4.5. Easy for Editing – The program could be edited to include new and/or remove current parameters/components.

4.6. Interactive and Exciting Learning Platform – The real-time outputs, graphics and interactive environment will allow the users (students) to involve in active learning. Therefore, the students could understand better the forced vibration problems, as they themselves input the variables and then visualise the response immediately.

4.7. Simple and easy to use – The program is employing an analytical approach (exact solution), with direct input and can produce results with good accuracy. The interface has been constructed to be user-friendly. The choice for inputting parameters includes an editable text area, a drop-down menu, and click on buttons.

4.8. Concurrent results for on-the-spot comparison – The basic program provides the possibility for the user to change parameters and observe how different parameters would affect the respond of the vibration system.

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4.10. Easy for Editing – The program could be edited to include new and/or remove current parameters/components.

4.11. Interactive and Exciting Learning Platform – The real-time outputs, graphics and interactive environment will allow the users (students) to get involved in active learning. Therefore, the students could understand better the forced vibration problems, as they themselves input the variables and then visualise the response immediately.

5. Benefits to Society

VSATT is a valuable yet simple teaching tool which can assist in evaluating displacement in SDOF forced vibration problems. It can simply and accurately calculate the displacement value under various parameter conditions, thus reducing the need to calculate and simulate the value repetitively. The developed program can significantly contribute to new knowledge about the use of teaching and learning tool that is user-centred and encourages active learning.

5.1. Industrial Application

VSATT is a simulation software, which is originally developed for industries to determine the type and behaviour of vibration in a mechanical system. In addition, the vibration parameters and outputs could be analysed. From this industrial-based application, VSATT is further enhanced for teaching and learning sessions on vibration problems. The effect of different parameters can be observed in the response of the vibration system in terms of displacement. This is easier than recalculating conditions manually. The visual representation of the displacement can also help students or industrial practitioners in understanding how the system behaves under various vibration conditions.

Industries related to plants, machinery, equipment, system, and structure that experience vibration. The target industries are Oil & Gas, automotive, aerospace and manufacturing industries. In addition, VSATT is also promoted to the Training and Consultation companies.

6. Novelty

VSATT is a newly developed MATLAB-based program which could calculate accurately the displacement over different initial parameters. The program will be used during the teaching and learning sessions for chapter 3 in the course Vibration (MEC521).

7. Potential for Commercialisation

VSATT is ready to be commercialised, either as it is (VSATT interface, execute file) or with the option for an upgraded/customised program.

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Measuring Urban Walkability Index for Petaling Jaya

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Abstract. Walkability has been introduced as one of the newest elements in supporting green neighbourhood. Various studies have been conducted to identify the built environment factors that influences people's decision to walk. From these studies, scholars have developed walkability index to measure the walkability of a specific areas. However, most of these studies are conducted outside of Malaysia. Despite the numerous advantages of using walkability index to measure walkability of an area, the application of walkability index in Malaysia is limited and scarce. Therefore, this study attempts to develop the walkability index based on Malaysian context and test the feasibility of using this walkability index in Malaysia. The walkability index indicators were adjusted to suit the Malaysian local environment and used transportation network design, land use diversity and population density as the built environment indicators. The walkability index was tested in the urban areas of Petaling Jaya and were validated by the officers from the Transport Department of Petaling Jaya City Council. Results shown that the index is able to produce walkability results and depict areas with high and low walkability among the people. This study provided useful insights on how walkability index can assist planners and stakeholders in making informed decision in improving the built environment to promote walkability among the people.

1. Introduction

Green neighbourhood is one of the initiatives taken by PLANMalaysia to reduce the nation's overall greenhouse gas emissions. This is in-line with the pledge taken by Malaysia during the United Nations Framework Convention on Climate Change (UNFCCC) Conference of Parties, Paris held in November 2015, to cut carbon emissions intensity by 45 per cent by 2030. Design elements of green neighbourhood consists of 10 elements and one of the elements is walkable streets (PLANMalaysia, 2017). For that reason, to increase the chances of having fewer carbon emissions from the implementation of green neighbourhood, it requires a well thought design of walkable streets in the built environment to promote walkability among the community.

Walking is one of the oldest mode of transportation used by people. It is considered as one of the best approaches to reduce carbon emissions. Walking creates less air pollution and thus reducing the carbon emissions that are warming the atmosphere. Various studies have been conducted by scholars to determine the relationship between built environment factors and the tendency of people to walk (Ewing & Cervero, 2010; Stockton, J. C. et al, 2016; Mavoa, S., 2018). Identifying this relationship is important in ensuring that the neighborhood design is ideal in promoting a walkable environment.

From previous studies, built environment is proven to have an influence on the individual's tendency to choose walking as their mode of transport (Larrañaga, A. M., & Cybis, H. B. B., 2014; Liu, J., Xiao, L., & Zhou, J., 2021). Thus, studies were conducted to find factors that encourage people to walk based on built environment factors. Most of the studies agreed that there are five main factors that may influence people to walk; transportation network design, land use diversity, population density, destination accessibility and distance to transit (Ewing & Cervero, 2010; Larrañaga, A. M., & Cybis, H. B. B., 2014). Studies to identify the relationship between built environment factors and the tendency of people to walk have been conducted mostly outside of Malaysia such as in Australia, India, United Kingdom and United States of America. The results from the studies have been used to derive the walkability index based on the built environment factors. However, there are limited studies on deriving the walkability index in Malaysia. The built environment and climate condition in Malaysia is likely to differ from the studies conducted in Australia and United States of America. Therefore, it is utmost

importance that a local walkability index that is more suited to the Malaysian context is develop to assist town planners in measuring the walkability of a city.

2. Methods

This study developed a neighbourhood walkability index in Malaysia, using the urban areas in Petaling Jaya as a case study. The study investigated the factors of built environment to be used as the indicators in the walkability index and identifying an appropriate GIS data source for modelling the walkability index.

The walkability index for Petaling Jaya was developed and computed based on three indicators associated with walking behaviours; transportation network design (intersection density), land use diversity and distance to transit and Point of Interest. The three indicators were chosen based on the availability of data and the highest value of weighted average elasticities of walking. Based on the value of weighted average elasticities of walking, population density indicators were omitted from the computation of walkability index.

The walkability index was produced at neighbourhood scale using land use data, street data, transit data and POI data. The formula used to derive the walkability index are as follows:

$$(w/3) + (x/3) + (y/3)$$

w = ranking score for proximity to transit station and Point of Interest (POI)
x = ranking score to street intersection density
y = ranking score for Entropy Index

The w score was produced using a street level data and POI data. The x score was calculated using the street data while the y score for Entropy Index was computed using land use data based on the following formula

$$Entropy = -\left([\sum_{j=1}^{k} P^j \ln P^j]\right) \Big/ \ln k$$

P^j = percentage of each land use type j in the area
k = total number of land use types

2.1. Development of Walkability Index

This study used Geographic Information Systems (GIS) as the main tool for computing and deriving the walkability index for Petaling Jaya. GIS is used because of its capabilities in handling spatial data and the ability to conduct spatial analysis for walkability. ArcMap 10.8 are used as the main GIS software for the data processing and analysis of spatial data. All the data input was converted from TAB format to SHP format. The process of deriving the walkability index were done manually in the software using the ArcToolbox. However, a model builder was also created in this study to allow more automated process of the GIS workflows.

3. Results and Discussions

Figure 1 shows the result of Walkability Index for Petaling Jaya based on the three (3) indicators. The high score indicates areas of high walkability areas in Petaling Jaya based on built environment factors while the low score of Walkability Index means that people are more inclined to use motorized vehicles which resulted in less walking.

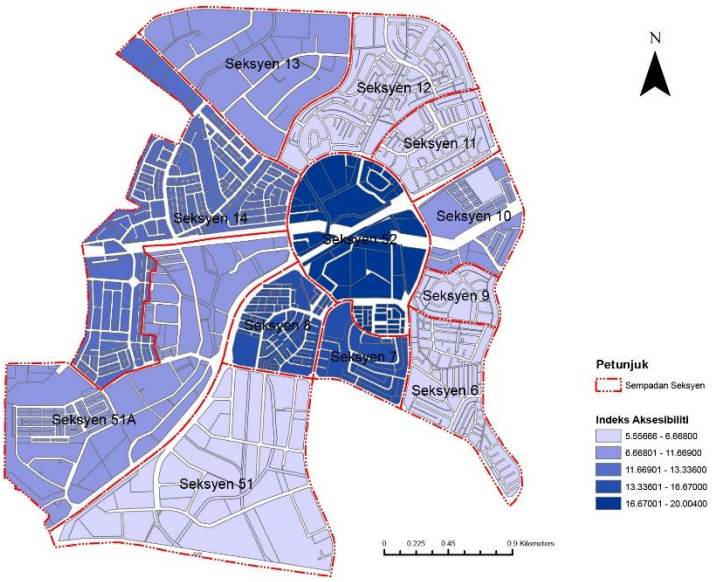

Figure 1: Results of Walkability Index for Section 5 – Secton 52, Petaling Jaya

Results from this study was validated by officers and technicians from the Transport Department, Petaling Jaya City Council. The index showed high reliability in depicting areas which may have high volume of pedestrian especially in the town centre of Section 52.

Based on this study, the index has the potential to be applied at City Council especially in assisting the City Council in determining areas with high or low volume of pedestrians. However, it should be highlighted that the accuracy of the Walkability Index is highly dependent on the accuracy of input data used in developing the index. Therefore, the acquisition of highly accurate spatial data is important to ensure the reliability of the index.

4. Conclusions

The findings from this study showed that the Walkability Index is a highly valuable tool to assist planners and stakeholders in understanding areas with high levels of walkability and low level of walkability. Having this valuable information will assist planners and stakeholders in formulating strategies and policies to improve the pedestrian infrastructure in the city. Previously, most of the decisions to upgrade or improve the pedestrian infrastructure were based on visual inspections by the technicians. However, this approach is time consuming. By using Walkability Index, planners can focus a more thorough inspection at the areas with high scores because it is deemed that this area has a high chance of people walking based on built environment factors. This approach will improve the efficiency of the public services and ensure that areas with high scores will be provided with the proper infrastructure. This also will provide the planners with a proper tool to evaluate the existing and proposed new layout from the built environment factors that can encourage people to walk.

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3D Web-Based Residential College Management System Via Geovisualization Approaches

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Abstract. The system prototype system created for the Melati Residential College in Universiti Teknologi MARA, Shah Alam (UiTM, Shah Alam) utilized geovisualization and geospatial approaches. The existing UiTM e-college system is incompatible due to time consuming, unattractive and the data is stored semi-manually with undynamic system database searching. Therefore, a 3D geographic information system (GIS) has arisen as a critical component of the residential college administration system. A 3D web-based Residential College System of the Kolej Melati UiTM was created as an innovation product prototype. The objectives of the innovation output are: i) to develop an interactive and informative 3D Residential College System based on analyzed user specific requirements and ii) to perform a 3D geovisualization database query and system performance test of developed web-based Residential College System. The methodology used in this study included 2D and 3D system modelling development using ArcGIS PRO software, as well as a semi-structured interview with selective college administrator. A 3D web-based Residential College System was developed with capabilities such as query tool, add data, info summary, analysis, direction, and print created in the 3D apart from 2D systems. The system's test performance indicated positive results, with respondent's feedback stated that enhancement of the system in term of effective monitoring and feedback, better visualization on the system, the information of the students can be extracted easily from the database system, containing query system and user -friendly system. The innovation product has resulted in the development of a 3D web-based residential college system that could improve the organization's ability to handle future building data such as multi-storey college building.

1. Introduction

Kolej Melati is one of the colleges that accommodated the students in the UiTM Shah Alam where all the facilities that are available for the students are top tier. The requirement analysis of the establishment of the GIS web-based Residential College System was conducted using close ended questionnaires surveys via online and most of the respondent stated that the problems that faced by the current system are difficulties in gaining the data and inefficient database system to store all the data. The system is prototype system created for the management system in the Melati Residential College in Universiti Teknologi MARA, Shah Alam (UiTM, Shah Alam) and intended to be replace in future the existing system of the e-Kolej as used currently to manage the college student applicants and occupants.

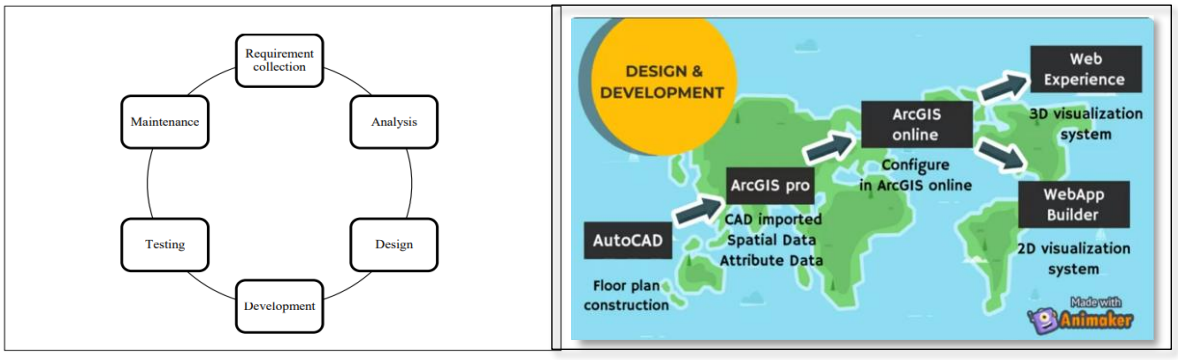
Residential college system has been facing the same problems from many years where the system is not compatible and an outdated system. The existing system has been time consuming as most of the information are stored semi-manual in the system where it will be time consuming to cover the thousands of students' profile and unattractive as well as unable to be visualize the exact building or

location of the blocks or rooms. Therefore, it implies that a 3D web-based Residential College System is needed and emphasized in the residential college.

The data is obtained from Kolej Melati where the layout of building plan and floor is determined in order to digitize the building structure and infrastructure to represented it in 3D manner. The student's data that is collected for this the research study involved only 350 students due to the pandemic Covid-19, the capacity of the college is not at its outmost. However, all the block building was entirely represented in this developed system (4 block: Block 3A, 3B, 4A and 4B). The existing student's data are extracted from the existing system (i.e., e-Kolej) with attribute data such as the room number, furniture number, name of the residents, IC number, ID matrix number, program, semester, state, religion and the status of the residents. Several platforms/software's were used known as AUTOCAD, ArcGIS PRO, ArcGIS online, WebApp Builder and Web Experience.

2. Materials and methods

This study covers the area of residential college in UiTM Shah Alam which is Kolej Melati with the full capacity of 3456 students of four (4) block, 3A, 3B, 4A and 4B. The software and program used are AUTOCAD 2007, ArcGIS Pro, ArcGIS Online, WebApp Builder and Web Expereience (ESRI, 2020). The GIS web-based system is a combination of GIS and web-based system where it defined as an advanced GIS system that is portrayed in server platform. The methodology that is used for the research study is Agile Software Development Cycle where the agile methodology is a project management style mostly used in software development, in which needs and solutions emerge from the collaborative efforts of self-organizing and cross-functional teams and their clients (Becker et al., 1995)



(a) (b)

Figure 1: (a) The Agile Methodology of the research study, (b) The GIS Development Process (Becker et al., 1995).

The data that are extracted from the e-college are the room number, furniture number, name of the residents, IC number, ID matrix number, program, semester, state, religion and the status of the residents. The requirement analysis is done in order to obtain the users' needs regarding on the new developed residential college system. The requirement analysis is done by using the questionnaire survey and interview. The selected respondents were chosen based on their expertise level and opinions as the users of the current system. Several function of the system such as geodatabase system in storing the residents', query database system of the residents in Kolej Melati, 2D and 3D mapping of the residential college, Analysis on the residents' information of Kolej Melati UiTM such as occupied room, vacant room, room need repairment in term of furniture, student's demographic background (original state, faculty, program, semester).

3. Findings

The developed residential college system is better compared to the current e-college system where the visualization of the system can be easily interpreted by the user. The position of the room units as well can be determined easily in the map that is provided by the developed GIS web-based Residential College System. The interface of the 2D web-based system consists of query tool, add data tool, analysis, info summary, directions and printing. The system is user-friendly where any person who did not have the GIS background study will also be able to utilize the new system that is developed.

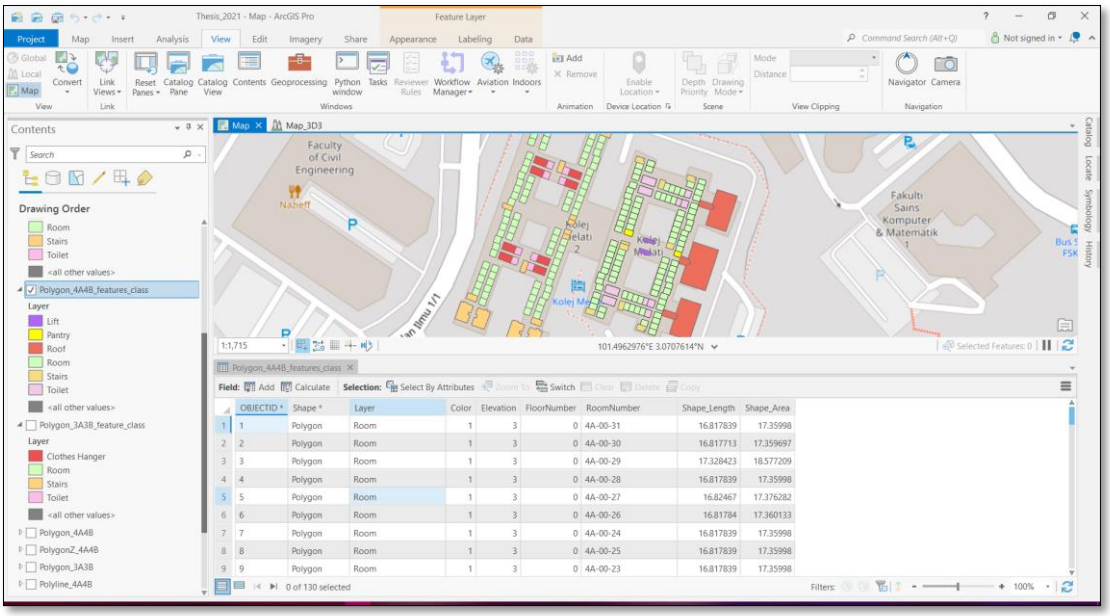


Figure 2: The 2D features are extracted and displayed on the attribute tables

The query tool will be able to query the important information from the system such as vacant room, occupied room, states and the status of the students. The students that are not having a room will be placed in the vacant room. The vacant room will be easier to be accessed and can easily extracted from the system by just clicking the button on the interface of the system. Then, the 3D web-based system for the residential college shows the better visualisation compared to the current e-college system where the technology used for the system development is an advanced technology.

The 3D building of the Kolej Melati can be overviewed by the users more thoroughly. The users will be able to determine the position of the vacant and occupied room or room in general, the floor number, the elevation of each floor, the pathway of the building and whole block itself, for both of the Block 3 and Block 4. This will provide the information of the building if it displayed in 3D where the legends, layers and base map can be clicked on the web-based. The base map of the system can be changed based on the users' preferences and the legend will show the features of the building such as room, toilet, clothes' hanger, wardens' house, lift, stairs and pantries.

Figure 3: The 3D layer representative of the Kolej Melati building

4. Conclusions

The system's test performance analysis revealed higher acceptance result by the respondents with the system being able to coordinate the management of Kolej Melati's residential college in better manner. Feedback of the system stated that it is a user-friendly system and dynamic tool for searching information such as room vacancy, occupied room in the college, the states of the residents, and the status of the residents. This system proven easier and faster data extraction by the staff. In summary, the system able to reduce time and cost, enhance management efficiency from semi-automatic to fully dynamic online system, fast action if maintenance of room if required since the exact room easily be located, and the system can be continuously updating from time to time with the availability of internet networking for any assign administration staff. In summary, this innovation product has resulted in the development of a GIS web-based residential college system that could improve the organization's ability to handle future building data.

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Quality Assessment of Ground Penetrating Radar (GPR) Dataset with Various Soil-Based Conditions

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Abstract. In terms of accuracy and speed, Ground Penetrating Radar (GPR) is the best approach for detecting and identifying underground utilities. This technology can precisely find a wide range of underground utilities, including both metallic and non-metallic materials. It analyses the ground by emitting a signal from an antenna at various frequencies of electromagnetic (EM) pulses. However, these reflected signals always contain undesirable echoes caused by heterogeneous materials, such as the wide range of soil properties and utilities. The site's soil composition has a direct influence on the accuracy of the GPR signal image. Thus, the aim of this study is to assess the quality of radargram images for different soil types with different soil characteristics: fine sand, topsoil and silt soil. The objective is to interpret the resolution of radargram images on different soil conditions based. GPR Electronic TriVue with high frequency (1GHz) was employed, and the resolution of the resulting radargram image was post-processed in ReflexW software to yield promising depth results. Based on this research, the radargram obtained shows different textures that provides different presentations of each soil on the radargram image. The types of underground objects with different types of pipes (PVC & iron pipe) were used in this study. In conclusion, the type of pipe play role in the choice of utility and soil properties (texture, moisture, and electrical conductivity) that impact the most on the accuracy assessment of GPR Data.

1. Background

A vast sophisticated network of cables and pipelines runs beneath the surface of metropolitan regions and large cities all over the world, providing crucial utility services that support contemporary civilised life. A surge in demand for utility services in the city led to the burying of a large numbers of utility pipelines, including telecommunication lines, fibre optics, water and gas pipelines, and electrical cables. Many subterranean utilities have reached the end of their useful lives, necessitating their replacement or maintenance. As a result of urbanisation and the evolution of human living styles, such as enhanced communication technology, new utilities are being installed. Engineers, surveyors, utility owners, or contractors will require accurate data and information on these utilities as a reference for excavation work (Desai L. et al., 2016).

Many people are unaware of the need of underground utility identification before beginning any excavation work. If the construction continues before the utilities are found, a mishap may occur. Underground utility detection is defined as the process of identifying, separating, and labelling public and private subsurface utility wires that are buried beneath the ground surface. Electricity distribution cable, telephones, fibre optics, and communication lines, as well as water and wastewater conduits, large oil and gas pipelines, mass transportation, road tunnels, and rail, are all examples of these lines (Metwaly M., 2015).

Due to its numerous benefits, such as quick data collecting, cost efficiency for mapping vast areas, better results than other non-destructive technologies, and high-resolution images for enhanced interpretation, GPR has been extensively utilised in identifying and locating underground utilities (Gani

A. & Hamid R., 2018). This study is to assess the quality of radargram images for different soil types of soil characteristics between fine sand, topsoil and silt soil. Consequently, the study's findings will reveal which varieties of soil are easier and more accurate to identify using 1GHz GPR.

2. Methodology

The research methodology contains four (4) main stages. Figure 1 shows the general research methodology flowchart of this study.

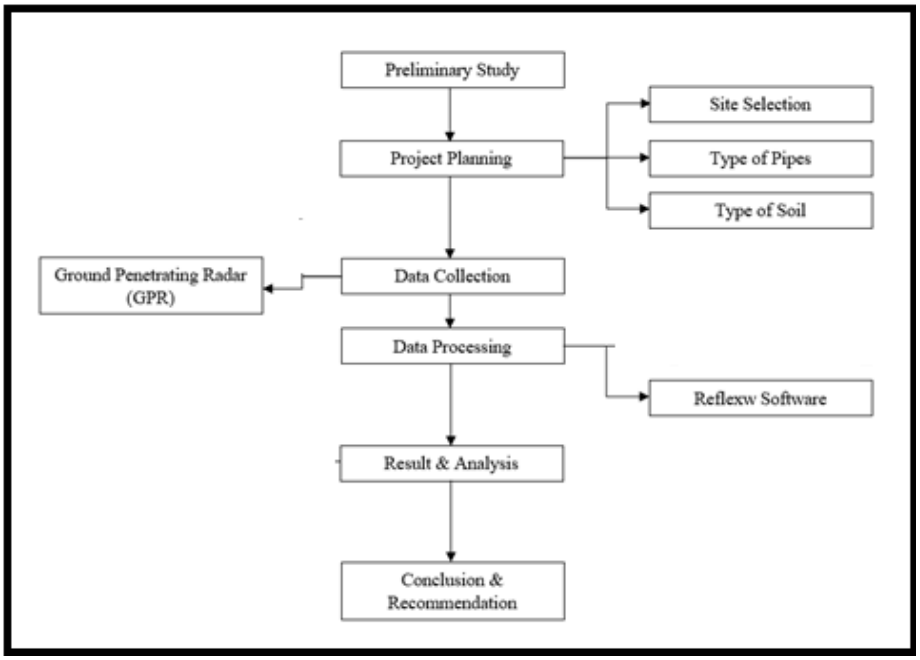


Figure 1: General Research Methodology Flowchart

2.1.

2.2. Project Planning

Project planning is a discipline addressing on how to complete a project in a certain timeframe. One of the crucial steps is site reconnaissance. Field data collection is located at lot 1 Jalan Kristal 7/67a, 40450 Shah Alam, Selangor Darul Ehsan. This location was selected due to its wide space and the presence of excellent soil for dredging activities as shown in Figure 2.

Figure 2: Research area located at Jalan Kristal, Shah Alam

2.3. Testbed Dimension

GPR measurements were taken on three (3) distinct soil types: fine sand, silt soil, and topsoil. Material distinctions, which were highlighted strongly in this study. The soil was excavated to a depth of roughly 0.5 metres, and all soil types were planted in the trenches. The trenches were to be roughly 1.5 metres in length and split into three pieces/divisions to represent the three kinds of soils, as seen in figure 3. The final dimensions of the soil trenches were measured and split properly separated by plank wood measuring 10 mm x 0.5 m x 0.5 m, which assists in distinguishing the soil and prevent it from mixing, as illustrated in Figure 3. In this study, the types of underground objects with different types of pipes (PVC & iron pipe) were used in assessing the quality of radargram images from different soil-based condition.

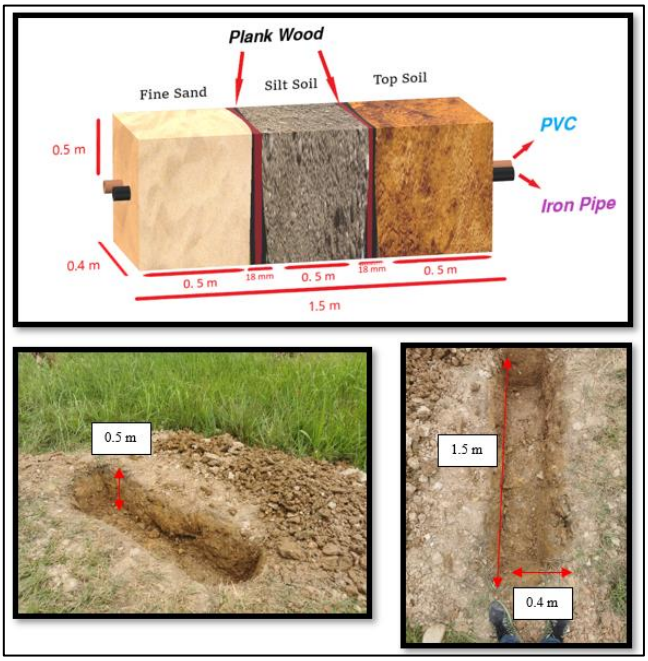


Figure 3: Testbed dimension and configuration

Different types of three soil will be buried at a depth specified to fit the surrounding soil's height as shown in figure 4. The soils were chosen based on their characteristics. Fine sand is a form of soil that is dry and non-sticky, whereas topsoil is sticky and difficult to work with when wet, and it dries out quickly in the summer. The last type of soil is silt soil, which is comprised of incredibly microscopic particles that give the soil a smooth, slippery feel.

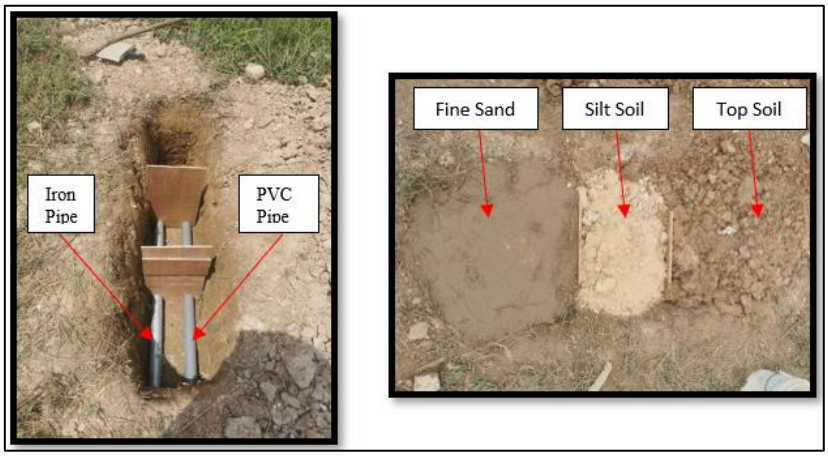


Figure 4: Different types of soil (fine sand, silt soil, topsoil) with Iron and PVC Pipe

2.4. Data Collection

The field data collection was conducted using GPR detection. The equipment used for this phrase; UTSI Electronic TriVue for GPR detection. GPR measurements were taken on three (3) distinct soil types: fine sand, topsoil, and silt soil as shown in figure 5. The observation used the Two-Way Travel Time (TWT) technique, in which the signal was transmitted in subsurface and received signal was reflected into the receiving antenna. The optimal frequency with high frequency category used for collecting data with 1 GHz. The GPR detection are performed eight (8) times in order to obtain a good and consistent of underground dataset detection.

Figure 5: GPR scanning and detecting process

2.5. Data Processing

In this stage, the image obtained from GPR detection was post-processed to acquire radargram image with a better resolution using ReflexW software. The ReflexW software was used to filter the data image for a cleaner image in terms of brightness and contrast, as well as to remove any noise contained in the radargram images such as ringing noise and time delay. In data interpretation phase, the filtering procedure for a radargram images with ReflexW software is shown in Figure 6.

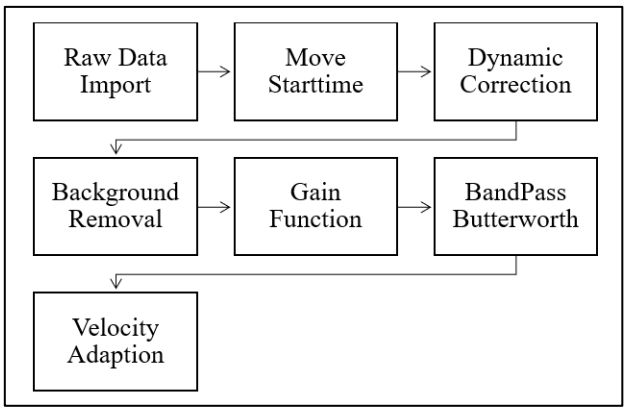


Figure 6: Flowchart of post-processing using Reflexw Software

3. Result and Analysis

3.1. The comparison of data visualization in term of texture on the radargram images between three (3) different types of soil conditions is quite significant. Each type of soil described with various characteristics that distinguishes it from others as illustrated in Table 1.

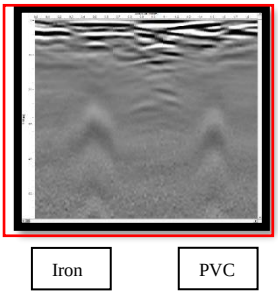
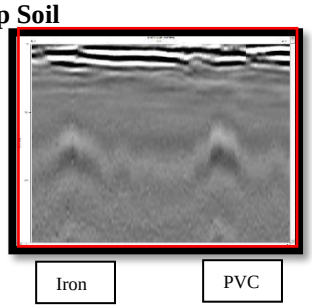
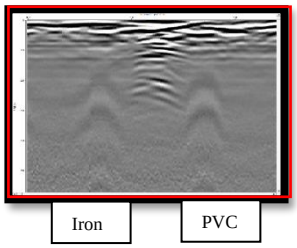
Radargram Images	Radargram	Texture
1) Fine Sand 	The appearance of the parabolic Iron & PVC pipe is clear and easy to interpret after processing	The texture for the fine sand with small particle surface and has a bit void
2) Top Soil 	The appearance parabolic of the pipe is clear for Iron Pipe and PVC pipe and easy to interpret after processing	The texture for the topsoil is finer than the surrounding texture compared with silt soil and fine sand
3) Silt Soil 	The Iron and PVC Pipe parabolic more upward compared to others and there is void in the middle of image	The texture for the Silt Soil has the highest rough surface compared with fine sand and topsoil

Table 1: Radargram Image interpretation for fine sand, topsoil, and silt soil

4. Conclusion

Based on the research outcomes, the radargram obtained shows different texture that giving different presentation for each soil on the radargram images. It can be concluded that each type of soil has its own structure that may impacts on how the radargram appears. Furthermore, based on the soil properties structures (texture, moisture, and electrical conductivity), fine sand the is least suitable for soil in detection compared to topsoil and silt soil.

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Multi-Criteria Evaluation Approach to Coastal Vulnerability Index Development in Port Klang, Selangor Areas Using Analytic Hierarchy Process (AHP)

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Abstract: Climate change is verifiably the greatest issue confronting our general public. The extent and effects of climate change are developing, and especially in Malaysia, studies show increases in temperature and changes in rainfall regimes. Such changes have significant ramifications, particularly for coastal communities. Since information and view of general society on climate change could influence the achievement of executed adaptation and mitigation choices, it is vital for direct assessments to assemble such data. The aim of this study is to develop a multi-criteria index to assess coastal vulnerability sea level rise on the Carey Island, Selangor. The main focus area is Carey Island, Selangor. The research is divided into three phase's namely preliminary study, data collection and data analysis. To study the influence of parameters, the area is divided into twelve grid boxes, in which each grid has its own unique value. The Grid Index Features are crucial to determine which part of the coastal areas is really vulnerable to certain parameters. Final CVI map was produced to determine the vulnerability ranking of Carey Island shoreline. The Coastal Vulnerability Index was calculated by using the initial formula by the Gornitz. CVI maps created in this research is a combination of all parameters and CVI rank resulted in low and moderate vulnerability to the shoreline areas. The low vulnerability were classified to grid-code (D1-E3-E4-E5) while moderate vulnerability to grid-code (A1-B1-C1-E1-E2-E6-F6-F7). This study could also make a significant contribution to the other researcher aiming to help Malaysia sustainably protect its coastal zones and improve socio-economic resilience to the impacts of climate change.

1. Introduction

The Intergovernmental Panel on Climate Change (IPCC) has demonstrated that global climate is changing at a rate unprecedented in recent human history, resulting in changes in geophysical, biological and socioeconomic systems (IPCC, 2022). Malaysia is experiencing an increasing trend in

annual mean surface temperature, mean sea level and extreme weather events (Tang, 2019). Throughout the 21st century, the climate in Malaysia is expected to witness further temperature increases, sea level rise, precipitation that varies greatly spatially and seasonally with some drier and wetter conditions, and an increasing frequency of extreme weather events (NAHRIM, 2021).

A relatively small rise in sea level could have an inherent impact on the natural coastal system. Climate change has created many ecosystem risks by attracting natural hazards, particularly sea level rise. Coastal areas are then exposed to many unfortunate effects of sea level rise consequences pose a risk to the well-being of coastal populations, resources and assets (M. Anwar, 2014).

These dynamics, operating at multiple spatial and temporal scales within the interconnected human-environment system, create vulnerability by impairing the ability of individuals and communities to prepare for, cope with, and recover from impacts (Rubinato et al., 2020). The level of vulnerability is determined by a coastal system's vulnerability, resilience, and resilience to hazards. For example, a system with soft sediments is more susceptible to storm surge changes than a system with hard sediments. Resilience and resilience are aspects of a system's stability in the presence of threats. Vulnerable coasts have low shoreline, abrasive sediments, high tidal energy, and a greater likelihood of experiencing storms such as coastal erosion (Guillard-Gonçalves et al., 2018). Coastal systems become more vulnerable as sea levels rise and storm frequency increases.

Although Selangor state is not seriously safe from sea level rise compared to other peninsular states (NAHRIM, 2010), it is important to design a successful plan as it will be vulnerable to climate change in the future.

2. Methodology

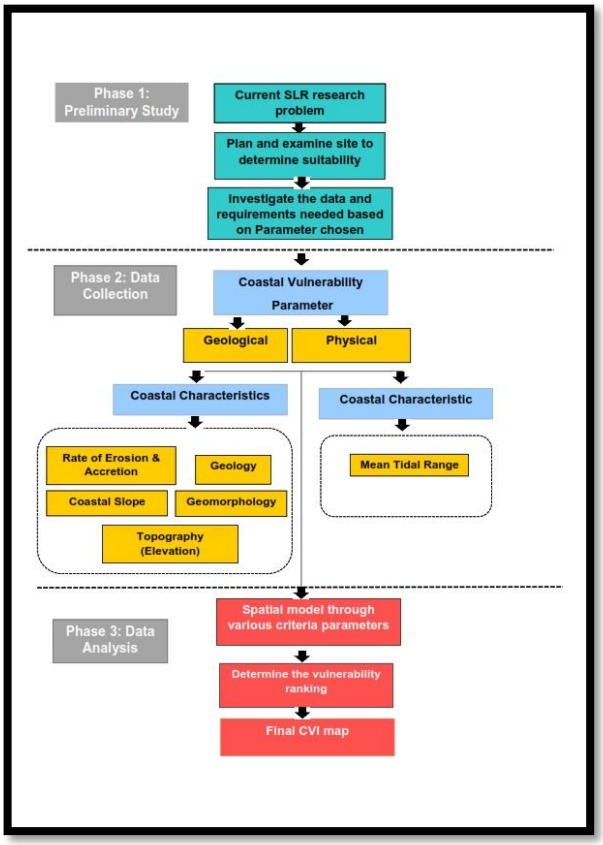

Figure 1: Methodology of the study.

3. Main results

Final CVI was mapped using the ArcMap software. Figure 2 shows all the parameters for each grid for the determination of CVI levels. Even though, it may seems like certain parameter like geomorphology, geology, topography and erosion rate has a high vulnerability rank or values, the

final CVI rank will determine whether the particular zones selected is really vulnerable. CVI ranks will be determine by using formula of CVI provided by (Gornitz et al., 1994).

$$CVI=\sqrt{(a\times b\times c\times d\times e\times f)/6}$$

Figure 2: CVI formula used to determine the vulnerability ranking

Parameters like mean tidal range and coastal slope generate low rank of vulnerability towards the coastal regions. Even so, the final CVI ranks will determine which grid or areas that actually has high or low vulnerable. CVI rank for grid-code (D1-E3-E4-E5) has a low rank in vulnerability to the coastal areas. The low rank of vulnerability depend on the CVI value calculated. The low vulnerability means that particular parameter selected on the grid-code (D1-E3-E4-E5) areas does not really affected the coastal/shoreline of Carey Island.

Even if it doesn't affect the grid code areas, it should not be unlooked and periodically monitoring and research recommended. Next, CVI rank for grid-code (A1-B1-C1-E1-E2-E6-F6-F7) has a moderate rank in vulnerability to the coastal areas. The moderate value also depend on the CVI value calculated. Moderately vulnerable means the particular grid on the coastal/shoreline areas was affected but not very strong by the parameter used in this study. Nevertheless, it was really important to set a high landmark in prediction over the coastal area for the future references.

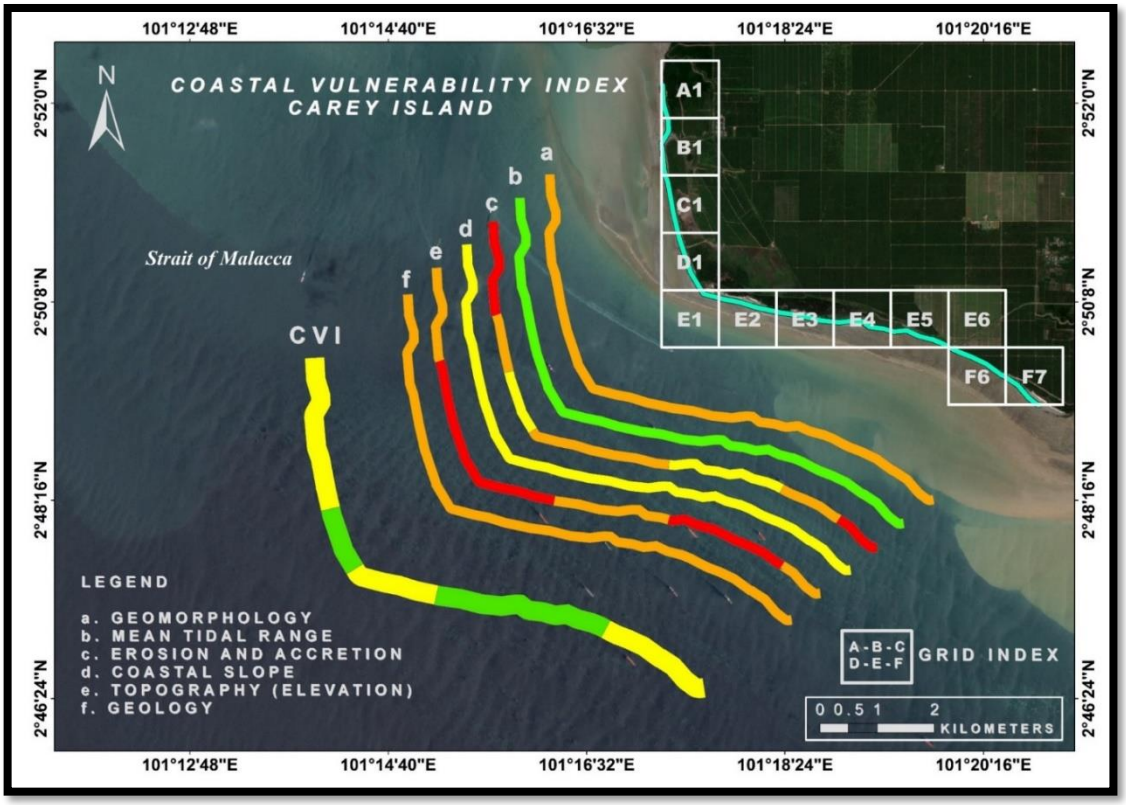

Figure 3**:** Final Coastal Vulnerabiity Index (CVI) Map

To study the influence of parameters, the area is divided into twelve grid boxes, in which each grid has its own unique value. The Grid Index Features are crucial to determine which part of the coastal areas is really vulnerable to certain parameters that were chosen in this study. CVI is calculated by combining the differential weighted values of the variables. Each variable of CVI is defined by a weighted score, which is related to the importance and relevance of determining the vulnerability of coastal areas to erosion. By assigning each variable to a value between 1 and 5, where 1 is the lowest risk and 5 is the highest risk.

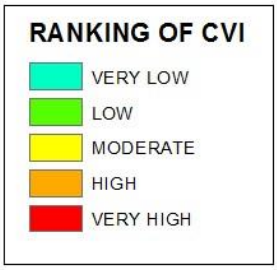

Table 1: Grid-Index shows how value of each Parameter were Rank.

GRID	GEOMORPHOLOGY	MEAN TIDAL RANGE (m)	COASTAL SLOPE (%)	EROSION AND ACCRETION (mm/y)	TOPOGRAPHY (ELEVATION) (m)	GEOLOGY	CVI	CVI RANK
A1	4	2	3	5	4	4	18.00	MODERATE
B1	4	2	3	5	4	4	18.00	MODERATE
C1	4	2	3	4	5	4	18.00	MODERATE
D1	4	2	3	3	5	4	15.50	LOW
E1	4	2	3	4	5	4	18.00	MODERATE
E2	4	2	3	4	5	4	18.00	MODERATE
E3	4	2	3	4	4	4	16.00	LOW
E4	4	2	3	3	4	4	13.90	LOW
E5	4	2	3	3	5	4	15.50	LOW
E6	4	2	3	4	5	4	18.00	MODERATE
F6	4	2	3	4	5	4	18.00	MODERATE
F7	4	2	3	5	4	4	18.00	MODERATE

4. Conclusion

Parameter maps produced in this study like geomorphology, erosion rate, topography (elevation), coastal slope, geology and mean tidal range really important not only to visualize the vulnerability to Carey Island coast but also to create platform of ideas to other agencies or researcher that supposedly CVI research or studies happen more promptly in the future.

5. Acknowledgement

This study was supported by the Trans Disciplinary Research Grant Scheme (UKM-YSD-2021-003). The authors would like to express gratitude to all parties involved in this research, to the Lecturer of the Universiti Teknologi MARA who has contributed greatly to the implementation of this research.

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Lignin: Green Modifier for Road Pavement

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Abstract. Bitumen is an essential material that is used to build flexible pavement. Due to the availability of supplies, bitumen is also expensive to use in road construction, hence an alternative binder that can partially replace bitumen is needed. A natural polymer called lignin has been investigated as a potential bitumen modifier. In this study, physical testing namely penetration and softening point tests were conducted to determine the properties of bitumen penetration grade 60/70 when mixed with 10% lignin by weight of bitumen. The findings show that lignin reduces the penetration value of bitumen whereas the value for conventional bitumen and modified bitumen are 68.3 dmm and 65.0 dmm, respectively. The addition of lignin raises the softening point temperature of conventional bitumen from 48°C to 52°C for lignin-modified bitumen. Therefore, the use of lignin as a modifier will improve the properties of bitumen and reduces cost because of less bitumen usage.

1. Introduction

Bitumen has been widely used in pavement construction as a binding material to bind the aggregates together, forming a bituminous pavement. Bituminous pavements are the most common type of pavement in Malaysia. Bitumen is a petroleum-based hydrocarbon, obtained from crude petroleum distillation and a non-renewable material. Advances in oil refinery technology have lowered both the quantity and quality of bitumen, resulting in higher bitumen pricing and the requirement for modification.

Lignin is an organic renewable resource, one of the most abundant materials available, and can be obtained commercially from the pulp and paper mills industry. Lignin has a chemical similarity to bitumen binder and possesses good binding and antioxidant properties. Lignin has generated considerable interest in recent years as a partial substitute or performance modification for bitumen [1,2].

This study aims to investigate lignin as a bitumen modifier for road pavement in Malaysia. Thus, the objectives of this study are:

- To determine the physical properties of lignin-modified bitumen by penetration and, ring and ball tests.
- To compare the temperature susceptibility of conventional and lignin-modified bitumen.

2. Materials and Methods

2.1. Materials

This study utilised bitumen penetration grade 60/70 as the control bitumen and Kraft lignin powder (commercially available) as the bitumen modifier.

2.1.1. Bitumen. Bitumen of 60/70 PEN grade was used as base bitumen. Bitumen penetration grade 60/70 indicates a penetration value (a measure of bitumen hardness) in the range of 60 to 70 dmm. The

penetration and softening point tests are used to specify bitumen. The thermoplastic feature of penetration grade bitumen leads the material to soften at hot temperatures and harden at cold temperatures [3].

2.1.2. Kraft lignin. The manufacturing of industrial paper involves a process known as the Kraft-pulping process, where wood is processed into wood pulp and then into paper. The process creates waste by-products referred to as black liquor, a liquid mixture of pulp residues (such as lignin) and inorganic chemicals (sodium hydroxide and sodium sulphide) [4, 5]. Lignin extracted from black liquor is known as kraft lignin. In this study, the lignin incorporated in the bitumen was 0% (control bitumen), and 10% (modified bitumen) by weight of bitumen.

2.2. Methods

2.2.1. Penetration of bituminous materials. Penetration test uses to examine the consistency of bitumen by measuring the distance in one-tenth of a millimetre that a standard needle penetrates vertically into a sample under specified conditions of temperature (25ºC), load (100g), and loading duration (5 sec). Values obtained from the penetration test indicate the hardness of the bitumen sample and can help to determine its suitability to be used under given climatic conditions. Details on the equipment and procedures are given in ASTM D5 [6].

2.2.2. Softening point of bitumen. Bitumen is viscoelastic material with no defined melting points. The materials gradually become softened when subjected to heat. Softening point indicates the temperature at which the bitumen attains a degree of softening under the specified condition of the test. The test is conducted by using Ring and Ball apparatus. A steel ball is placed upon the bitumen sample and the liquid medium is heated at a rate of 5ºC per minute. Temperature is noted when the softened bitumen touches the metal plate and is recorded as the softening point. Details on the equipment and procedures are given in ASTM D36 [7].

2.2.3. Penetration Index. Penetration Index (PI) is not a test method but is obtained by calculation from the softening point and penetration value of the bitumen. The PI can estimate the effect of temperature on the properties of bitumen, where a lower PI value indicates a higher susceptibility to temperature variation [8]. The penetration index (PI) can be determined from a nomograph or by the equation (1) below:

$$PI = \frac{1952 - 500 \log pen - 20SP}{50 \log pen - SP - 120} \quad (1)$$

Where; PI = Penetration index
pen = penetration value (dmm)
SP = softening point value (ºC)

3. Findings

The penetration value of conventional and lignin-modified bitumen is reported in Table 1. The penetration value of control bitumen (0% lignin) is 68.3 dmm whereas the penetration value for modified bitumen with 10% lignin is 65.0 dmm. The percentage of decrement for the penetration value was 4.83%. The result indicates that the lignin has increased the hardness of the bitumen based on the reduction in penetration value.

Table 1: Penetration value for control and modified bitumen

Type of bitumen	Sample	Penetration value (dmm)	Mean penetration value (dmm)
Control	1 23	69.2 67.7 68.0	68.3
Modified	12 3	65.0 65.4 64.6	65.0

Table 2 shows the softening point data for both conventional and modified bitumen. The control and modified bitumen fulfilled the JKR standard specification requirements of 48°C to 56°C for bitumen grade 60/70. In addition, the findings show that adding 10% lignin increases the softening point temperature of bitumen by 8.33%. The softening point value for modified bitumen is 52°C, which is higher than the conventional bitumen, which is 48°C.

Table 2: Softening point for control and modified bitumen

Type of bitumen	Softening Point (°C)
Control	48
Modified	52

The penetration index (PI) was calculated using Equation (1) to determine the temperature susceptibility of the conventional and modified bitumen. From Table 3, it was found that the PI for the control bitumen is -1.0 while the PI for the modified bitumen with 10% lignin is -0.07. The incorporation of lignin as the bitumen modifier improves the consistency of the bitumen by increasing the PI, as a lower penetration index indicates that the binder consistency changes faster as the temperature changes (highly temperature susceptible).

Table 3: Comparison of penetration index

Type of bitumen	Penetration Index (PI)
Control	-1.0
Modified	-0.07

4. Conclusion and Recommendation

From the study, it can be concluded that:

- Adding 10% of lignin increases the hardness of bitumen by lowering the penetration value.
- Lignin raises the softening point of bitumen thus modified bitumen can withstand a higher temperature compared to conventional bitumen.
- Lignin reduced the temperature sensitivity of bitumen where the PI for modified bitumen is -0.07 compared to conventional bitumen is -1.0. Lignin-modified bitumen is suitable to be applied in pavement construction (PI within the range of -2 to +2).

- Incorporation of lignin in the bitumen will help in reducing the usage of bitumen in road construction thus lowering the cost of materials.

As a recommendation, the study suggested increasing the percentage of the lignin to determine the highest content of lignin that can be incorporated into the bitumen. It is also recommended to conduct other tests for bitumen properties such as flash point test, ductility, and storage stability test.

5. Acknowledgement

This study was conducted at the Universiti Teknologi MARA, Cawangan Pulau Pinang, Permatang Pauh Campus.

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Titik Temu : Central Market

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Abstract. The outbreak of Covid-19 has been affected internationally. This situation has had a significant impact on the tourism industry, especially cultural and heritage tourism with severe consequences for jobs and businesses. Tourism is one of the first industry to be severely hit by the pandemic, as efforts to contain the virus resulted in a near-complete stop of tourism activity. A lot of people were affected by losing jobs and opportunities which lead to decreasing in economy. Cultural heritage is the experience of historic, cultural, and natural attractions that genuinely depict the tales and people of the past. Cultural Heritage is the customs, practises, places, artefacts, and artistic expressions that have been formed by a community and passed down from generation to generation. This study aims to analyze the possible opportunity to local entrepreneurs and Artisan to build up their business by proposing an interior design space as a platform to promote their products after pandemic outbreak. To obtain the data, cultural mapping and site sensing in Jalan Kampung Hulu were applied for this study. The outcome of this study is beneficial and references for designer, heritage researchers locally and internationally and the proposal will be a platform to promote their products and a space accessibility for all races engagement to create diversity and unity without any form of discriminations.

1. Introduction

It appears that modernization has aided in the dissemination of cultural resources and the protection of historical artefacts. In the words of key informants interviewed during the fieldwork, this phenomenon increases the value placed on cultural practices and the likelihood that they will be preserved. Modern techniques for managing cultural and natural heritages are based on the positive aspects and impacts of modernization on these resources. (Uzomaka & Pamela, 2017). Many factors, including progress, modernization, climate change, and assimilation, have made cultural heritage preservation an urgent necessity. The United Nations Educational, Scientific, and Cultural Organization (UNESCO) has set up committees and guidelines to ensure that cultural properties all over the world are safeguarded. Cultural and heritage can be a source of economy income for the country as it can attract people from other countries to explore more especially in Malaysia. Malaysia has a relatively high collectivist culture and has the highest score in the power distance index (Hofstede, 1994). Furthermore, within its collectivistic culture, harmony and unity are more socially desirable (Hofstede, 1991). Malaysia is also ranked first in humane orientation in the GLOBE study of 18,000 managers in 62 countries (Javidan & House, 2001)

The outbreak of the Covid-19 virus caused a significant upheaval in the cultural industries. The cultural and creative industries have substantial effects on the economy and provide significant employment opportunities. The sudden spread of COVID-19 has had a devastating effect on the creative industries. Travel, sporting events, conventions, theatres, and other offline forms of entertainment have all been cancelled or outlawed. In addition to having a positive effect on the economy, they also have a wide range of other societal benefits (well-being and health, education,

inclusion, urban regeneration, etc.). They are among the most vulnerable to the pandemic, with many more jobs in large cities being threatened.

2. Objectives

The research aims to produce an interior space for local entrepreneurs and Artisan to build up their businesses as a platform to promote their products by integrating the understanding of cultural mapping and site sensing to develop the outcome of the interior design spaces and understanding of historical background. The market is a meeting place for sellers and buyers to offer / sell goods or services. This is in line with the opinion of explaining that traditional markets are markets where sellers and buyers bargain directly so that a price agreement is reached between the two parties. As a shopping experience it combines with food markets and craft- based trades. This activity will follow the same old pattern and system of purchasing and selling things from local businesses. As a result, community services and productivity shall be improved.

3. Methodology

The research conducted using qualitative method. Methods began with a systematic review of secondary data literature, which included previous research, journal articles, and precedent studies. To gain the solid proof and data, site observation or "Site Sensing" were conducted for cultural mapping. Cultural mapping is the process of making two- or three-dimensional pictures of landscapes from the point of view of indigenous and local people (Taylor, 2013). The data collected were interpreted to form of keywords and conceptual model to be implemented in design.

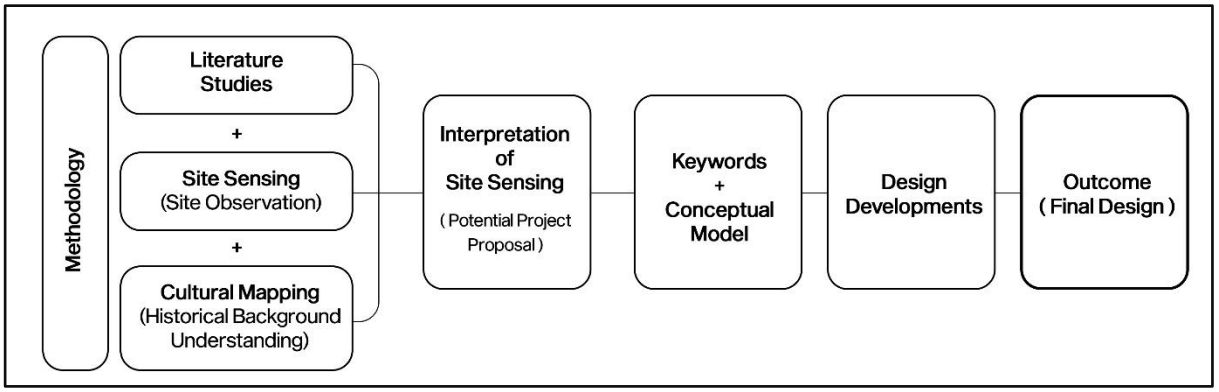

Figure 2: shows the process of methodology implemented

4. Findings

This study of cultural heritage is the experience of historic, cultural, and natural attractions that genuinely depict the tales and people of the past. Cultural Heritage is the customs, practices, places, artefacts, and artistic expressions that have been formed by a community and passed down from generation to generation. This heritage is rooted in the language, customs and practices brought over from respective countries of origin Maintaining the originality of Malaysian's culture and heritage are beneficial to the young generation to fit in the urban and modernization while preserving it.

Therefore, the project proposed are focusing on economy growth of community in Kampung Hulu, whereby the local there are invisible from the attention. Past story, the original community mainly Malay society left Kampung Hulu as the environment starting to change (Johan,1999). Due to this history, Jalan Kampung Hulu has lost it is identity. Thus, this project will significantly boost the community involvement in the society, with the project serving as the focal point for a meeting point and commerce much like in times past.

Illustration 1 shows the interior space designed after a series of developments from historical understanding and the site sensing. It is illustrate the merging between Pasar with "Car-bon" creates a serenity and calm environment, that help boost moods, increase creativity, and reduce stress. Pasar was inspired from a setting of past trading activity in Kampung Hulu where it is located at the centre of the market , as a meeting point that creates engagement and bonding between shoppers and sellers. The booth was designed based on Malay traditional house but setting is set differently from each culture. (Malay, Indian, Chinese and Baba Nyonya). Mainly focused on selling local dessert that represent each of the culture. This area is a focal point in the Titik Temu Central Market, whereby it reflects to project aim and objectives which is it igives oppurtunities to local vendor and artist to start their businesses here.

5. Novelty

The Jalan Kampung Hulu will be significantly improved because of the proposal's implementation. It is an initiative that aims to improve the growth of the economy and to bring the treasure of Kampung Hulu back to its former glory. This proposal will also help the community create opportunities for local entrepreneurs and artisans to build up their businesses as a platform to promote their products. In addition, it will provide a space that is accessible for engagement by people of all races, with the goal of fostering diversity and unity without resorting to any form of discrimination.

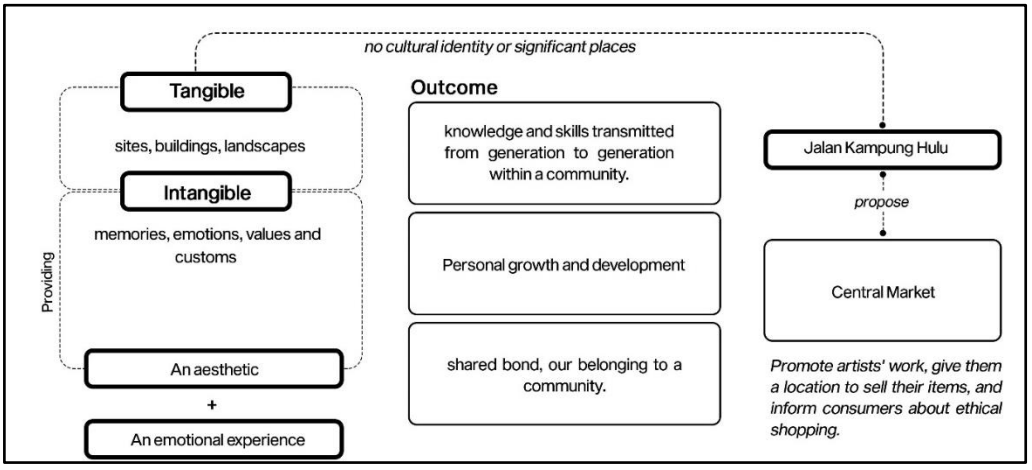

Figure 3: shows the benefits of the project

6. Conclusion

The strength of the study area is the distinct heritage buildings that give the place meaning and symbolism. It is not an exaggeration to say that Malacca is extremely wealthy due to the city's enormous number of historical sites as well as its wide variety of cultural traditions. Despite this, there are still some things that may be done to enhance the quality of the heritage tourism that is offered in Malacca especially in Jalan Kampung Hulu.

This project was developed to Strengthening tourism's position as a sustainable, responsible, and inclusive driver of economic growth is a key component of aligning the National Tourism Policy with the United Nations Sustainable Development Goals (UNSDGs).

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Strata Calculator: Mobile Application to Facilitate Share Unit and Charges for Stratified and Landed Strata

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Abstract. Share Unit value is important in calculating maintenance fees in Strata Title. This study aims to develop a Strata Calculator mobile application for calculating share units and charges that include maintenance fees and sinking funds. The party that is responsible for calculating share units is the Licensed Land Surveyor. Meanwhile, the party involved in calculating maintenance fees and sinking funds is the Joint Management Body (JMB) of that building. The objectives of this dissertation are to commercialize the share unit calculation to the public. The workflow of this application is using Agile Software Development Life Cycle methodology to ensure that all of the objectives are achieved. The development began with a research background of the topic. Followed by, conducting a survey of user requirements for the application. After obtaining the result from the survey, the application is built based on the result. The development platform used is Android Studio, Flutter, and Java programming. The calculations provided in this app have been tested and the results obtained are correct and precise. During User Acceptance Test (UAT), Strata Calculator mobile application received feedback from various users such as the Licensed Land Surveyor and JUPEM. This application is useful for surveyors, developers, and public user who has an asset under Strata Title as they can directly calculate the share unit in the convenient and shortest way.

1. Background Research

The share unit is basically the numbered to each parcel by the Licensed Land Surveyor (LLS). The Department of Land and Mines (PTG) is responsible for checking the share units before approving the share unit [1]. In strata, there are some charges fees that need to be paid by the parcel's owner. the charges fee consists of maintenance charges and sinking funds. The value of the maintenance fee is based on the value of the share unit. It means, the bigger the parcel, the more the share unit value, and the higher the maintenance fee that needs to be paid [2]. The amount of the sinking fund is 10% of the total maintenance fee. This research is conducted to make a mobile application where the calculation of share units is more convenient and less time-consuming. By conducting this research, the app introduced can be beneficial for the surveyor when calculating the share unit thus increasing the accuracy and efficiency as less time is consumed. This application will be made using Android Studio software [2].

2. Problem Statement

Share unit is introduced to require the collection maintenance and management charges. Share Unit is computed based on the area, usage, size, and location of the accessory parcel using the formula under strata title rules. The bigger the size of the parcel, the higher the share unit. Nowadays, according to [3], most developer does not have an interest in understanding the share unit. As the result, they tend to change the maintenance fee from time to time at a higher rate. It gives a burden to the house owner or the parcel owner as they do not expose to the share unit.

Nowadays, most surveyors used Microsoft Excel in order to calculate share units for parcels during strata surveys[3]. Although it is faster than the conventional method which needs to be calculated manually, it is still less convenient as we need to use laptops and some of the laptops need a constant

power supply. It also can increase the error as we need to enter many numbers and many equations to calculate the share unit.

3. Literature Review

3.1. Strata Title Management in Malaysia

Now in Malaysia, the Strata Management Act 2013 (Act 757) has been used for any legislation related to strata title work. Strata Management Act 2013 is the replacement for the past 3 acts that had been used before by the government. The past 3 acts are Housing Development Act 1966 (Act 118) Schedule G, H, I, and J, Strata Title Act 1985 (Act 318), and Building And Common Property (Maintenance And Management) Act 2007 (Act 663) [4].

3.2. Share Unit

Share unit was introduced in Act 318. It is used to determine the maintenance charges, sinking fund other outgoings that need to be paid by the parcel owner. The share units are computed based on the size, area, usage, and location of the accessory parcel [4]. The bigger the area of the parcel, the higher the share unit will be.

According to [4], the proposed share unit of each parcel or proposed parcel and the total share units of all the parcels need to be shown in the Schedule of Parcel plan. In this share unit topic, we will discuss the definition of share unit, Certificate of Share Unit Formula (SiFUS), and problems related to share unit.

The formula for the calculation of allocated share units:

Share Unit of a Parcel = $(A \times F^1 \times F^2) + (B \times F^3)$

Share Unit of a Land Parcel: $(A \times 0.8) + (B \times F^3)$

A = area of the parcel
B = area of the accessory parcel
F1 = weightage for the type of parcel as specified in Schedule A
F2 = weightage for the overall floor parcel as specified in Schedule B
F3 = weightage for the accessory parcel as specified in Schedule C [5]

3.3. Maintenance Fee

The maintenance fee is one of the charges that need to be paid by the parcel owner. It use to provide for every day repairs. Maintenance fee is based on the elements of property management such as repairing common areas, gardening, gardening, keeping the place clean, and security. Joint Management Body (JMB) must be established at the first general meeting. The process must take place within 12 months before the transfer of ownership for the first unit. Then, JMB will elect 3 to 14 people from the units' owner of the building to participate in Management Committee (MC). JMB is responsible to collect funds and manage the maintenance of the building as stated in the Act [5].

3.4. Sinking Fund

The sinking fund is a fund that has been prepared against future expenditures such as major work on the building or large-scale work. The residents in the strata building must pay this fee to provide financial security if major works are being undertaken. It is important for all residents to contribute to paying this fund. For sinking fund collection, JMB is also an organization responsible to collect this fund.

4. Methodology

The workflow for this study will follow Agile Software Development Life Cycle. This method is the most appropriate and potential solution for developing a mobile application. The improvement of each application built is based on user feedback. The usage of the Agile Software Development Life Cycle in this application process can help the process run smoothly. Figure 1 shows the workflow for Agile Software Development Life Cycle.

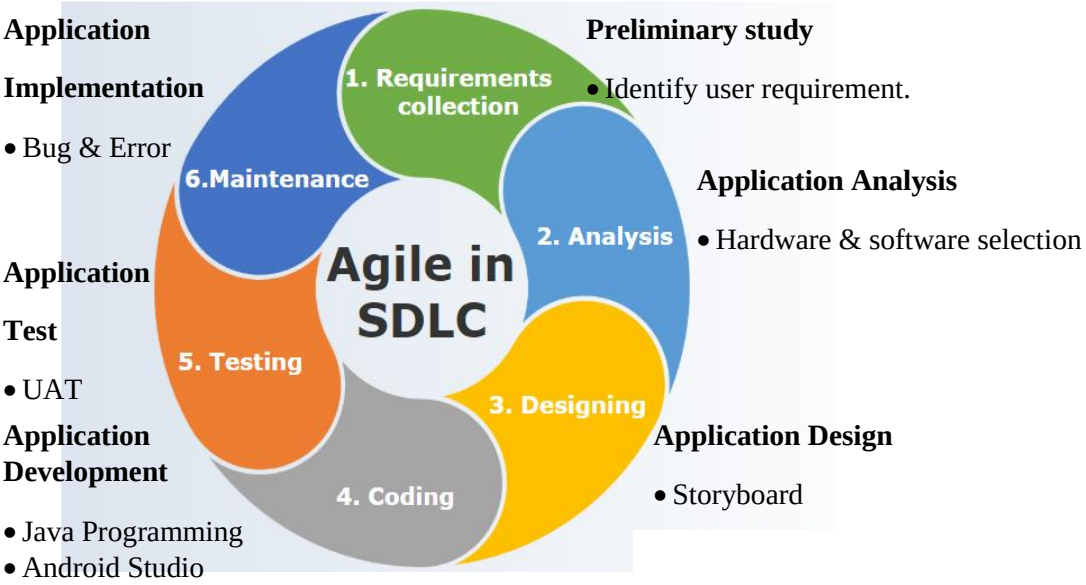

Figure 1: Agile Software Development Life Cycle
source: educba.com

5. Result

5.1 Result comparison for Share Unit.

Rumah	Jenis Susunatur	Keluasan lantai (m^2)	Unit syer (dibundarkan)
Intermediate unit	Type 1, 1a, 1b	80.2682	68

Figure 2:

Result for Share Unit from Microsoft Excel Joint Management Body (JMB) Pusat Komersial Seksyen 7, Shah Alam

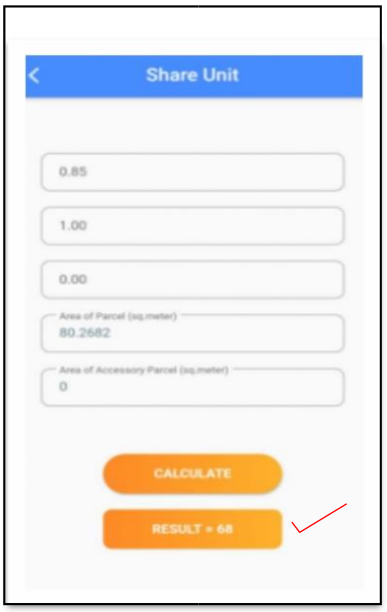

Figure 3: Result for Share Unit from Strata Calculator Mobile Application

5.2 Result Comparison for Charges Fee

Badan Pengurusan Bersama Pusat Komersial Seksyen 7, Shah Alam

Belanjawan penyelengaraan 2019	RM952,908.51
Kos purata setiap bulan	RM79,409.04
Jumlah unit syer	108149
Caj penyelenggaraan semasa	0.73

Nombor unit rumah		VG/3		Caj penyelenggaraan semasa	RM86.64
Block	L	Unit Syer	118	Sinking fund (10%)	RM8.66
Keluasan Unit		M^2	FT^2	Jumlah perlu dibayar	RM95.31
		138.24	1488.00		

Figure 4: Result Comparison for Maintenance Fee, Sinking Fund and Total Charges Fee from Joint Management Body (JMB) Pusat Komersial Seksyen 7, Shah Alam

Figure 5: Result Comparison for Maintenance Fee, Sinking Fund and Total Charges Fee from Strata Calculator Mobile Application

6. Conclusion

Strata Calculator is robust and can be used for all conditions whether stratified building or landed strata. Work on calculating unit share and charge maintenance and sinking fund can be easy.

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Pandemic Disruptive Factors in Estate Agency Performance

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Abstract. The unprecedented COVID-19 pandemic outbreak has affected the world's populationand disrupted the global way of life. The new normal is taking over the way of doing things including in real estate business dealings. The pandemic disruption has required new strategy beimplemented to sustain the estate agency performance in real estate industry. Therefore, the research objectives are to identify the pandemic disruption factors affecting estate agency performance and to determine the performance indicators of estate agency. The methodology includes literature review and synthesis to explore the current situation of pandemic disruptions and key performance indicators in real estate agency. The key factors found through the exploration of literature search formed the evidence of the pandemic disruptions in estate agency practice. Another perspective of the content analysis focused on key performance indicators of the estate agency in accordance with the second research objective. As a conclusion, content analysis on the related literature provides insight for the arousal of new strategies to sustain the estate agency performance in real estate industry during COVID-19 pandemic.

1. Introduction

1.1. Real Estate Sector Disrupted by Pandemic COVID-19

The spread of COVID-19 that has affected on human health, it also affected on country's economy, world's population and disrupted the global way of life (Cucinotta and Vanelli, 2020). Real estate industry being in services sector and like most capital-intensive industry has been badly affected by COVID-19 pandemic (Tuah, 2021). Almost all countries faced the economic recession due to the implementation of lockdown, causing many sectors of the economy to be disrupted or stunted and changed the employee workflows and increase reliance on technology and virtual collaboration (Nah and Siau, 2020). According to Woodruff (2019), factors that contributes to the economy growth could affect the property industry, such as human resource, physical capital, natural resources and technology. One of the consequences of the COVID-19 crisis is the shrink in demand (Tanrivermis,

2020) especially in sale and purchase transaction of properties. This affects the estate agents' performances in conducting property on behalf of property owners.

1.2. Problem Statement

The pandemic remains in our society, affecting the whole world economy, government policy, health, social life, educational system, individual routine and working process all become a new norm. Data retrieved from National Property Information Centre (NAPIC, 2020) stated that COVID-19 pandemic has contracted sharply on the property market activity and transaction value in Q2 2020 (NAPIC, 2020). The performance of estate agency during pandemic worsened during total lockdown declaration in Malaysia making the real estate sector and others observed nervously (Lehan et al., 2020). Movement Control Order (MCO) was limiting agents from meeting with customers for business transaction and property viewing and causing a decline in their working performance. According to Dang (2019), real estate agencies were facing more challenges than before due to COVID-19 and they need innovation of technologies in sustaining the business and conducive real estate Key Performance Indicator (KPI) will lead to a good performance of estate agents for the sustainable practices during pandemic disruption.

1.3. Objective

The research objectives are to identify the pandemic disruption factors affecting estate agency performance and to determine the performance indicators of estate agency.

2. Literature Review

2.1. Factors Affecting the Real Estate Agency Performance

According to the contingency theory, to achieve high performance, the asserts of characteristic in an organizational must fit their environment (Lawrence, 1967). Brooks (2021) stated that many findings showed estate agencies maximize their performance by using social media effectively and boost the connection with both buyers and seller. Real estate industry has evolved from the traditional marketing methods suchlike printed advertising and in-person meetings towards using the social media to showcase their property listing virtually.

2.1.1. Technology Use.

Nowadays, technology development is highly competitive with rapid development in business market and drastically transforming into the e-business (Hasnah et al., 2019). To maximize business performance in the marketplace, an organization needs to create relationship with their customers and manage their information effectively.

2.1.2. Training and Development.

Training and development program for estate agents are essential to improve employee productivity and performance in the estate agency (Waqar Azmi, 2021). This training program helped the estate agent to focus on current situation such as unprecedented pandemic COVID-19 and their performance growth while pushing technology knowledge to the next level (Li, 2022). Hence, to maximize efficiency in work performance and build economic growth, training should be engaged between agency and estate agent (Godfrey, 1997) resulting in good quality service and producing knowledgeable workers (Nik Nazli and Sheikh Khairudin, 2018).

2.1.3. Business Networking.

Real estate industry is a business that need support from potential customer, employees and networking relationship is one of the factors that will affect the performance of estate agent. According to Kadonetworks.com (2021), strong networking skills are necessarily essential to build business relationship, generate referrals, retain current clients and develop company reputation. Business

opportunity to estate agent surfaced when strong referral network takes place and expand to new business in the future (Dang, 2019).

2.1.4. Interpersonal Skills.

Interpersonal skills are a medium of communication to define, maintain, initiate or further a relationship with customers that will determine the performance of people (Dainton and Zelley, 2005). Social skills and interpersonal competencies help estate agent to communicate, learn the body language, tonal variation, facial expressions, and the way to interact with customers effectively (Duszynski, 2022). People mastering those skills are good at adjusting to situation, avoiding, or solving conflicts, gaining trust and respect (Konrad et al., 2021). This increase performance of estate agents through efficacy and adaptive selling (Gabler et al, 2019).

2.2. Performance Indicators of Estate Agency

2.2.1. KPI 1- Number of Calls Made. In real estate industry, a business requires great effort reaching target market through making numerous numbers of outbound calls as KPI that motivates estate agent to reach their target (Dang, 2019). Estate agents need to pay attention on the phone call details inbound or outbound to indicate their active efforts and improve estate agency performance.

2.2.2. KPI 2- Client Feedback Ratings. According to the Realtor Magazine, 30% of their sales volume came from the past client referrals and another 30% is repeated business with past clients. Getting feedback from client is important where it helps estate agent to make continuous improvement.

2.2.3. KPI 3- Networking Goals. Networking goals is helpful in building a relevant contact database. Networking reaps reward and takes time; therefore, estate agents need not be distracted or disheartened (Networkingtips, 2015).

2.2.4. KPI 4- Individual Marketing Activities. Individual marketing activities adopted by estate agent includes promoting the property to sale in the individual website, allowing the potential buyer to directly deal with that estate agent. According to Rafner (2021), the best agent will fill the personal website by uploading photos, doing virtual tour and other efforts to keep the website active.

2.2.5. KPI 5: Revenue Growth. Estate agents' income is received when they close a deal, and each estate agent has their own target. Since the estate agent wages is depending on commission base, it is important for estate agent to track monthly, quarterly and annual revenue growth as it is individual analytics which can highlight on performance achievements instead of effectiveness (Stone, 2018).

3. Research Methodology

The research methodology is taken from secondary data source like journals, research publications, magazines, news, etc. The authors have focused on the content analysis of relevant literature reviewed and synthesized to explore the current situation of disruption in real estate agency and its performance indicators.

4. Findings

Results show four major factors affecting performance of estate agency and five key performance indicators (KPI) in current situation of pandemic disruption. Hence, the impact of COVID-19 on real estate business performance requires new strategies to be taken by estate agencies.

5. Conclusions

This pandemic has opened the eyes of all industries globally, including real estate agencies in Malaysia, that they must think creatively and effectively to keep running their real estate business to generate income and revive the country's economy. The use of technology is not only significant to the

entire real estate industry, but it also gives a new perspective from buyers and sellers, creating an opportunity for real estate agency to sustain their performance throughout pandemic.

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Development of Elemental Cost Analysis (ECA) Web-Based Application Platform

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Abstract. Preparing the Elemental Cost Analysis (ECA) is an additional service provided by the quantity surveyor (QS) in preparing cost plans for future schemes. The ECA enables QS to provide the best value for money for the client by comparing the project cost with other previous projects. Due to that, the compilation of ECA for the various types of projects is crucial for the QS to prepare a reliable estimate. The aim of this study is to develop the ECA web-based application to assist the QS in preparing and storing the ECA systematically. A set of 50 questionnaires were distributed among QS consultant firms within Klang Valley to investigate the causes of the poor documentation of ECA. It was found that the majority of QS had a problem storing ECA because they were too busy handling project tasks. The conventional method may also result in a lack of interest for the QS in completing the documentation. Thus, the development of the ECA web base is important in acquiring QS interest and encouraging the preparation of ECA. By having a database, the compilation of ECA from previous projects can be centralized and can act as a repository and guideline to refer to while preparing the ECA. The novelty of the web base is significantly focusing on the enhancement of the manual method of documenting ECA by providing a more interactive, easily accessible, and user-friendly ECA web base to store data. The continuous engagement with the web base application is a repository of cost data that assists in forecasting estimation costs.

1. Introduction

The success of a construction project can best be described as a project that can be completed within the stipulated time and budget while maintaining the quality of the project. The cost estimation at the inception stage is important to forecast the actual budget of the project (Khalid, 2019). The use of strategic historical cost data would produce benchmarking information that allows the development of accurate quantities and costs of a project (Cunningham, 2015). Elemental Cost Analysis (ECA) is one of the reliable sources of cost data that QS may refer to in order to prepare a cost plan. ECA is a systematic breakdown of cost data that briefs project cost information gathered from the Bill of quantity (BQ). In order to ensure consistency with data collected from various sources, ECA is prepared using standard forms. In Malaysia, the Building Cost Information Centre (BCIC) and the Royal Institution of Surveyors Malaysia (RISM) have their own standard forms known as Form 1- 3.

Numerous researchers argue that the construction industry would benefit greatly from improved cost data collection, analysis, and utilization (Ahmad, K. 2023; and Edafin et. al., 2016). Having several numbers of ECA allows the establishment of cost trends for each material and element. The analysis is used by the designer and the client for future projects reference to allow a comparison between two or more buildings. Further, the cost analysis of a construction project could provide the QS with useful cost data information and provides a yardstick for the client and the designer (Ahmad, 2023).

Soutos and Lowe (2018) claimed that there is a lack of documented ECA even though it can be done once the contract document has been issued. The benefits of having ECA as cost data are undeniable, but the QS remains inert on preparing and storing ECA systematically. Through informal discussion with industry practices, the awareness of properly documenting ECA is still low among QS probably due to time constraints and lack of interest in preparing it. Therefore, this study initiates the development of an ECA web-based application for storing the ECA systematically. In line with digital transformation 4.0, the development of the ECA web base is valuable as a centralized historic cost data that can be accessed anytime and from anywhere.

2. Methodology

A comprehensive literature review has been done to gather information on the challenges that occur in preparing the ECA by QS followed by a pilot survey which was conducted from 1st July 2022 until 31st August 2022. 50 questionnaires were then distributed among QS consultant firms within Klang Valley to identify the causes of the poor documentation and storage of previous ECA. As shown in Table 1, out of the 50 questionnaires that were distributed, 30 have been returned back, making a total response rate of 60%. The findings were analyzed using descriptive analysis. In the final stage, the development of the ECA web base was undertaken in overcoming the issues of lacking of systematic documentation of the ECA.

Table 1: A response rate of the survey

Total distribution of the questionnaires	Returned questionnaires	Unreturned questionnaires
50 questionnaires	30 questionnaires	20 questionnaires

3. Findings

Based on the survey, the investigation of the challenges faced by QS in storing the ECA was conducted (Refer to Table 2). Results showed that QS lacks interest in storing ECA manually, whilst too busy handling construction tasks. It also indicated that there is less motivation in preparing ECA due to excessive documents that need to be referred to and facing difficulties in understanding terms and calculation guidelines in the ECA manual.

Table 2: Challenges faced by QS in documenting the ECA

Challenges faced by QS in documenting the Elemental Cost Analysis	Frequency	Percentage	Rank
Lack of interest in documenting ECA manually	12	40	1
Too busy handling construction tasks	9	30	2
Too many documents need to refer while preparing for ECA	5	17	3
Difficult to understand ECA Manual by RISM	4	13	4

Table 3 shows the difficulties in documenting ECA based on each item in the forms. Based on the document analysis, it was categorized into four which are document information, filling Form 1, Form 2 and Form 3. For document information, the majority of the respondents are having problems due to the difficulties in obtaining contract documents and tender reports of previous projects. The previous contract documents and tender reports are always misplaced because the organizations have not stored them properly. This problem persists while preparing Form 1. The list of competitive tenders involved in the bidding process is always missing because the list is included in the tender report. Meanwhile, for Form 2, QS had difficulties in calculating the Element Unit Quantity (EUQ) due to a misunderstanding of the rules of the EUQ calculation in the ECA manual. In Form 3, the majority of the respondents ranked the writing of specification for services as the one causing the highest difficulty in completing the ECA due to the unfamiliar terms of services in the Bill of Quantities.

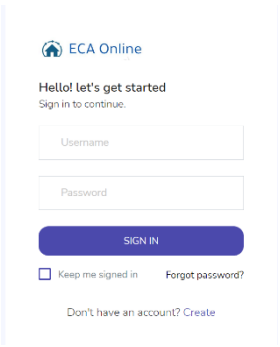
Table 3: Difficulties of documenting ECA based on the item

	Frequency	Percentage	Rank
Document Information			
Contract Document	12	40	1
Tender report	10	33	2
Working drawing	4	13	3
Specification	4	13	3
Manual ECA	0	0	5
Standard ECA form	0	0	6
Filling Form 1			
Competitive tender list	8	27	1
Areas (Usable, Internal division, circular and ancillary area)	8	27	1
Project details & site condition	4	13	3
Contract particulars	4	13	3
Accommodation and design features	4	13	3
Functional Unit	2	7	6
Filling Form 2			
Element Unit Quantity (EUQ)	15	50	1
Element Ratio	4	13	2
Element Unit Rate (EUR)	3	10	3
Cost/GFA	2	7	4
Reinforced Concrete	2	7	4
Formwork	2	7	4
Reinforcement	2	7	4
Filling Form 3			
Specification for services	8	27	1
Specification for finishes	6	20	2
Specification for external work	6	20	2
Specification for substructure	5	17	4
Specification for superstructure	5	17	4

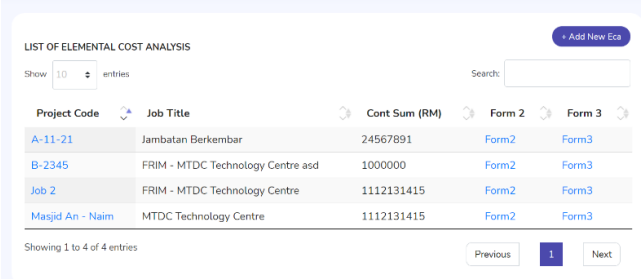
Based on all these findings, the ECA web-based application using open-source, PHP was developed to encourage the QS in documenting ECA. The URL of the web base is https://ecauitm.epizy.com**.** The advantages of having a web base are the users do not have to install additional software, and that the

web - based is user-friendly and easily accessible. The followings are screen captures of the web features and steps required to document the ECA.

Step 1
Login username and password



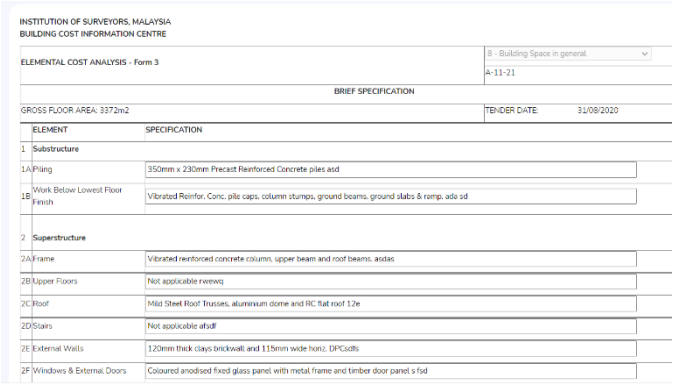
Step 2
User need to key in details of the project such as the project title, project code and contract sum.



Step 3
The user is required to fill up Form

The cost breakdown of each element needs to be filled in every column. This is important to indicate the cost trend of the project.

Step 4
The specification of each element will be filled in Form 3. The type of material used, quality, and method of construction need to be described.



4. Conclusion

In a nutshell, the development of the ECA web base will encourage QS in storing ECA systematically. The web-based will increase the QS's interest and motivation to compile the ECA for each project once the contract document has been issued. The benefits of developing the ECA web-

based such as centralized data, accessibility, and manageability will hopefully help the QS to have a reliable forecast for future project costs. This web-based can be linked easily to the construction cost data portal such as Building Cost Information Services Malaysia (BCISM) and can also be customized to suit organization preferences.

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Adaptation of Semiotic Theory in Neo-Chinese Interior Design

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Abstract. Globalization has inevitably disrupted the sanctity of the local culture of countries in the world under the impact of dominant foreign culture. Ignoring the preservation of domestic culture will lead to cultural homogenization and loss of identity. Attributable to this, protecting local culture has become one of the most crucial agendas in many countries' cultural development planning, including China. One of the most potent approaches to this is through design. The emergence of Neo-Chinese interior design in China has created a window to forward new interpretations and meanings while preserving the Chinese culture through contemporary interior design. The study attempts to formulate a new design model by interpreting and conveying meanings of traditional Chinese culture through the material form using semiotics. Meanings from traditional Chinese paintings will be decoded to help formulate the structures for the new proposed model of the Neo-Chinese interior design. They will serve as the research variable and the basis of the study. The outcome of this research can be helpful to Chinese interior designers while also acting as a reference for other countries to maintain and develop the nationality of their design.

4.1. 1. Introduction

Today's world has entered a new era of economic globalization and cultural diversity. Regional economic exchanges not only bring development opportunities to countries but also impacted the local culture of countries. Since opening herself up to outside world in 1978, China has been participating in increasing international economic and cultural exchanges. Foreign cultures have progressively influenced the country's local culture. Many Chinese people have greatly admired mainstream Western culture, resulting in the gradual decline of traditional Chinese culture. In this context, a group of Chinese designers began to integrate traditional Chinese culture into modern designs, aiming to maintain

contemporary Chinese design's nationality and avoid losing local Chinese culture. The Neo- Chinese style emerged in this period and spread widely in the interior design field.

Chinese interior designers often label designs containing forms and elements of traditional Chinese cultural symbols and characteristics as Neo-Chinese. However, when approaching the design containing traditional cultural elements in modern interior spaces, many Chinese designers choose the most superficial ways to frame the decorative elements, focusing only direct and superficial adaptations of traditional symbols and elements within the design. The actual values and meanings of traditional Chinese culture are not accurately translated within them. The outcomes are pompous and artificial. The designs produced are rigid, lacking innovation and unharmonious with the essence of traditional culture within modern forms. The essence and meaning of Neo-Chinese interior design are anticipated to be discovered through the scientific approach of Semiotics, which would lead to the interpretation and design of apt contemporary Chinese interior spaces.

2. Objectives and Methodology

This research employs the semiotic approach as a theoretical tool to analyze the relationship between spatial design and cultural connotations in Neo-Chinese style interior design. The study focuses on the semiotic relationship between the interior design representation and the artistic conception from traditional Chinese culture, such as Chinese architecture, painting and poetry. This study aims to construct a model to help Chinese interior designers interpret and reproduce traditional Chinese culture in their designs more effectively. This research employs a mixed-mode research method. In the qualitative research phase, this study engages fundamental semiotic theories to analyze the ideographic process of Neo-Chinese interior design and make an analogy analysis with Chinese traditional painting, exploring the connections and commonalities between them. The paintings act as a representation of the category of traditional Chinese culture, helping to formulate a methodology model for Neo-Chinese interior design under the frame of semiotic theories. In the latter research phase, data will be collected and evaluated through the analysis of design cases involving expert interviews and questionnaire surveys. In the end, the assessments of the value and practicality of the Neo-Chinese interior design methodology model will take place.

3. Initial Findings

This study regards "Neo-Chinese interior design" as a representative symbol containing multiple and complex meanings. Roland Barthes' theory of "connotation and metalanguage" has revealed the multiple and complex code structures hidden under the symbol's surface structure level. They will be analysed to help decode the representations. Louis Hjelmslev's theory of "expression plane and content plane" and Umberto Eco's theory of codes have revealed and broadened the innovative ideas that could lead to the formation of the Neo-Chinese interior design language[1]. This research will examine the similarities and relationship between Chinese traditional painting and Neo-Chinese interior design by using Hjelmslev's theory of "two planes of the sign", which will assist in constructing the Neo-Chinese interior design model.

4.2. Roland Barthes's theory: "Connotation and Metalanguage"

Roland Barthes' theory of "connotation and metalanguage" can be extended to the "signifier - signified" structure of any symbolic system. In any symbolic system, "connotation" can be understood as how the symbol contains implications beyond the surface meaning. On the contrary, "metalanguage" can be understood as how the symbolic codes interpret the complex (multiple) meanings beneath them[2]. This study will use the formula of "metalanguage" to analyze the "Neo-Chinese style", a symbolic system which has complex (multiple) meanings and many symbolic codes below it, as shown in Diagram 1.

4.3. Hjelmslev's theory: "Two Planes of the Sign"

Hjelmslev proposed that the internal structure of a symbol consists of two elemental planes, namely, the "expression plane" and "content plane". The "expression plane" can be divided into two planes: "expression-form" and "expression-substance", while the "content plane" could also be divided into two planes: "content-form" and "content-substance"[3]. The internal structural layers of this theory concerning the symbolic structure analysis of Chinese traditional painting and architectural interior space applied to this research are shown in Diagrams 2 and 3.

4.4. Eco's theory: "Aesthetic Hypercoding"

In his theory of codes, Eco describes the creative text as an open message produced in uncoding or hypercoding[4]. In exploring innovative methods of Neo-Chinese interior design, Eco's "Aesthetic hypercoding" theory could be employed to establish the design process and achieve design innovation. "Hyper" here refers to the process of obtaining inspiration and information from other fields of culture, art and even science and technology outside of the architectural field and generating "open information" from them. This approach will not only engage in the process of "aesthetic hypercoding", which refers to the formation of physical images but also in forming immaterial things. The method will simultaneously participate in the encoding process of the two planes of expression plane and content plane proposed by Hjelmslev.

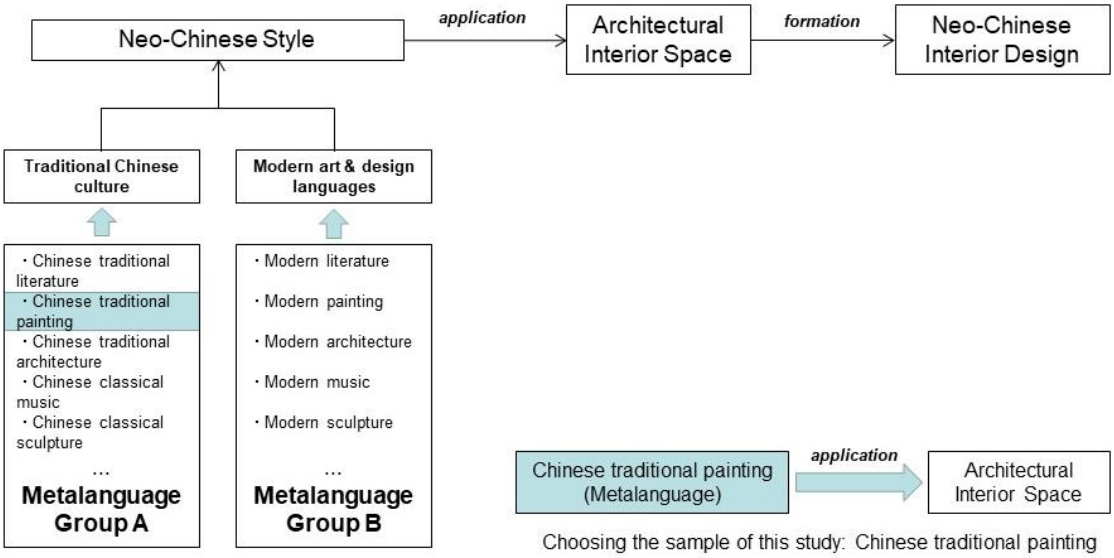

Figure 1: The metalanguage groups of Neo-Chinese style

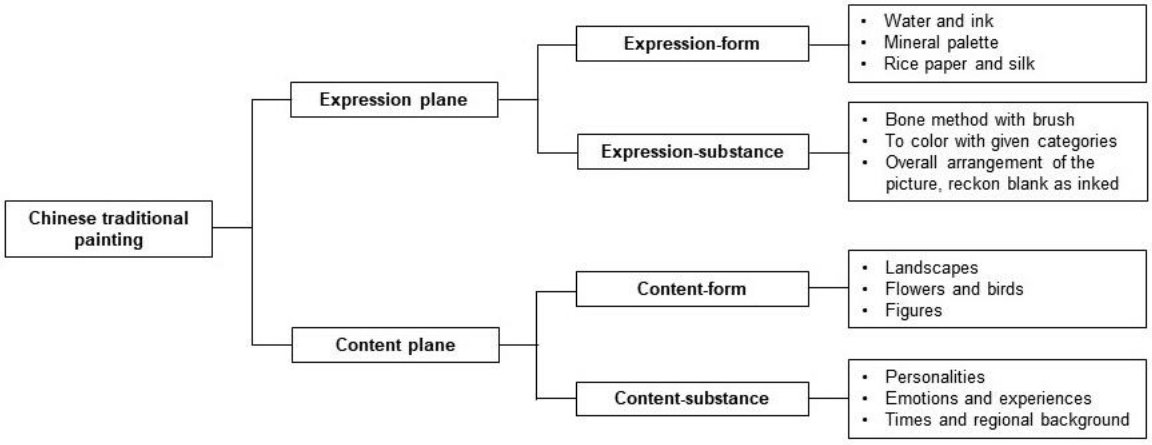

Figure 2: The two symbolic planes of Chinese traditional painting

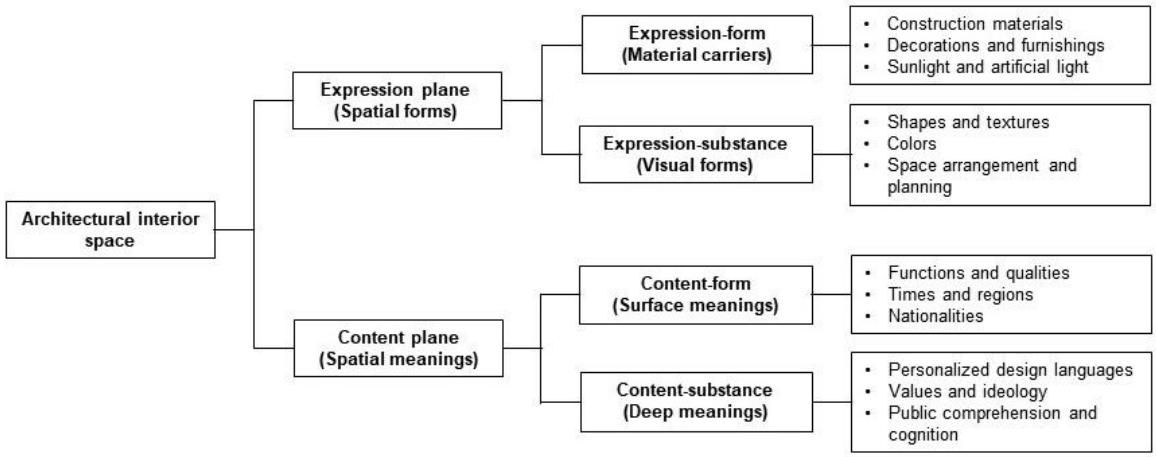

Figure 3: The two symbolic planes of architectural interior space

Semiotics is a capable theoretical instrument that would be applied to aid the process of interpreting traditional Chinese culture into modern Chinese interior designs. The approach in constructing a methodological model for Neo-Chinese interior design does not intend to make Chinese interior design stylized and dogmatic. Instead, it will make the Neo-Chinese interior designs act as a symbolic system and a narrative text that helps symbolize and sustain traditional Chinese culture into the future.

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Investigating The Influence of Gender and BMI on Thermal Sensation

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Abstract: A study about the influence of gender and BMI on thermal sensation was conducted among the students in UiTM Shah Alam that utilized PTAR. The main goals of this study were to investigate the effect of gender differences on thermal comfort, and to investigate the BMI of students and their relationship to thermal comfort. Males and females have different perspectives about thermal comfort since they have a preferred temperature at which they feel comfortable. The students that were in PTAR must complete the questionnaires that were given to them, and they needed to fill the questionnaire about their comfort and personal data. A device, HD32.3TC was used to measure the thermal sensation at Site A and Site B. The result unveiled those female respondents preferred higher temperature more and they tended to quickly feel dissatisfied with the temperature compared to male respondents. In term of BMI, respondents with highest BMI mostly preferred lower temperature more.

1. Introduction

Thermal comfort is a state of mind that expresses a person's satisfaction with their thermal comfort or surroundings [1]. It signifies that the person is at ease in their surroundings, regardless of whether they are in a warm or chilly atmosphere. When they are comfortable with a certain temperature, they would not mind sitting at the temperature. In general, heat can alter the environment to ensure the comfort of the people.

The impact of gender on thermal comfort has not been consistently identified. Both males and females have different opinions about thermal comfort. At both high temperature extremes, the study showed that females are more dissatisfied with the room temperatures than males [2]. Males preferred chilly and swift airflow, whilst females preferred warm and sluggish airflow [3].

Thermal comfort and BMI can be remotely related but there is no significant impact that can be found in this study. We can identify which category of BMI is feeling more discomfort which is overweight people. Lipczynska et al., [4] stated that they feel uncomfortable at high temperature, so they prefer low temperature to live in as this kind of temperature gives them comfort.

2. Methodology

2.1 The study area

This study was conducted at one of the public universities in Malaysia, Universiti Teknologi MARA (UiTM) located in Shah Alam. The air-conditioned building chosen for this study was at PTAR, where the students were evaluated and with this, the objectives were fulfilled. It was chosen because of its air-conditioned ventilation, which was ideal for thermal comfort research, and most of the students spent their time at PTAR. The first area, referred to as Site A, was classified as Level 4, while the second area, referred to as Site B, classified as Level 5 in the PTAR. This study was conducted for three consecutive days at each site.

2.2 Sample collection

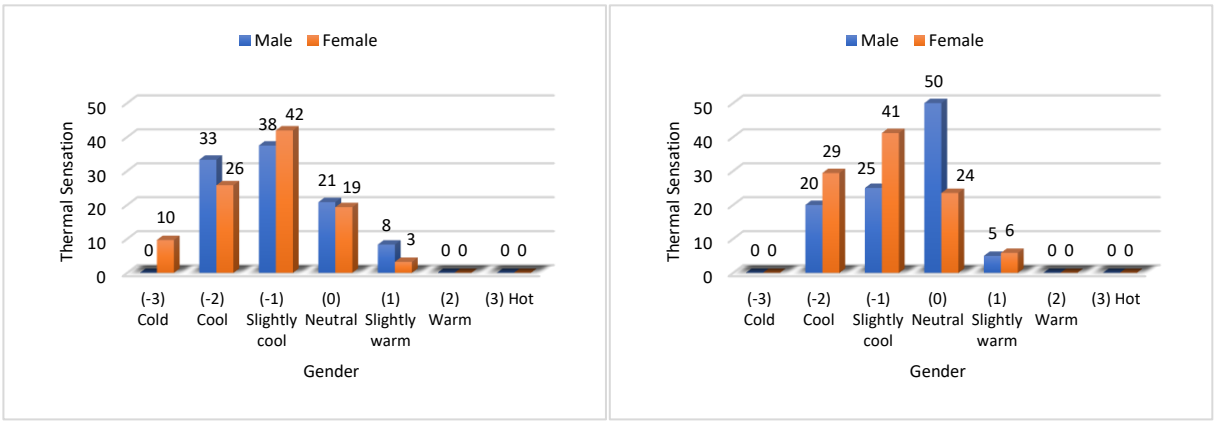
The samples chosen were students who utilized the PTAR and their responses towards thermal comfort were recorded via the questionnaire being contributed to them in a Google Form. At the site study, we met the students face to face and asked them to participate in the questionnaire. Both male and female respondents were needed to fill the information about thermal comfort sensation and their personal data like gender, height, weight, and BMI.

3. Findings

3.1 Thermal sensation on gender

There was a total of 129 respondents including males and females who participated in the questionnaire, with the percentage of 49% for male respondents and 51% for female respondents. As categorized by sites, male respondents in Site A were 44% (23 respondents) and female respondents were 56% (32 respondents). For Site B, male respondents were 54% (40 respondents) and female respondents were 46% (34 respondents).

From the analysis, it was discovered that female respondents tended to be more dissatisfied with the temperature in the PTAR (presumably at a particular area or environment), as they favoured warmer temperatures over cooler ones. The data, shown in Figure 1 (a), explained that most female and male respondents at Site A reported feeling slightly cool, with the percentage of 42% and 38%. To compare the dissatisfaction between these two genders, females were the only one who voted cold for thermal sensation at 10% while male either voted for cool or neutral with 33 % and 21%, respectively. At (b), respondents who identified as female were more likely to report they felt cool and slightly cool, with 29% and 41%, respectively, whereas respondents who identified as male were more likely to say they felt neutral, at 50% which was the highest percentage for male respondents in Site B.



(a) Site A (b) Site B

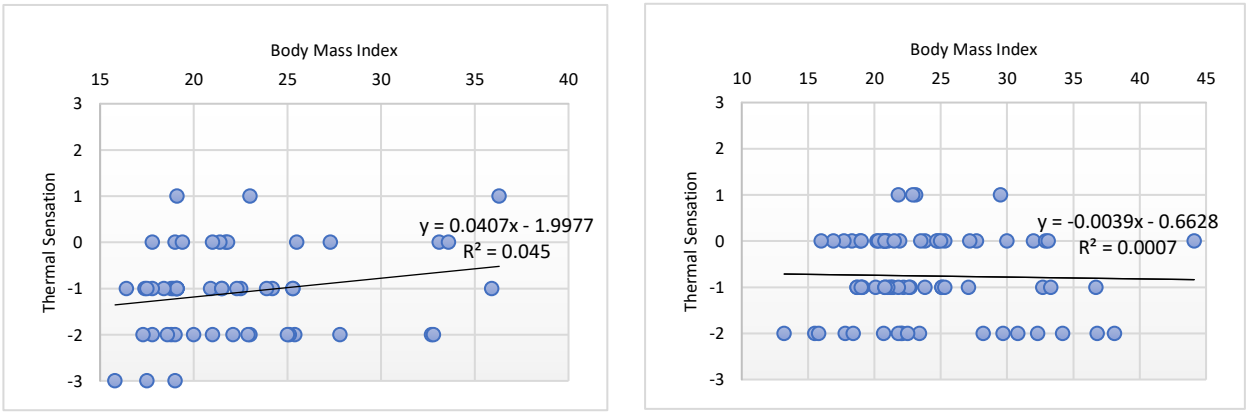
Figure 1: Thermal sensation of male and female respondents

Abdulrahman and Mohammed [5] stated that males generally preferred lower room temperatures than females did. This suggested that body size and fat-to-muscle ratios can be the reason to the differences of preference between these two genders. Females tended to experience discomfort from both cold and hot temperature more frequently than male did. This explained why majority of female respondents who participated in the survey voted cold, cool, and slightly cool thermal sensation since they have a stronger preference for cooler temperatures in indoor environments. It was important to note that females seem to have a stronger need to adjust the temperature to their own comfort level compared to males.

The results of this study showed that females respondents tended to perceive the temperature as colder than males in particular location, even though both genders reported having a similar temperature setting at two different sites. In this study, female respondents preferred to wear more heavily insulated clothing with an average value of 0.66 clo compared to male respondents who wore less clothing insulation on average, with a value of 0.54 clo.

3.2 Thermal sensation on BMI

The number of respondents in this study mostly have a normal BMI group which was between 18.5 to 24.9. From figure 2 shown, trend of changes in thermal sensation were plotted based on the BMI of the respondents with the rise of BMI. The linear regression showed that in Figure 2 (a), only 4.5% of the BMI contributed to thermal sensation while at (b), the contribution was only 0.7%. This showed that the contribution at both Site A and Site B were not strong enough.



(a) Site A (b) Site B

Figure 2: Thermal sensation in the function of body mass index for all respondents

Obese and extremely obese BMI groups' respondents generally did not show a clear preference for any specific temperature in air-conditioned building, but they tended to feel more comfortable in a slightly cool environment. Some research on the BMI indicated that occupants with higher BMI groups may prefer cooler temperatures more when doing indoor activities [6].

4. Conclusion

Thermal comfort is essential when designing and operating the air-conditioned building like PTAR. Maintaining a suitable level of comfort for students is crucial for ensuring their productivity and comfort. By prioritizing thermal comfort first, PTAR can make the students feel welcome and comfortable, which may ultimately result in more usage and satisfaction not only among the students but also to the staffs.

In the study of thermal sensation, the result showed that gender and BMI can be the factors on the comfort and discomfort towards cold and hot temperatures. Females are more likely to feel dissatisfied with lower temperature compared to males as females have lower skin temperature. In BMI study, there is no significant impact of BMI that can be found on thermal sensation but through this study, it showed that people with higher BMI tend to have some problem with the temperature.

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Mall walking circuit: Elevated walkway to improve walkability in Kuala Lumpur

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Abstract. Walking is a sustainable mode of transportation that has numerous health benefits. However, modern built infrastructure has marginalized walking and encouraged car dependency. To overcome this trend, designers can learn from the principles of mall design, which can encourage people to walk, and create a walkable built environment. To understand the walkability elements suitable for Kuala Lumpur, this project examines the principles of mall design and conducts a spatial analysis using space syntax. The decision to walk is measured by considering the walking purpose, path condition, and spatial attributes. This project implements human spatial behaviour by using space syntax spatial analysis tools. The proposed mall walking circuit connects eleven shopping centres, creating an elevated walking path that offers a shorter travel distance, better visual experience with city views, and comfortable weather conditions. The implications of this project are significant, as it can improve walking behaviour and enhance the vitality of shopping centres by attracting visitors and pedestrians. This project highlights the importance of designing a built environment that prioritizes walkability and encourages sustainable transportation modes. By providing a walkable infrastructure, we can create a more sustainable, healthier, and vibrant community. This study can serve as a model for future urban planning and design, providing insights on how to create a more walkable city that promotes public health and sustainable transportation.

1. Introduction

Research and media have highlighted the health benefits of walking, yet many people still choose to be sedentary. Walking for at least 2 hours per week can reduce premature deaths by up to 54% [1]. However, the average number of steps taken by Malaysians daily is 3,963, which is below the global average of 5,000 steps [2]. This sedentary behavior is evident in the number of cars, which outnumber the population at 32.8 million [3]. This car-dependent culture is not only degrading our health but also polluting the environment by releasing more carbon dioxide. We need to encourage our community to walk, bike, and use public transportation.

Interestingly, there is one place where people like to walk for long periods - the mall. Mall walking is a public health exercise that people of all ages can perform, and it has been successful in getting people to walk. The success story of mall walking can be the key to generating a successful walking path.

The proposal for the Mall-walking Circuit took place on the Tiongnam or Chow Kit site in Kuala Lumpur, Malaysia. The site has eleven shopping centers and the potential to serve as the central area of the shopping district. However, people primarily come to this site for shopping, making walking an issue. To solve this problem, the designer proposed connecting all the malls with bridges as walking routes. Together, the bridges and all corridors inside the malls will become the mall walking circuit. To ensure the mall-walking circuit is successful, the designer first needs to answer what motivates people to walk.

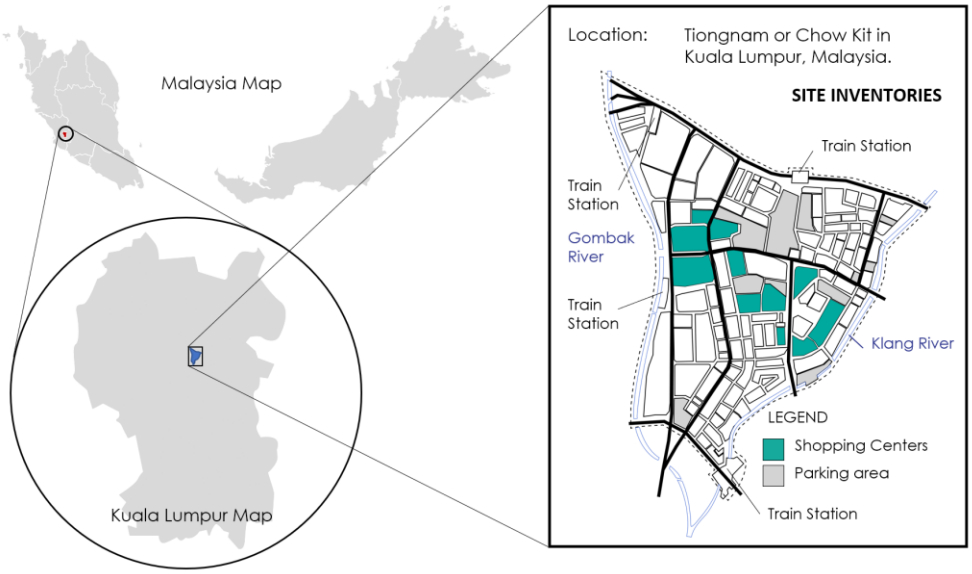

Figure 1: Location and site inventory

2. What makes people walk

To encourage walking, a place must provide attraction, comfort, safety, and ease of walking, as observed in general. Conversely, reasons such as falling, uncomfortable weather, poor sidewalk conditions, dangerous traffic, and crime discourage people from walking. The willingness to walk is affected by various factors including gender, nationality, marital status, current walking distance, current walking time, availability of safe and accessible pedestrian walkways, types of trips, and trip purpose [4]. The reasons *what makes people walk* can be narrowed down to three main elements - purpose, path conditions, and spatial attributes (refer to Diagram 1). Given that malls are considered a best practice for promoting walking, it is essential to examine how these three elements are incorporated in mall design.

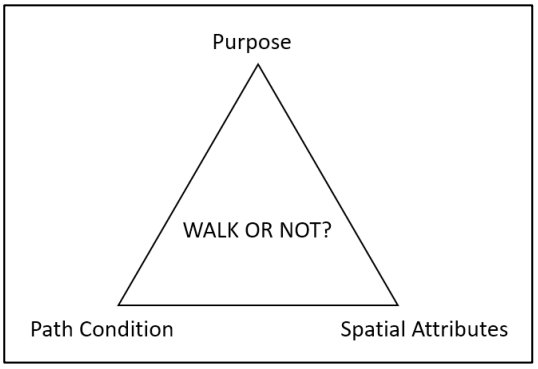

Figure 2: The elements that affect the decision to walk

2.1.

2.2. The purpose of walking

People choose malls for safety, socializing, convenience, and variety of activities [5]. Teenagers see malls as a way to escape confinement at home [5], while the elderly appreciate the accessibility and affordability. Although malls are primarily for shopping, social interaction is a major reason why most people visit them. Motivated by that, this project injects several program to encourage walking in Chow Kit area (see Figure 3).

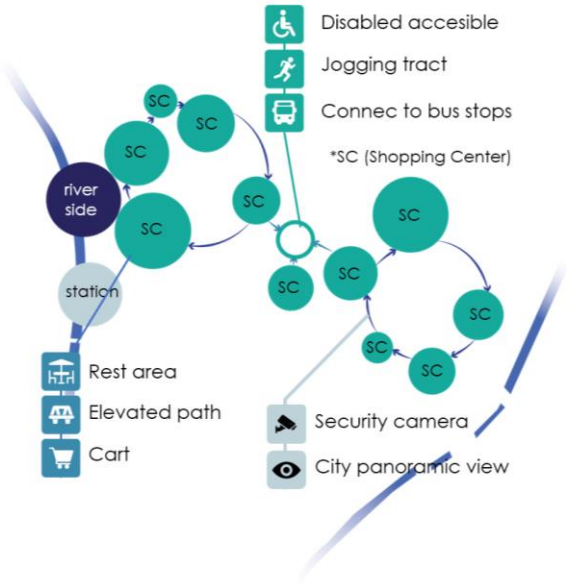

Figure 3: Project's Program

2.3.

2.4. The comfortability of walking

According to Lo (2009), walkability is determined by sidewalk continuity, accessibility of public facilities, visual interest, and perceived security [6]. Naderi and Raman (2005) found that weather, sound, water, light, and edge of space also affect walking decisions [7]. Krambeck & Shah (2006) identified three components of the global walkability index: safety, convenience, and policy support [8]. Overall, walking comfort consists of physical path conditions, sensory comfort, and safety, which also apply to malls through factors such as architecture, infrastructure, and services. Responding to that needs, the mall walking design provide an indoor type walking path with utilities (See Figure 4).

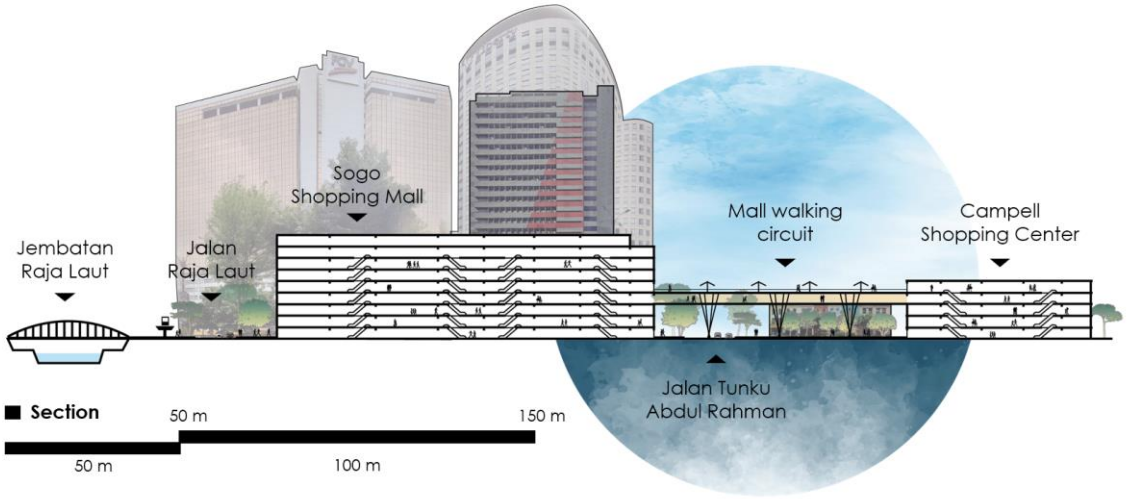

Figure 4: Section of the project

2.5. Spatial attributes in the mathematics of walking

How do spatial characteristics affect walking? Accessibility, directness, and distances are key factors influencing pedestrian perception and decision to walk. Studies by Fonseca et al. (2022) and Lo (2009) emphasize the importance of easy access and directness of walking paths to key destinations[6], [9]. Additionally, Major and Dalton (2018) found that cities with smaller blocks have higher walkability[10]. Space syntax provides a mathematical approach to analyze and measure these spatial attributes for designers to ensure their designs accommodate natural movement (see Figure 5).

Figure 5: Spatial analysis of Chow Kit area by using space syntax

3. Discussion: Manifesting the Walkability Elements

The key to making a successful mall walking circuit is three elements that will make people walk. Those elements are creating purpose, adjusting the path condition, and arranging the spatial attributes. This project implements the walkability element in Figure 6. Those are all the key factors that should be considered and followed to make the mall walking which is also already applied to the proposal of the Mall-walking Circuit of Tiongnam or Chow Kit in Kuala Lumpur, Malaysia.

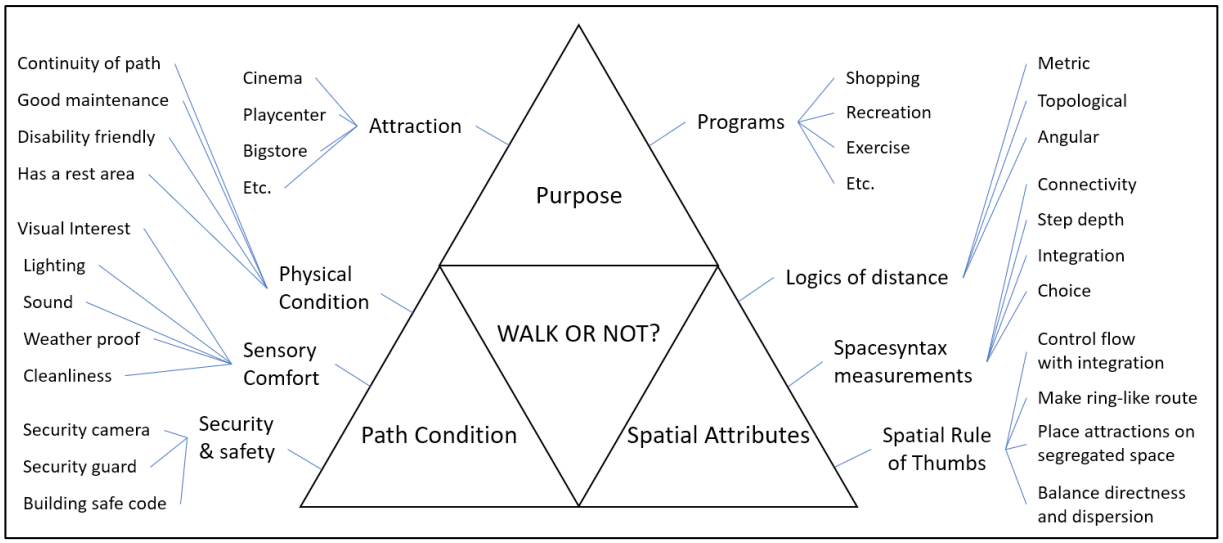

Figure 6: The keys factor of successful mall-walking circuit design

Most of the places in Kuala Lumpur city is the single-access environment for pedestrians. Therefore, this project elevates the walking path to the highest level of all eleven shopping centers, which is level fourth. The mall walking circuit can generate better income for the connected mall by vitalising the top level. It is because this level is hard to get more visitors due to the single-layer access located on the ground level. On this level, pedestrians have a magnificent view of the city. The circuit provides a comfortable environment by creating a weatherproof shell, rest area, and other utilities. The course manifested in a circular path because it makes the best pedestrian flows by the spatial character of human movement. Nevertheless, the designer adds sustainability to the design by implementing green space and green energy sources.

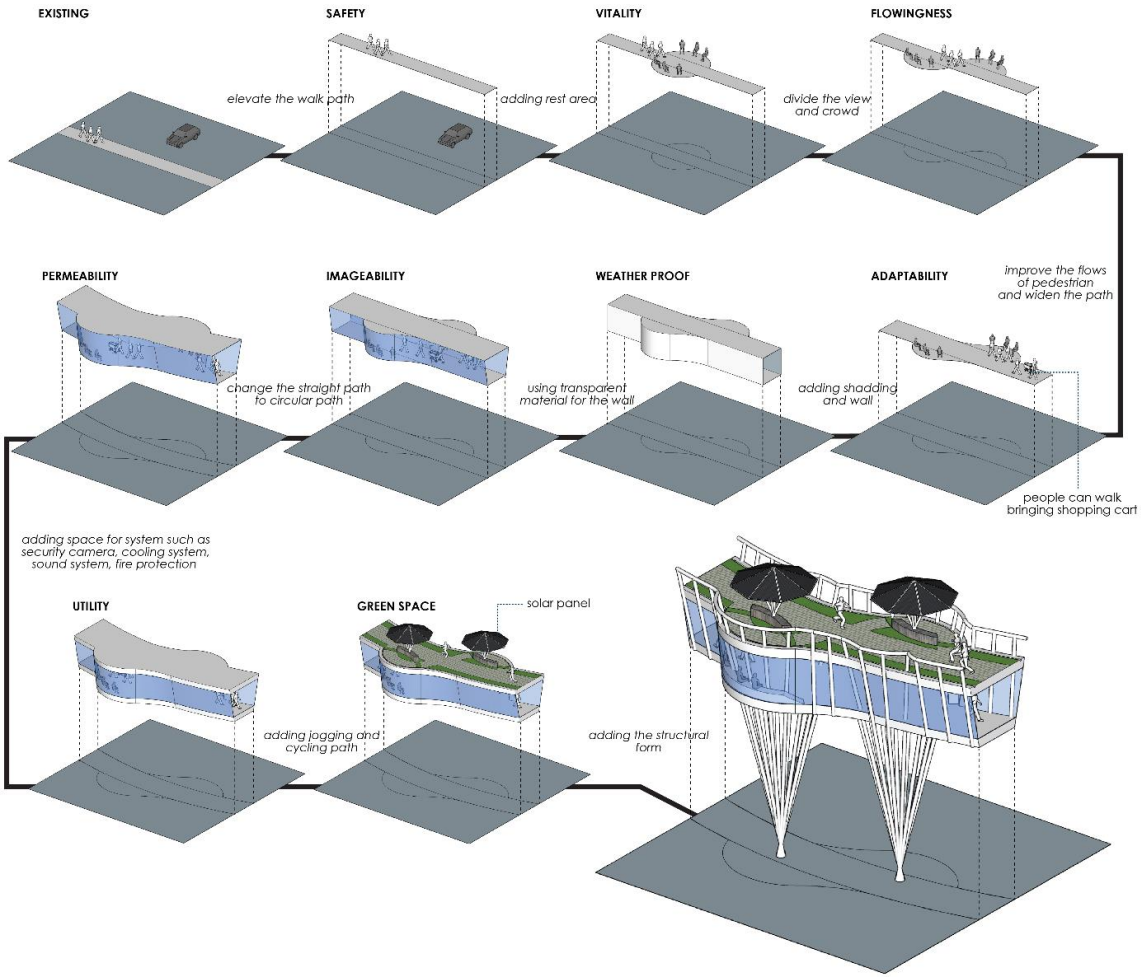

Figure 5: The design approach of the Mall Walking Circuit

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Mangifera Indica Disease for Smart Agriculture Monitoring

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Abstract. According to the Department of Statistics Malaysia (2021), Per Capita Consumption (PCC) of mango and Self Sufficiency Ratio (SSR), is 1.8 kg/year and 20.2% respectively. The reports indicate that mango production in Malaysia is insufficient to fulfil the local demand. Among the most significant variables associated with harumanis production losses are pest and agricultural disease, which has a substantial impact on the quality and quantity of the output. For that reason, there is a demand for an effective and reliable technology to solve this issue automatically, accurately, and efficiently. A smarter approach is necessary to allow for more cost-effective husbandry of harumanis crops without compromising the quality of its yield. Thus, this research aims to model the disease identification and spot application of pesticides to the harumanis crops using geospatial and machine learning approaches. This study expands the potential of multispectral drone technology in plantation by leveraging object-based image analysis (OBIA) for aerial imagery. With the advancement of the proposed system, this project could provide an early assessment of the disease related to harumanis so that the affected area can be treated instantaneously.

1. Introduction

Mangifera indica Linn. or harumanis is one of the most popular clones of mango in Malaysia, which was registered as MA128 by the Department of Agriculture (DOA), Malaysia (DOA, 2022). Indonesia was acknowledged to be the origin of this variety and has been cultivated in Malaysia since it was first registered by DOA in 1971 (DOA, 2022; Sani et al., 2018). According to DOA, the harumanis fruit is elongated with a prominent tip, weighing between 300 and 600 grams on average, and the skin is green, slightly shiny and turns yellowish-green when ripe. The flesh of this cultivar is fibrous-free, sweet and juicy with a pleasant aroma making the fruit ideal for export purposes (Sani et al., 2018).

Harumanis has a high commercial demand and is quickly expanding especially in Malaysia's northern state of Perlis. Due to the Perlis land's uniqueness, Harumanis has grown to be recognized as the greatest Perlis variety supplied to the rest of the world (Uda et al., 2020). Perlis has the largest planting area for all mango varieties in the year 2020 about 1465 ha producing 2121 metric tons of mangoes. However, the production is third on the list after Sabah and Perak (Statistik Tanaman, 2021).

In addition to that, the current conventional farming of mango is threatened by insidious fruit rot disorder, pest and disease attacks besides being labour intensive, especially during pesticide application, thereby causing an increase in the production cost (Sani et al., 2018). The gap between supply and demand requires a pragmatic shift from conventional farming to smart farming for sustainable mango production through the Industrial Revolution 4.0 (Sumberg & Giller, 2022).

Manually taking care of harumanis crops can be laborious. The wider the area, the more challenging it is. Two major concerns relating to harumanis husbandry are the health of the crops and the effective way to apply pesticides on sick crops. The typical labor-intensive method primarily involves physically checking each harumanis to inspect and decide on its condition and the disease symptoms are generally found later in the disease's progression. This requires not only much manpower and infrastructure but

also many hours spent. Adding to the challenge is the need for trained and experienced manpower capable of correctly assessing the crops' condition.

Considering the issues, therefore, this project determines to focus on increasing the productivity and competitiveness of the sector, particularly for harumanis mango in Perlis, Malaysia. By optimizing the inputs such as the water quality, type of fertilizer and pesticides used as well as the tools and equipment, the agricultural yields can be maximized. Furthermore, the advancement of modern technology using an unmanned aerial vehicle (UAV) with various types of sensors can benefit a huge revolution of the existing agricultural process towards farming systems. Thence, this study aimed to model machine learning for precision agriculture that focuses on early disease identification on the harumanis crops and spot application of pesticides to the sick crops.

2. Methodology

This study will take place at the Plantation Unit, Universiti Teknologi MARA, Perlis and a total of 140 harumanis trees were selected. The plantation with approximately 197 acres consists of various types of crops such as paddy, and jatropha and one of the prominent plantations is harumanis mango (about 2.63 hectares). The precise location of the data gathered is between a longitude of 100°16'30.27318"E and a latitude of 6°26'44.50584"N. The average day temperature of this area ranges from 30°C to 33°C while it falls from 24°C to 26°C during night-time with a rainfall of about 1952 mm per year. There are approximately 300 mango trees in the plot that are between 7 to 12 years old. Figure 1.0 depicts the experimental plot where this study will be conducted.

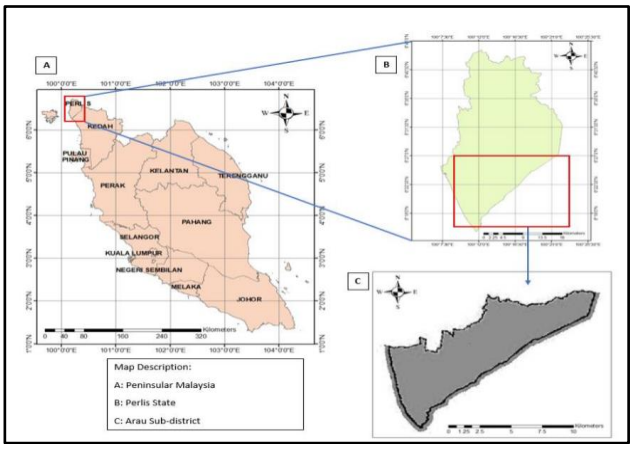

Figure 4: The study area at UiTM Perlis
Map of Peninsular Malaysia; B.) Map of Arau District; C.) Map of the study area, UiTM Perlis

The development of the project will be carried out in corresponding with the proposed methodology, consisting of three phases altogether (as shown in Figure 2.0). All these phases serve as guides for project development ensuring that the objective is met. There are five different types of raw data will be collected, which are a sampling of harumanis leaves, weather data, field data, aerial images from UAV multispectral as well as pesticides and fertilizer data. Each data will undergo different processing techniques before it can be subjected to correlation analysis. Among all the factors considered, the identification of the most important variables for model development will be evaluated. The relationship between extracted features (colour, texture and size), weather data, field data, Crown Projection Area (CPA), pesticides and fertilizer will be assessed prior to model development using Pearson's correlation coefficient. From the master dataset involving 140 trees, 70% of the data will be used to train the model and 30% for validation. This regression model will be evaluated against its overall accuracy, Root Mean Squared Error (RMSE), Mean Absolute Error (MAE), Mean Squared Error (MSE) and Coefficients of determination (R^2).

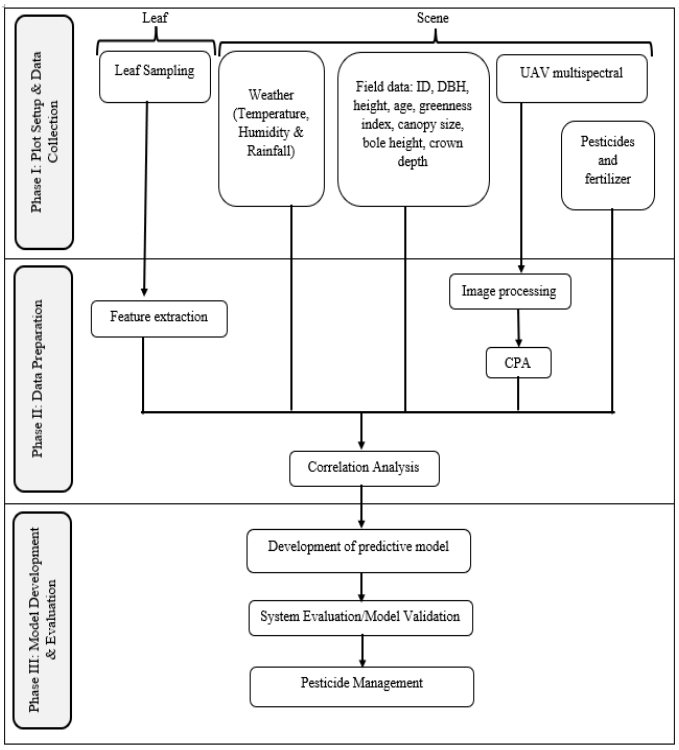

Figure 5: An overview of the methodology

2.1. Preliminary Results

Figure 3(B) shows the image obtained from UAV multispectral that was flown at Plantation Unit, UiTM Perlis. Using the watershed algorithm, the UAV multispectral image of the harumanis plantation in UITM Perlis has been meaningfully segmented. A map has been created to show the individual tree crown in the study area, as shown in Figure 3(B), where the orange border denotes the projection area for the individual tree crown and the yellow dot marks the tree ID. The aerial image is first divided into a few categories, including shadow, tree crown, bare soil and grass, but all of them were masked off except for the tree crown to create the tree crown map. This result will be further analyzed for correlation analysis.

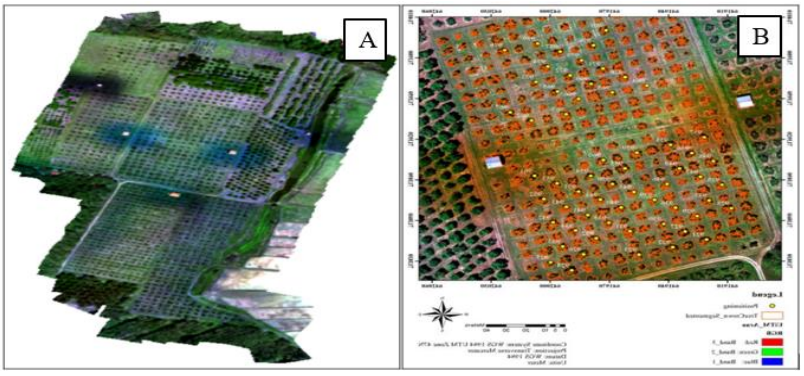

Figure 6: A.) UAV multispectral image B.) Segmented tree crown

3. Conclusion

This project will ensure the crops' productivity can be maximized, in line with Malaysia National Agro-Food Policy 2011-2020. Expected findings include an assisted technology that could assist the

farmers to detect diseases earlier. Thence, farmers will be able to protect their crop until it is harvested, reducing economic losses, at the same time, increasing the quantity and quality of the yield. Moreover, the early assessment would assist the farmers to plan and advise the optimum usage of pesticides for disease management in the harumanis plantation, simultaneously helping the environment by reducing waste from excess input applications. This project is also relevant to the Sustainable Development Goals (SDGs) of the United Nations, under the 15th item, which is Life on Land and also the 2nd item, Zero Hunger.

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Cultural Sustainability in Regard to National Architectural Identity in The City of Kuala Lumpur

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Abstract. Our local architecture scene is heavily influenced by the myriad of cultures and ethics that have come together due to colonisation and trade. Therein lies the question, "What defines Malaysian architecture?". This question has been debated and discussed extensively by creatives within the architectural scene, though different approaches and deductions have also been made over the past several decades. We must understand how architecture significantly affects and contributes to society as it heavily influences our thought process. This research highlights the importance and value of Malaysian architectural identity and spirit towards the community. The data collection method was done through an observative case study and an autoethnography conducted at three cultural enclaves within the urban vicinity of Kuala Lumpur. The data was collected and analysed thoroughly by a comparative analysis method. Our country has lost its national architectural language due to advancements and fundamental changes, particularly in the last two decades due to increased urbanisation worldwide. The three cultural enclaves in the centre of Kuala Lumpur have shaped our national architectural identity by expressing unique yet necessary architectural aspects. In essence, the search for an architectural identity is a multifaceted phenomenon that we should try to pursue.

1. Research Background

Human civilisation has grown and survived throughout history by integrating with the surrounding environment and relying on preserving nature. Every area and region evolved distinct features that separated it from other places over time and via the multifarious interplay of evolution and human adaption to the ambient environment, which is the essence of "identity." [1] A national architectural identity is imperative in urban society as it often signifies their particular stature in the global community. Preservation and conservation of a place's individuality and unique traits necessitate a thorough grasp of the natural systems in existence and absorption in time-tested cultural reactions to the assets and liabilities of that environment, which are the essence of sustainability. Sustainability and conservation are not merely constricted to the tangibility of a building, but also the intangibility of the values and traditions of the community brings. National architectural identity is composed of defiant factors such as ideas, effects and functionality, which are the coherent result of the cultures in their surrounding context. Nevertheless, these notions of identity become problematic when projecting sociological and post-structural concepts on the cultural creation and historical shift of meaning onto the architecture set. As shown in Figure 1, [2] defines the main principles of an Architectural Identity into seven categories which are as follows:

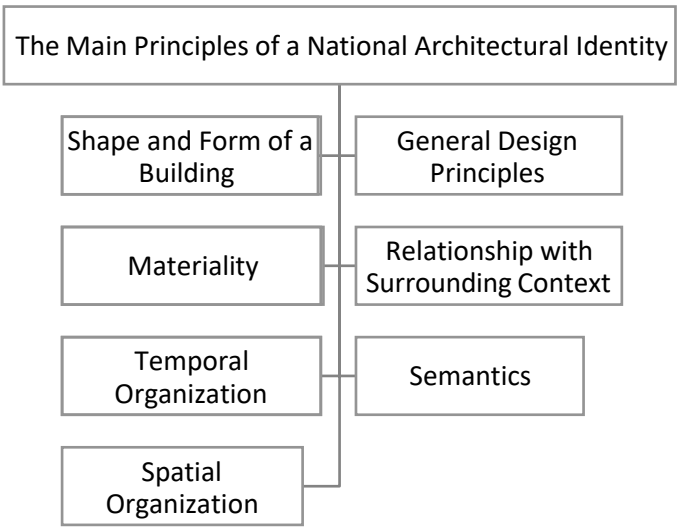

Figure 1: The Main Principles of an Architectural Identity, Source: [2]

2. Malaysian Architectural Forms and their Influencing Styles

The rich storyline of our local architectural scene is one of the greatest stories to share. Before World War II, European architecture had made its way through Malaya and had influenced our architectural language, primarily in Kuala Lumpur, Perak, Penang and Malacca. [3] assessed and identified the architectural building styles into seven categories;

i. Indian Kingdoms (7th – 14th Centuries)
ii. Malay Vernacular (pre-15th Century to present)
iii. Straits Eclectic (15th Century to mid-20th Century)
iv. Chinese Baroque *19th Century to early 20th Century)
v. Chitya Indian Vernacular (15th Century to Mid-20th Century)
vi. Colonial (17th Century to mid-20th Century)
vii. Modernist (1950s – 1980s)

The styles were adapted to the tropical climate and amalgamated with Malay, Classical Portuguese, Dutch, English, and Chinese architectural influences. When Chinese merchants settled in the Malacca Straits Settlement in the 15th Century, they brought the Straits Eclectic styles. The variation of styles is widespread across these states and birthed characteristic features to urban architecture, such as terraced houses and shophouses. Following the Heritage of Malaysia Trust in 1990, several building periods have been distinguished within the general architectural style, which is as follows;

i. Kuala Lumpur Shophouses
ii. Malacca Town Houses
iii. The Villas in Kuala Lumpur

3. Research Methodology

This study encompasses the fundamental means and method of data collection research, whose purpose is to serve the main objectives of this research. This research process will involve a case study methodological approach and an autoethnography. The study delves into several sub-categories to better comprehend the subject matter. A case study methodological approach and an autoethnography were used to obtain the findings necessary for analysis and tabulation. These variables are then analysed to obtain illustrative qualitative data.

3.1 Case Study through Field Observation

This research chosed case studies within the urban vicinity of Kuala Lumpur, particularly in Kampung Baru, the Malay enclave of Kuala Lumpur, Chinatown of Petaling Street and Little India in Brickfields. The regions of choice were selected due to their historical significance in influencing the national identity of Malaysia in the urban setting of Kuala Lumpur. This qualitative methodological approach will provide a deeper understanding of how the multiplex of cultures has shaped Malaysia's identity, which will gradually evolve.

3.2 Autoethnography

Autoethnography is a qualitative analysis method in which the researcher summarises the material to be analysed using self-reflection and personal experience. The strategy aids in a better understanding of how Malaysia's identity has been moulded by multiple cultures, which will continue to evolve.

4. Research Findings and Conclusion

The material obtained in this study was collected through a case study based on observation within the urban vicinity of Kuala Lumpur, distinctly in the regions of Kampung Baru, the Malay enclave of Kuala Lumpur, Chinatown of Petaling Street and Little India in Brickfields. A comparison to the initial data and knowledge gained from the literature reviews was included in the post-data collection stage, alongside its comparison to the reference. The data was then compiled and tabulated based on the numerous tangible and intangible aspects of Malaysian architectural identity available within the urban context.

4.1 Chinatown

In a previous life, the British colonial authorities relocated tin mining workers, mainly from the Chinese community, to Jalan Sultan as part of the 1884 rebuilding plan. Along this street, as well as the two main thoroughfares running north and south, Jalan Bandar and Jalan Petaling, shophouses were built, forming the Chinatown neighbourhood, which is advantageously placed near the Klang River in the Kuala Lumpur City Centre [4]. The shophouses in Chinatown were built in an architectural style that significantly differs from the colonial buildings that are built on the opposite side of the Klang River. Shophouses along Jalan Sultan have stood for decades, seeing Malaysia's independence and the growth of Kuala Lumpur as the federal capital. [5] imposed that the shophouses in Chinatown are so distinctive that they are closely identified with the Chinese, symbolising the Chinese way of life and the 'race' itself. Even though construction bylaws were in effect, the British did not govern design style. Therefore Chinese builders built spaces and facades mainly in the Chinese style. As a result, the shophouse architecture is visually historic and must be preserved as it influences our national architectural identity. The 'five-foot path' (walkway in front of the shophouses) or '*kaki lima'*, ornamental façade, and decorative windows are all standard features of Chinese shophouses.

4.2 Kampung Baru

In the 1900s, some land reservations had been turned into urban settlements within the city limits, the largest of which is Kampung Baru, allocated near the city centre. A few Malay villages on the outskirts of former tin mines have formed the heart of modern squatter colonies in the Klang Valley, as seen in Figure 4. The tin mining industry, which was responsible for the early development of Kuala Lumpur, intensively worked over alluvial valleys in the basin in which Kuala Lumpur is located. Nonetheless, many small Chinese mining and commercial settlements were swallowed up as Kuala Lumpur grew from a small town of under a hundred thousand people in the 1920s to a developing mega-city of 2.5 million in the 1980s. When discussing the mannerism of Kampung Baru, it usually entails the substantial disparity that can be seen between the rich and poor. When 'rural' incomes rise, they result from transitory absentees employed in cities. In the face of such change, reliance on traditionally 'rural' sources of income

may be declining. A dual perspective is as imperative in planning as it is in research because archaic solutions will not work in regions that are already predominantly 'urban, nor are the difficulties solely urban planning issues because most of the land is still used for rural purposes or at least retains a rural component. [6]

4.3 Little India, Brickfields

Like Chinatown and Kampung Baru, the government had allocated Brickfields as the Indian Enclave of Kuala Lumpur. Brickfields is an area that was established using a combination of British colonial power, Chinese wealth and efforts, and emigrant labour from South India. Brickfields' storey is not only that of a self-contained community; the region has always been a part of many processes, schemes, and conflicts. Due to a financial initiative established by Yap Ah Loy, Brickfields emerged as a distinct zone within Kuala Lumpur. Yap sought other work for miners after the tin market collapsed in 1876 [7]. As a result, he has worked on several projects, including completing the unfinished Damansara road and fabricating bricks planned for export to Singapore. Due to the unacceptably high shipping cost to Singapore at the time, this idea failed as an export-oriented venture. However, the area became known as "Brickfields," the presence of fifteen brick chambers in the region by 1886 allowed Swettenham to begin his ambitious reconstruction of Kuala Lumpur's whole town in the 1880s [8].

4.4 Comparative Analysis and Autoethnography Review

Table 1 shows the comparative analysis of the case studies. The analysis of typology, materials, spatial organisation, building elements, people, spaces and social activities was tabulated and analysed. The differences between these three typologies are significant, which carries its identity for cultural sustainability.

Table 1: Title of the table

Name of Attributes	Chinatown	Kampung Baru	Little India
			
Typology	Shophouse	Dwelling	Mosque
Years	1870s	1900s	1900s
Architectural Style	Sino-eclectic	Traditional Malay	Mughal Architecture
Materiality	• Timber • Brick walls	• Timber • Brick • Zinc roofing	• Brick • Glass
Spatial Organization	Linear	Clustered	Radial
Building Elements	• Column shafts and capitals • Parapet wall • Louvre shutters • Decorative transoms • Canopy roofs	• Roof – Pitch • Long Window • Gable End • On stilts	• Heavy ornamentation • Bright colours
People	Predominantly Chinese	Predominantly Malay	Predominantly Indian
Spaces	• Rooms • Second hall/Dining • Terrace • Verandah	• *Serambi* • *Rumah Ibu* • *Anjung* • Kitchen • *Pelantar*	• Prayer hall • Ablution area • Dining hall
Social Activities	• Sales of goods • Cooking • Resting	• Cooking • Socializing • Resting	• Praying • Eating • Interacting


Figure 3: China Town


Figure 4: Kampung Baru

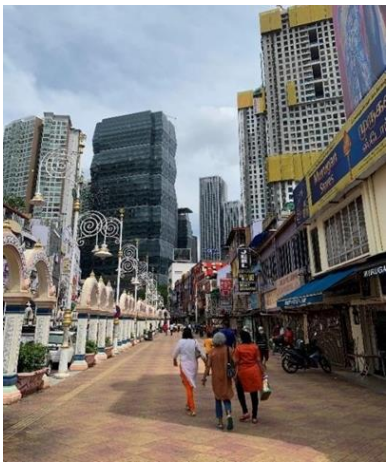
Figure 5: Brickfields

An architectural promenade along Petaling Street. The promenade is covered to provide shade to pedestrians as they walk. The tiered roofing provided ample airflow throughout the path. This iteration of the traditional Malay house found in Kampung Baru can be seen more in rural areas but can be seen in a city. The promenade along Jalan Tun Sambanthan gives the users a sense of direction with the Indian architecture style shop lots. The sporadic amalgamation of cultures in Malaysia birthed unique architectural types regarding the urban community. Hence, it developed the symbiotic relationship between building and context, quintessential as it frames the narrative of the spaces we inhabit or chooses to inhabit. Locality or localisation is a relatively constant variable in a complex breakdown of identities. The initiative of this paper was to understand the meaning of cultural sustainability regarding national architectural identity within the urban context of Kuala Lumpur. The personal and observative insight shows how culture is reflected within the architectural essence of Malaysia and how it influences our social status and ideologies. This study highlight the significance of Malaysian culture in its national architectural identity, to explore the stylistic characters of Malaysian architectural identity and its relevancy in the urban context as well, to analyse the perplexities like Malaysian culture in influencing the spirit of local architecture. To understand the cultural sustainability helps us to define what is national architectural identity within the urban context of Kuala Lumpur. These sites as per figure 3, 4 and 5 shows the ambient of the oldest cultural terrains in the city and the cultural enclaves set in the urban vicinity of Kuala Lumpur. The author found that the demeanour of the architecture of these three sites was heavily influenced by the cultures which inhabited and settled there. The multitude of cultures and ethnic backgrounds inadvertently influenced and formed our architecture. Finding the true meaning of a national architectural identity grows deeper than surface-level research; therefore, we must fully grasp the nuances that an architectural identity entails. The precarious inundation of political schemes has caused our local architectural language to be farcical and the essence of our architectural spirit to become scarce.

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Stylistic Characters of Shophouses in Bentong, Pahang

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Abstract. Shophouses shape the urban fabric of cities in Malaysia. Over the centuries, the shophouse styles in Malaysia have evolved by adopting eclectic influences and foreign technologies, causing numerous types to emerge across the different regions. However, due to a lack of understanding and appreciation of the shophouse's cultural values, many of the shophouses in Bentong, Pahang, were left unrestored. Hence, this research study investigates various shophouses' stylistic characteristics in Bentong to find their identity while increasing their heritage value. Six previous stylistic classifications of a shophouse in Malaysia were reviewed to guide the research through case studies, where direct observation and inventory classification is applied. The study applied comparative analysis to find the correlation with other shophouse styles in Malaysia to find a distinctive trait that can help Bentong to create its own identity. The findings suggest some unique features uncovered during the comparative analysis, making Bentong one step closer to achieving individuality.

1. Research Background

The shophouse is a typical urban building typology found in Southeast Asia and China, consisting of commercial use on the ground floor and residential on the top floor. It is a fundamental unit of urban structure in Malaysia. Vernacular shophouses in Malaysia have unique stylistic elements that differentiate them from the rest of the shophouses around the world due to the design revolves around its multicultural background. The syncretic nature of Malaysian culture and history in colonialism has created a unique identity for its shophouse by amalgamating different architectural elements, the result of intertwining both vernacular and foreign technologies. Consequently, the shophouse styles across various regions had also developed into variations, each having distinctive stylistic characteristics. George Town, Penang and Malacca City were successfully listed on the UNESCO World Heritage for their unique heritage identity.

This statement proves that the stylistic elements of shophouses are significant to a place's identity [1]. Rapid urbanisation has led to many shophouse demolitions without considering their potential heritage value. An article stated that 70% of buyers of George Town Penang heritage properties are reported to be Singaporeans [2]. The statement demonstrates a clear gap between Malaysia and Singapore regarding public awareness of the heritage value of shophouses. Hence, the lack of comprehension of the importance of retaining shophouses culture and the absence of appreciation for its cultural significance among Malaysians has caused difficulty in identifying stylistic characteristics of shophouses in towns like Bentong and Pahang. This issue affected the shophouse's architectural identity and will simultaneously decrease its architectural and Bentong's heritage value. Thus, this study aims to investigate the many stylistic characteristics and the origin of the shophouse in Bentong to find its architectural identity to elevate the heritage value of Bentong.

2. Shophouses

A shophouse is a building with particular architectural features typical of Southeast Asia during the colonial era. Shophouses were constructed in significant numbers between the early 20th century and the end of the 19th, and while many were destroyed during rebuilding projects in the 20th century, some have survived. They are now regarded as iconic representations of this era's architecture in Southeast Asia. During the colonisation era in Malaysia, new cultural imports were brought along, intertwining with the current culture. Both elements were absorbed in the design of the shophouse. Features such as a narrow layout and courtyard were obtained after the immigration of Chinese labourers during British colonisation. Chinese settlements soon began to spread on the Straits Settlement. Shortly after the British colonised Malaysia, new settlements were established in new cities and reached Bentong in 1889. Bentong began with early Chinese and Malay settlements scattered around Kapong after the British brought the Chinese immigrants for tin mining. Soon after, Bentong became a booming tin mining town along the Bentong River [3].

2.1 Architectural Identity and Stylistic Characters of a Building

Architectural identity is an architectural movement's identity that represents how it forms buildings, spaces and the social life it fosters. The national architectural identity represents a shared sense of place created by the community's cumulative efforts to encapsulate the meanings and way of life that make up the local culture [4]. Architectural stylistic characters are promptly found on the façade of a building and, in this context, the shophouses. The façade is the most crucial architectural component since it may transmit a building's purpose and identify the interior area it protects [5]. According to [6], the shape, craftsmanship, materials, decorative details, interior spaces, features, and surrounding environment define the building's significant character. These tangible key features are referred to as stylistic characters (SC), which include their unique personality, sense of place and time [6]. Therefore, it is essential to identify the SC of a building that gives a place value [7]. Shophouse contains historical features and stories from the past that are worth protecting for future generations to appreciate its heritage [8].

3. Research Methodology

The data were mainly collected through case study observation, comparative analysis, and literature research. Case study observations were made to understand the subject better. Photographs will be taken from each shophouse that displays a unique SC. Inventory classifications on the shophouse style will be done to classify it further, enabling the categorisation of its elements; structure, enclosure, openings, fenestration and ornamentation, as in Table 3. Then each of the features will be classified and analysed. After that, a comparative analysis is done by comparing Bentong shophouses with another region in Malaysia for its correspondence and SC.

3.1 Case Studies

The central location of the case study is set in Bentong, Pahang, Malaysia. Various selection of shophouse along Jalan Loke Yew, Jalan Ah Peng and Jalan Chui Yin is taken as the subject of this case study—only shophouses built from the 1890s, when Bentong was formed until the 1970s were included. Due to drastic technological development, newly Modern style shophouses are not included in this study as they don't reflect an appropriate style. The selected study area has a various diversity of styles. Case studies of shop houses were selected along Jalan Loke Yew, Jalan Ah Peng and Jalan Chui Tin, Bentong Pahang.

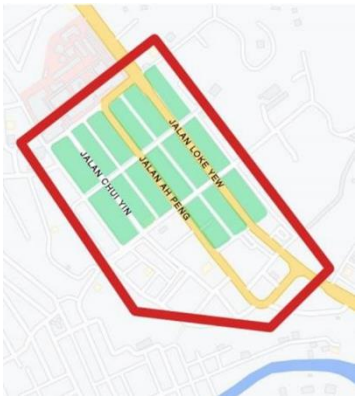


Figure 1. Selected Case Studies

3.2 Matrix Taxonomy

The matrix taxonomy is an inventory form with a specific calculation method. Its purpose is to classify and grade the architectural styles of the heritage shophouse façade based on the characters and physical condition seen on the façade. This thematic analysis categorised all architectural traits into five key groups: structural, building enclosure, opening, fenestration, and decoration. Tables 4, 5 and 6 all were grouped into 41 visual components. Later, a matrix taxonomy of architectural styles was devised to improve the current inventory and documentation approach for heritage shophouses.

4. Research Findings and Conclusion

8 types of shop houses had been cluster based on the similar stylistic characters. All six shophouses demonstrate the stylistic timeline of a shophouse in Bentong, further proving studies. It starts from a simple form with ornamentation to a grandeur facade with fine plaster works mimicking the colonial influences the British brought in. Due to its booming tin mining industry, shophouse 3 and 4 portrays Bentong's economic growth and prosperity with metal awnings and fretwork fascia, golden Greco-Roman capitals and architrave adorning the facade of its shophouse. Plenty of shophouses from Eclectic styles until Neo-Classical styles, have architrave covering only the transom light or fanlight part of the window. This unique feature of Bentong being the most architrave on shophouse from other regions covers the whole window.

Table 1: Stylistic timeline classification of shophouses 1 and 2.

Shophouse	Stylistic Timeline
 Fig. 9 Facade of shophouse 1  Fig. 10 Ground floor close-up facade of shophouse 1	Tangible Elements: Main Features / Sub-features / Characters; Traditional: Transitional, Eclectic, Neo-Classical; Modern: Art Deco, Early Modern Structure – Beam: a. Clay Brick ● ● ● b. Reinforce concrete Column: c. Clay Brick ● ● ● d. Reinforce concrete e. Free Standing column ● ● ● ● ● f. Five-foot walkway without column g. Engage column at the upper level ● ● ● ● Enclosure – Roof: h. Pitch roof ● ● ● ● ● i. Flat roof j. Greek style pediment k. High pediment l. Parapet wall External wall: m. Paint in pastel colour ● n. Paint in bright colour o. Paint in shade colour p. Shanghai plaster q. Wall tiles Opening – Door: r. Timber door ● ● ● s. Removable or folding timber panelling t. Removable or folding metal panelling Window: u. Timber shutter ● ● ● v. Casement shutter w. Glass louvres x. Concrete shading fin Air vents: y. Timber carved / ceramic slot z. Concrete slot aa. Timber or metal lattice at the ground level ● ● ● ● ● bb. Timber carved transomlight cc. Timber carved fanlight dd. Radiating bars fanlight ee. Louvres above window ff. Casement above window Fenestration: gg. 2-3 bay full length shutters ● ● ● ● hh. Large size ii. Architrave surround window frame Ornamentation: jj. Pilaster column kk. Keystone ll. Geometrical motifs mm. Natural motifs nn. Flagpoles oo. Dates Shophouse 1 with majority characters of 10 on Transitional style

Shophouse	Stylistic Timeline
 Fig. 12 Facade of shophouse 3  Fig. 13 Façade of shophouse 4	Tangible Elements: Main Features / Sub-features / Characters; Traditional: Transitional, Eclectic, Neo-Classical; Modern: Art Deco, Early Modern Structure – Beam: a. Clay Brick ● ● ● b. Reinforce concrete Column: c. Clay Brick ● ● ● d. Reinforce concrete e. Free Standing column ● ● ● ● ● f. Five-foot walkway without column g. Engage column at the upper level ● ● ● ● Enclosure – Roof: h. Pitch roof ● ● ● ● ● i. Flat roof j. Greek style pediment k. High pediment l. Parapet wall External wall: m. Paint in pastel colour ● ● n. Paint in bright colour o. Paint in shade colour p. Shanghai plaster q. Wall tiles Opening – Door: r. Timber door s. Removable or folding timber panelling ● ● ● t. Removable or folding metal panelling Window: u. Timber shutter ● ● ● v. Casement shutter w. Glass louvres x. Concrete shading fin Air vents: y. Timber carved / ceramic slot z. Concrete slot aa. Timber or metal lattice at the ground level ● ● ● ● ● bb. Timber carved transomlight cc. Timber carved fanlight ● dd. Radiating bars fanlight ● ee. Louvres above window ff. Casement above window Fenestration: gg. 2-3 bay full length shutters ● ● ● ● hh. Large size ii. Architrave surround window frame ● ● ● Ornamentation: jj. Pilaster column kk. Keystone ll. Geometrical motifs mm. Natural motifs nn. Flagpoles oo. Dates Shophouse 3 and 4 with majority characters of 12 on Eclectic style

Table 2: Stylistic timeline classification of shophouses 3 and 4.

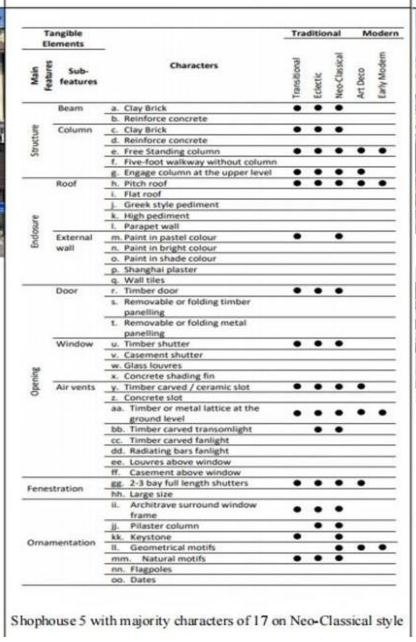
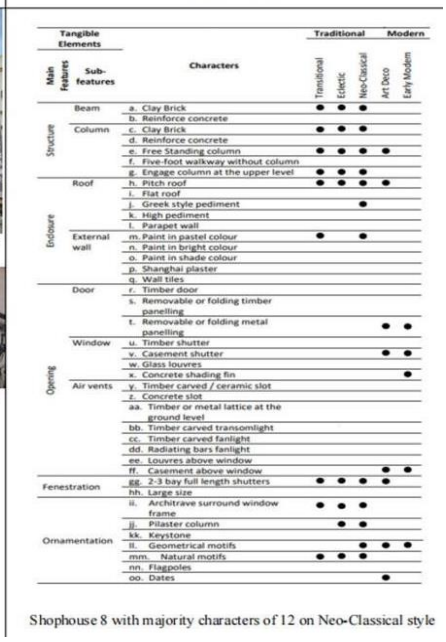
Shophouse	Stylistic Timeline	Shophouse	Stylistic Timeline
 Fig. 14 Facade of shophouse 5	 Shophouse 5 with majority characters of 17 on Neo-Classical style	 Fig. 20 Facade of shophouse 8  Fig 21 Shophouse 8 in 1914	 Shophouse 8 with majority characters of 12 on Neo-Classical style

Table 3: Stylistic timeline classification of shophouses 5 and 6.

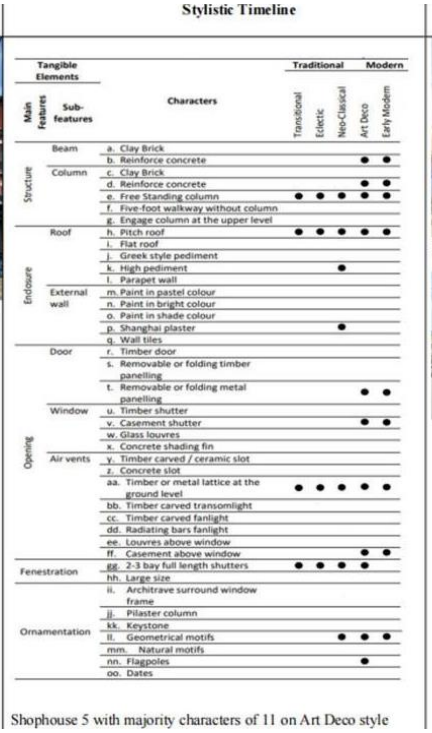
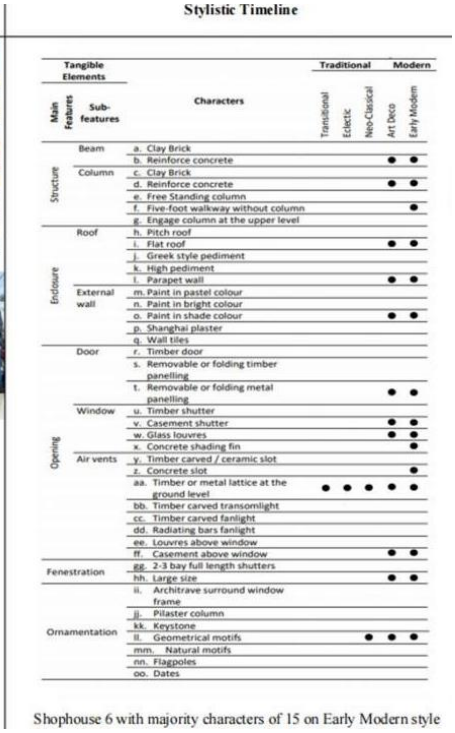
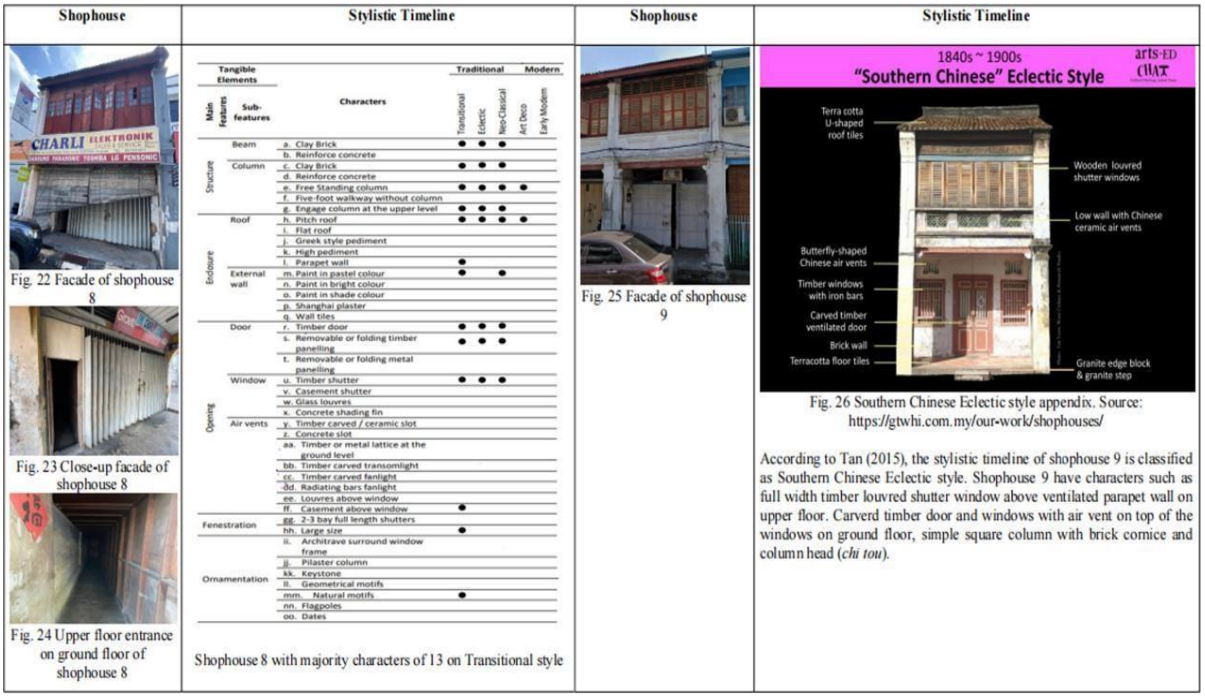
Shophouse	Stylistic Timeline	Shophouse	Stylistic Timeline
 Fig. 17 Facade of shophouse 6	 Shophouse 5 with majority characters of 11 on Art Deco style	 Fig. 18 Facade of shophouse 7  Fig. 19 Side facade of shophouse 7	 Shophouse 6 with majority characters of 15 on Early Modern style

Table 4: Stylistic timeline classification of shophouses 7 and 8.



The shophouse (7) from Bentong and shophouse (8) from Penang share the same styles as they have features of full-width timber shutter windows on a parapet wall with indented panels. Solid timber shutters are commonly seen on an Early Penang styles shophouse. Therefore, the solid timber shutters with glass infills on shophouse 7 differ from the conventional louvred timber shutters of shophouse 8. It portrays a hybrid of styles between the Early Penang style and Southern Chinese Eclectic style, which are unique to Bentong. Shophouse 7 provides entrance through a separate passageway straight to the courtyard with an access staircase to the upper floor.

The distinctions between shophouses 7 and 8 exist despite having similar styles. The findings demonstrated that Bentong's shophouse characteristics set them apart from others. Most facades contain streamlined, utilitarian linear features like fins and canopies for shading. The façade design and the structure are kept well-integrated with a flat plaster finish made of lime or cement over reinforced concrete (RC) construction of beams and pillars with cement or clay brick infill. The differences are mainly in the posts and beam design, which are de-emphasized and incorporated into the façade. The elements of decorations such as keystones, architraves and motifs are the stylistic components that help define the typology.

5. Conclusion

Based on the aforementioned typological research findings, it can be said that the principal facade and appearance are characterised by transitional, eclectic, and neo-classical architectural styles, which set apart how the structures' walls, beams, and columns are displayed. The ornaments and aesthetic characteristics allow one to observe the details, architrave, and motifs of the façade. Shophouses are crucial elements that influence how Bentong is shaped. By preserving it, the residents can better understand their town's history, promote it locally, and open up more prospects for improved tourism. The Geni Loci, or the elements that make a place unique, must be embraced by the new generation. The tangible fundamental elements that express a building's heritage values must be preserved to create a sense of place. A heritage building's architectural features have a minor impact on future generations' ability to express not only memory and identity but also values and a sense of place.

Heritage structures must be maintained, safeguarded, and conserved to address global concerns and local development.

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Simulation on Daylighting Penetration into Building Atrium for Artificial Intelligence Integrated Farming

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Abstract. Due to the COVID-19 pandemic and land scarcity, Malaysia is facing an exponential increase in the prices of food products, mainly primary commodities such as rice, oil and poultry products, because the increase in holding costs makes imported food prices rise. With that, an increase in urban farming activity is observed with the rise of food prices. Urban farming usually takes place within enclosed buildings, where daylighting penetration is typically scarce. The usual method of artificial daylighting will consume large amounts of electricity to maintain the optimum lighting source for plants to produce their food through photosynthesis. A way to reduce this is by integrating atriums to allow ample daylight to enter the farming area. Thus, by designing an atrium for urban farming to allow sufficient daylighting for the plants, it will improve the farm's energy usage and also adhere to green building strategies. This research aims to determine the most efficient atrium design for artificial intelligence-integrated urban farming. The main findings suggest that atrium design can be determined by following the suitable amount of daylighting penetration. Modifying the design will allow the atrium to be used efficiently in a tropical environment, providing sufficient indoor lighting for agriculture.

1. Background of Research

Malaysia's food crisis highlights how fragile the supply chains for everyday items can be in times of crisis. In order to feed the world in the future, there need to be new solutions for food supply - urban farming is one such solution (Rizou et al., 2020). Urban farming is mainly in a community within a city or other densely populated urban settings (Zainal et al., 2017).

Contemporary urban farming is usually done inside a building with an atrium for direct sunlight penetration for plants. The atrium designs are generally unsuitable for urban farming and can be utilised for optimum controlled indoor daylighting. In order to fully maximise the sunlight penetration within a tropical country, an atrium design must be efficient. With the help of artificial intelligence sensors integration with the farming system, an atrium can be designed to maximise daylight penetration. This research will test the designs of the atrium using simulation to determine the best atrium design from the aspect of daylight penetration into the atrium.

2. Research Aim/ Objectives/ Questions

The main aim of this research is to study how the atrium design affects daylighting penetration into artificial intelligence-integrated agricultural buildings. These are the objectives for this study that have been identified to achieve the aim of this research:

a) To study different typologies of atrium design in a tropical climate.
b) To analyse the characteristics, benefits and limitations of atrium design.
c) To simulate the atrium design based on the criteria provided.

3. Literature Review

Simulation on Daylighting Penetration into Building Atrium for Artificial Intelligence Integrated Farming must begin with an understanding of food security-related issues, followed by understanding of the meaning of artificial intelligence, the definition of urban farming, and atrium design and its implementation. Therefore, this literature review starts with food security issues, which are primarily defined by the need to have safe and comfortable food without having to pay high prices.

Food security means people always have enough calories and nutrients for a healthy lifestyle. This idea addresses food security, accessibility, use, and stability. Food security is a concern in both developed and developing nations. Poverty helps food security. Food insecurity is a major issue in low-income countries like Malaysia (Abdullah, 2020).

Artificial intelligence (A.I.) seeks to replace human intelligence where needed. Computerised medical diagnosticians and software that adjusts hardware to user needs are recent A.I. advances. A.I. focuses on perception, manipulation, reasoning, communication, and learning. Perception involves creating mental images of the physical world from sense data. Manipulation involves articulating appendages like mechanical arms or mobility devices to change the physical universe. Reasoning includes planning, diagnosing, and designing (Ahmed,2021).

Urban agriculture grows food in city and suburb backyards and community gardens. Thus, it resists statistical analysis and trend identification. Urban agriculture includes vegetable, fruit, and specialised crops like medicinal and ornamental plants, wood production, small-scale animal rearing, common species like bovines and poultry and local species like Guinea pigs, beekeeping, and aquaculture (combined fish and plant culture). A.I. is helping farmers grow healthier crops, eliminate pests, track soil and plant development, and reduce workloads (Rizou,2020).

Atriums are large, open-air rooms in the centre of buildings. Some atriums have glass roofs. Building designers and owners use atriums for daylight, circulation, and landscape surfaces. Tropical climates have high daylight, glare, and temperatures, increasing building energy demand. Malaysia is building more atriums. This popular and environmentally friendly architectural style blocks harsh elements while maximising natural light. Atriums can be designed to reflect the exterior and let in light and solar heat (Wang, 2018).

The objective of this study was clarified by reviewing several articles about atriums, tropical atrium design, and Malaysian atrium design. This study's theoretical concept helps determine its objective and nature, aligning with simulation research on daylighting penetration into building atriums for artificial intelligence-integrated farming.

4. Methodology and Methods

This study uses two methods. The first step is a literature review to determine atrium design criteria and which design best simulates daylighting penetration. Quantitative research primary data collection is the second method. This strategy was chosen to better analyse daylighting penetration to determine if the atrium design criteria selected for simulation are efficient for daylight penetration.

A simulation will be done to test out the criteria needed for an efficient atrium design. The process of model making and simulation starts with the first step, model making, based on the typology found in the atrium design. The models will be done in Sketchup 2022 software. The second step is to transfer the models into Lightstanza software for daylighting simulation. The third step is tabulating the results obtained from the simulation from Lightstanza.

5. Results & Findings

The characteristics of atrium design are that it can provide adequate daylight and circulation of spaces and surfaces for landscape applications. The benefits of the design are that it can reduce the electrical consumption of the building and provide a central area. In contrast, the limitations of atrium design are excessive daylight from inefficient design, glare and high temperature from tropical climates.

According to the secondary data, these are the six common typologies of atrium design that can be identified and found across the tropical climate, which are: -1) Centralised, 2) Semi-enclosed, 3) Attached, 4) Linear, 5) Long horizontal opening, and 6) Centralized Circular. From the simulation, the

circular-shaped atrium is found to be the most efficient in daylight penetration, followed by the long horizontal atrium and the square opening atrium.

6. Conclusion

In conclusion, the circular-shaped atrium is best for atrium design in tropical climates due to more daylight penetration and distribution than the rectangular-shaped atrium and the square opening atrium. Therefore, it can be inferred as a recommended typology of atrium design for artificial intelligence-integrated urban farming, which satisfies the study's aim and objective. Overall, this paper is a compilation of a comprehensive study and prediction on the simulation of daylighting penetration into the building atrium for A.I. integrated farming. The initial aim and objectives of the research have been achieved by providing a thorough understanding of the topic through literature research and with the aid of simulations. With this, the food crisis issue mentioned can be solved with efficient food production through urban farming.

7. Research Significant /Implications

This study reveals how atrium design can allow enough daylight into urban farming buildings. Local farmers looking forward to artificial intelligence-integrated agricultural sectors such as urban farming and vertical farming within building enclosures can benefit from this study's findings.

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Kuala Lumpur's Human Capital Enhancement Centre: Optionality, Alternatives and Possibilities for D.I.Y. spaces

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Abstract. D.I.Y. is a "self-made culture" that involves modifying, repairing, and customising goods without specialised equipment or knowledge. The term has evolved into a social concept, with people sharing ideas, designs, techniques, and completed projects online and in person. Recently, the Covid-19 pandemic has killed millions of people, caused significant social and economic issues, increased the number of people who engage in D.I.Y., and raised the demand for proper space and ways to explore hobbies and other activities. This research aims to better understand the cultivation of D.I.Y. culture in Malaysia during the Covid-19 pandemic and to consider the possibility of new capital enhancement on self-sufficiency. This study looks into programmes that help people after a pandemic and the working environment related to creative incomes in Malaysia. Four methods are employed: *document analysis, precedent studies, semi-structured interviews,* and *observations.* The findings suggest that passion and creativity motivate people to engage in do-it-yourself activities, and it requires the investment of both time and money. The findings can be further investigated and improved by recognising the importance of analysing the unique needs for specific programmes and optimising space efficiency as part of initiatives to cultivate better productivity for Malaysia's D.I.Y. and maker cultures.

1. Introduction

The world is affected by Covid-19, which has significantly changed the view on life, the economy, and everyday activities. People were forced to stay home to avoid spreading Covid-19, while others were forced to do so due to job loss. Many developed stress and faced hardship. They looked for opportunities to earn income, while some took the chance to increase their wealth. The unemployment rate in Malaysia reached a 30-year high of 5.3% in July 2020. Many people use their creativity, resiliency, and resourcefulness to help them start new businesses, enhance their mental health, and increase their self-sufficiency (Zhe, 2021).

Building, modifying, or repairing things without the direct help of professionals or trained specialists is referred to as *do-it-yourself* or 'D.I.Y.' This maker-culture is still in its early stages in Malaysia when compared to other developing countries as Malaysians are still the country's main consumer of many major products (Xiung, 2019). Many underestimate D.I.Y culture's potential, particularly in advancing sustainability and the economy. Dzul (2017) recorded in a study that the significant reason why the D.I.Y. culture in Malaysia is still relatively small is due to no space, tools and experience. Other issues include the lack of exposure to D.I.Y. training and culture in Malaysia.

2. Literature Review

D.I.Y. refers to people manufacturing, changing, or reconstructing tangible goods, including those derived from the natural world (Wolf & Mcquitty, 2011). A wide range of skill sets has been added to the definition. D.I.Y. refers to a "self-made culture" that involves *creating, customising* and *repairing*

goods without the aid of formal education. People are now sharing ideas, designs, techniques, and finished items in person and online. The D.I.Y. market effectively provides consumers with equivalent making and purchasing decisions that manufacturers must make. Manufacturers decide to produce their products if doing so saves money compared to buying goods or services. D.I.Y. activities are more prevalent among lower-income people (Bogdon 1996). According to Mackay & Perkins (2019), various factors such as preferences, experiences, cultural and economic influences, priorities, dreams, aspirations, skills and access to resources; are thought to contribute to the D.I.Y. culture. D.I.Y. activities are more prevalent among those with lower incomes than those with higher incomes (Bogdon 1996).

The categories of "*the manufacturing of items*" and "*maintenance of the home*" are another way to divide D.I.Y. projects (Atkinson, 2006). Knitting, handicrafts, clothing design or alterations, soft furnishings, furniture building, boat building, and self-publishing fall under the first category. The latter includes all construction-related activities, including building shelters, self-built homes, additions, decorating, plumbing, electrical work, gardening, and landscaping. Different degrees of creativity may be required depending on the level of expertise possessed by the person engaging in any of these activities. Financial situation and social and economic circumstances were also the determinants to fulfilling personal needs, or because there are no other viable options.

This study attempts to understand the development of D.I.Y. culture in Malaysia to raise awareness and as a starting point for learning, particularly on D.I.Y. topics. The proposed design aims to provide a maker space where individuals can delve deeper into their areas of interest and programmes that reduce stress and increase user productivity.

3. Research Methodology

This study employed four methods: a *literature review, precedent studies, semi-structured interviews,* and *observations*. It begins with reviewing articles, relevant documents, reports, and reference books, only to define the D.I.Y. culture, the categories of D.I.Y. activities, and the factors that contribute to the cultivation of maker culture. Precedent studies include Station F in Paris, Blackhorse Workshop Sideshow in the United Kingdom, and KEDAI Artisanal Market in Kuala Lumpur. The studies covered the function of the building, programmes, target users, and spatial planning. The semi-structured interviews involved four (4) homeowners who ran a D.I.Y. project and profited from it. The questions focused on the nature of D.I.Y activities and workspace. Observations enable the researcher to observe the activities and spatial layout required for D.I.Y projects.

4. Results and Findings

The data shows the rise of power in optionality, alternatives, and possibilities. Such regenerative design provides a space for people to explore more in their interests. It can spark curiosity and interest in the community, particularly in Malaysia. The participants began their projects to deal with stress and increase their income levels due to the Covid-19 situation. Some used this as a springboard to pursue their life's passion and creativity. Experiences, skills, economic influences, and easy access to resources allowed participants to engage in D.I.Y. activities

The programme for the design of this centre will include interaction and intervention to help reduce poverty, particularly by implementing new technology. The building's main programs are: *Make; Sell; and Manage*. *Make spaces* include labs (green lab, clay lab, fabric lab, iron lab, moulding lab, wood lab, and snack lab) and a lecture hall. *Sell spaces* include a D.I.Y. market, artisanal market, resource market, fresh market produce, retail, and an exhibition area. *Manage spaces* include offices, co-working space, a meeting room, and services.

The building core is a regenerative design, which ensures future flexibility for change. A 3-dimensional (3D) recursion rule creates a module or capsule with compatible joints. These capsules are constantly growing and evolving, and the assembled and disassembled components can be added to the geometry.

5. Conclusion

This study shed light on the importance of making space for D.I.Y. activities, developing talents, teaching people about resilience by exploring opportunities in the artisanal society and bridging the educational divide between different income groups. This study examined the profile of Malaysian D.I.Y. culture and how important it is to consider the workspace to make it personal, productive, and fulfilling while maintaining a sense of home. The findings can be further investigated and improved by recognising the importance of analysing the unique needs for specific programmes and space efficiency as part of initiatives to cultivate better productivity for Malaysia's D.I.Y. and maker cultures. Designers and developers can apply the concept of adaptability, optionality, alternatives, and possibilities by designing capsules to other D.I.Y. or similarly styled structures.

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PAO Decision-making: Collaborative Planning Approach Framework

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Abstract. Urban planning and its operation involve many processes where participation and collaboration between various key stakeholders are fundamental to ensure the best possible planning and operational decisions are made. Collaboration can be defined as two or more groups of people and higher integration among key stakeholders toward achieving common goals. A collaborative approach can better obtain stakeholders' commitment, stronger stakeholders' relationships, balance power and control, and consensus building. The aim of this study is to enhance the capability of participation and collaboration among the key stakeholders in planning and operational decisions. The study was conducted using qualitative methods which involved a series of in-depth interviews and focus group discussions with key informants, namely the local public planners, residents' committees, local councilors, and private developers' representatives. A total of 43 in-depth interviews and nine focus group discussions involving 67 participants were conducted. The outcome of this study indicated that accessibility to planning information and process, intergovernmental relationship, stakeholders' awareness, knowledge, representation, and behavioral skills are vital in enhancing the capability of key stakeholders in participating and collaborating in planning and operational decision-making.

1. Introduction

Public participation in urban planning provides a clear picture to decision-makers about the public's preferences, thus contributing to better decision-making by incorporating the community's experiential knowledge into the process [1];[2]. It promotes a democratic way of making and legitimizing a decision by involving all stakeholders; henceforth inclusively addressed all interests [1]. Based on this understanding, the capability of the community to participate effectively in urban planning should be empowered to ensure that the participatory process is not merely tokenism [3]; [4].

Nevertheless, participation in urban planning has been historically ambivalent in the public process, particularly during decision-making where government tends to employ a cautious approach as a result of interest discrepancy between the government and interested stakeholders [5]. It is also suggested that the decision-making process is mainly influenced by dominant stakeholders which resulted in self-interest overshadowing collective interests [6]; [7]. [3] claimed that the participatory process only benefits specific actors or community segments and retained the status quo. It has resulted in the less-influenced segment of society being marginalized from the process.

2. Collaborative Approach for Effective Planning and Operational Decision-Making

2.1 Collaborative approach in urban planning

In addressing the complexity of decision-making in the urban domain, and providing genuine participation to the stakeholders, a new paradigm for participation is needed. Therefore, collaborative planning has been promoted as an approach to addressing the need to empower the stakeholders' capability to participate and influence the process. This paradigm shift of the participatory method is based on continuous discussion and collaboration has promoted greater trust and consensus; as well as improved public knowledge and produced collective decisions [8]. Although the probability of achieving a resolution that appeals to all actors is ambiguous, the approach will ensure the objectives of the participatory process can be achieved.

Collaborative planning offers the opportunity for urban stakeholders to inclusively interact and participate in the planning process, thus addressing the complexity of the interests of modern society [9]. Predominantly, Collaborative planning is based on continuous communication between stakeholders, particularly community and planning authorities throughout the planning process to address any dispute through consensus building [8]. This planning approach is built from Habermas' communicative rationality which saw interested stakeholders participate in extensive dialogue and discuss the deliberate alternative. Stakeholders need to be actively informed and believed they can influence regardless of their stature [5]; [10].

Collaboration could be initiated by involving extensive stakeholders through numerous participatory means including forums and meetings [11]. Broad public participation prospectively advocates genuine participation, hence ensuring the interest of marginalized segments is considered.

2.1. 2.2 Planning and operational decision-making in urban planning

Various backgrounds and interests among the urban stakeholders have led to the complexity of the decision-making process. With the impact of urbanization, the process is becoming more complex. In this research, both development plan-making and planning permission as the planning and operational decision-making in urban planning is focused. It is corresponding to the argument about the relationship between both planning processes which see development plan to guide the local government in granting planning permission [12]; [13].

In preparing a plan, the planner needs to collaborate with other stakeholders, particularly those who are affected and addressed by the plan. The participation and opinion of these stakeholders will help the planner to deliberate in finding the best alternative.

3. Methodology

Qualitative methods, namely the in-depth interviews and focus group discussions, were employed to obtain the primary data, whilst document gathering for secondary data. In addition, purposive sampling is employed due to the selection of various key stakeholders (government and non-government actors) as the respondents and participants for both methods to ensure qualitative data are gathered from the key informants that can provide valid and comprehensive information concerning the research subject [14]. Thematic analysis and document analysis are then used to analyse both primary and secondary data.

4. Discussion

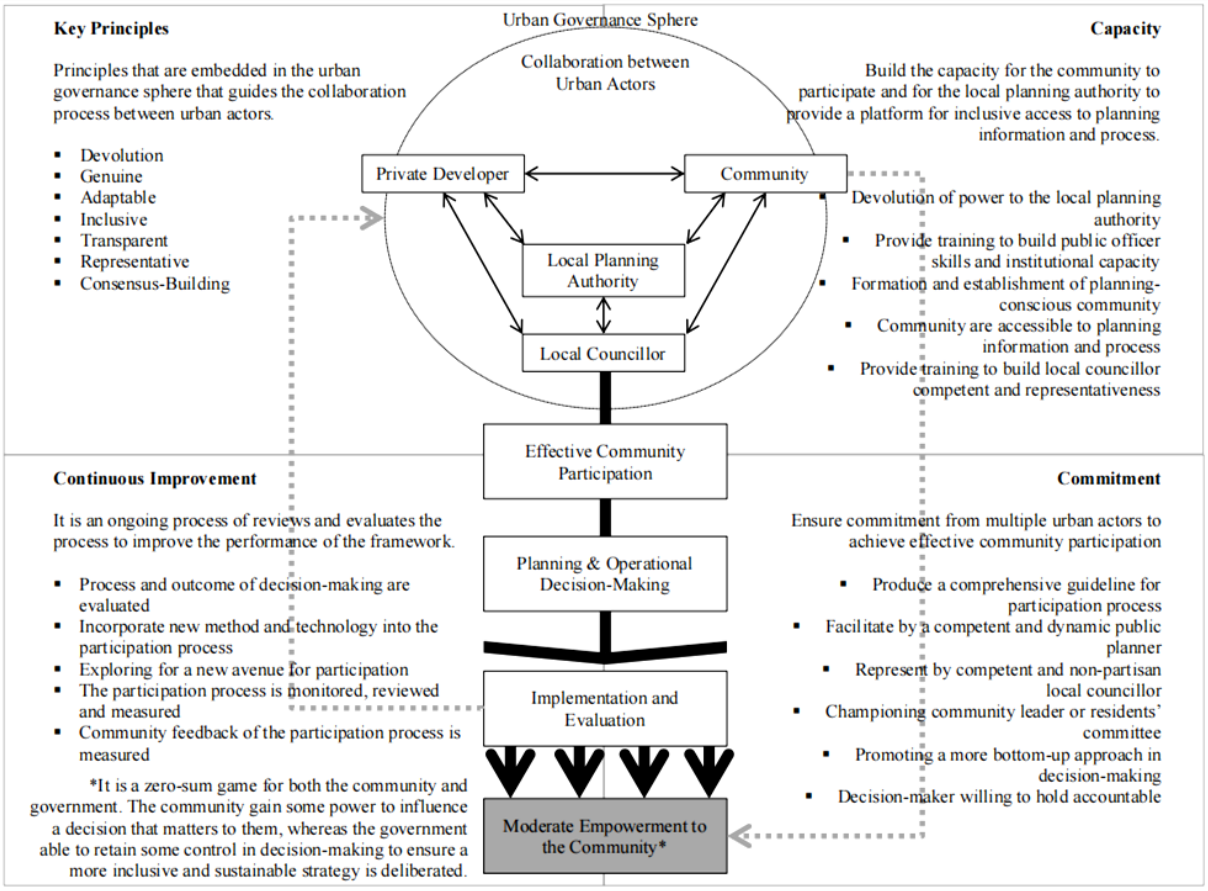

Figure 1: Collaborative approach Framework

Figure 1 Collaborative approach framework explains on the key principles for collaboration, the capacity of the community to participate in decision making, the commitment of key-stakeholders to achieve effective community participation and the continuous improvement to review and evaluates the process of decision-making. From the collaboration among the key-stakeholders, it will drive towards effective participation, and this will make the planning and operational decision-making more efficient.

5. Conclusion

The shortcomings in the current practices are primarily concerned with the incorporation of stakeholders' interest, particularly community in decision-making and collaboration between stakeholders, community's access to information and process, and intergovernmental relationship in planning. It is also associated with community's awareness and knowledge, community's representation. It is suggested that the skill and attitude of public planner in handling the participatory process also affect the community's access to the planning information and process.

In response to the shortcomings, a framework is proposed to improve the urban stakeholders, predominantly the community's participation in both development planning and planning permission processes. The development of the framework is based on the idea that effective participation is about giving more power to the local (government and non-government actors) together with genuine participatory that shapes the attitude and willingness of various stakeholders, especially the community towards participation process. This should be a catalyst to enhance their capability to participate and influence in both the planning and operational decision-making.

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The Malaysian Generational Elderly-Friendly Housing Design Features Framework (MGens-ElderLyHD)

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Abstract. The continuous increase of the elderly will render Malaysia with an ageing nation status by 2030. The growth of the elderly (senior) population will affect the housing market and indirectly affect the Malaysian housing demand. Despite the continuous increase of elderly (senior) populations, less attention given on housing provisions that are tailored explicitly according to the needs and preferences of this specific elderly (senior) generations in Malaysia. Many countries, such as the United States, United Kingdom, Australia, Hong Kong, and Singapore have been incorporated the elderly (seniors) strategies in the housing provisions in their country. Different scenarios occur in Malaysia, where we have yet to observe comprehensive policy and practice. This study aims to provide an in-depth overview of the Elderly-Friendly Housing Concept and Design Features Preferences for the Malaysian Ageing Generation. The study adopted mixed-method research strategy via qualitative and quantitative data gathering. Six (6) main elderly-friendly housing design features preferences by generations derived from the study are (1) Bathroom; (2) Bedroom; (3) Kitchen; (4) Floor; (5) Living Room; and (6) Staircase. The findings derived from this study will significantly provide the public and private sectors in understanding the needs of the ageing population on the elderly-friendly housing concept and preferred elderly-friendly housing design features for the Malaysian context. Multi-Generational Friendly Housing Concept with elderly-friendly housing design features is a suitable housing concept proposed for the Malaysian elderly (seniors) population.

1. Introduction

The population projection by The Department of Statistics, Malaysia displayed that by 2030, the elderly population would escalate up to 15 percent out of the overall population in Malaysia (Hamid et al., 2013; Sulaiman, 2011). The increasing elderly group and soon retirement group among the Malaysian population should be interpreted as an important segment to be taken into consideration by policymakers for such trend will have long-term implications towards the nation economics.

Several studies on population and housing put emphasized on the preferred housing attributes

among the elderly, including those studies conducted in China (Wang & Li, 2004); Netherland (Jong et al., 2012); Japan (Seko & Sumita, 2007), and Korea (Kim, et, al, 2003). Traditionally, Malaysians as in similar with the other Asian countries practice the norm where the elderly live together with their children. Nonetheless, only a few studies in Malaysia have examined the preferred attributes among the Malaysian Elderly. Analyses on the elderly housing preferences, specifically on the preferred housing attributes, will provide vital information to the housing developers on the elderly housing needs. Hence, this paper aims to support the needs and preferences of the Malaysian ageing population by focusing on the elderly-friendly housing (dwelling) features aspect.

Although there were studies on the elderly and ageing, a fixed and definite age used in defining the 'elderly' is yet to be established (Lim, 2012; Tinker et al., 2013; Yusnani, 2006). The primary definition is by referring to The World Health Organization (2012) terming the elderly as the population aged 60 years and older. In the Malaysian context, "60 years and over" of age group are used as the cut-off point in reflecting the elderly. The elderly definition was following the United Nations World Ageing Assembly in Vienna in 1982. Nevertheless, this study focused on the elderly population aged 56 years and older to discover the future housing aspirations and preferences of the elderly, specifically on the elderly-friendly housing (dwelling unit) design preferred features.

The continuous growing elderly (senior) population figures will hugely influence the housing market and in specific would affect the Malaysian housing demand. Compared to other developed countries and despite the continuous increase of elderly (senior) populations, less attention given to housing provisions tailored explicitly based on the needs and preferences of the elderly (senior) generations in Malaysia. Due to the growth and increase of longevity of the elderly (senior) population in Malaysia, more emphasis on offering more housing concepts or living arrangements for this unique group of generations are vital and highly needed. Therefore, a study in determining the Malaysian elderly (seniors) housing needs and preferences is essential in enhancing the quality of life of this unique population by promoting the elderly-friendly housing concept.

2. Problem Statement

The critical matter of seniors is the quality of life in their old age life stage. The fundamental of housing is not only due to the older person need for a secure and comfortable home. Housing also offers social surroundings for older people to interact with society and the community. Planning efforts on the housing of an ageing population are one of many countries' most significant challenges. Numerous elderly housing studies have been conducted internationally with the awareness of the importance of the elderly in the community. The knowledge of the elderly is diverse and varied. Thus, the understanding of the diversities requires a detailed exploration of the elderly in various aspects. In Malaysia, the elderly housing needs and aspirations are often either neglected or not given proper emphasis. Lim (2012) suggested that critical knowledge of unique issues concerning the needs and desires of the elderly is crucial. Understanding is vital to improve the existing elderly housing policy and framework for better housing provision. Malaysia is a multiracial country, and this resulted from specific criteria for aged care service delivery and required a comprehensive assessment in meeting the needs and aspirations of the current and future elderly community (Lim, 2012).

Garin et al. (2014), pointed out that research focusing on older people and the built environment is relatively recent. Amiri (2018), highlighted the need for further emphasis on the provisions of the elderly housing facilities. Age-friendly of build environment will encourage active ageing, and thus improve the quality of life as people aged (WHO, 2007). The trend of active ageing is a significant change for the elderly. Many countries such as the United Kingdom, Australia, Hong Kong, and Singapore have earlier incorporated the elderly (seniors) strategies in the housing provisions. The Government mostly had practised fulfilling the elderly (seniors) needs in each of the housing development. For example, in Singapore, the Housing Development Board (HUD), had been the prime actor in practising the matter. Every housing development projects, mainly the public housing, will be incorporated with the elderly (seniors) housing standards and thus making the development Elderly-

Friendly. However, a different scenario occurs in Malaysia, where we have yet to observe comprehensive policy and practice on this matter.

Nevertheless, the private developers in Malaysia have taken the initiative and recognise the potential need and demand for the elderly (seniors) housing. Both design and modifications of the built environment in serving the older population's needs require more considerations in all aspects. The concerns include an emphasis on housing, transportation; civic participation and employment, community support; and health services. An age-friendly built environment optimises health, participation, and security opportunities to enhance the quality of life as people age (Siew, 2015). The above-presented problem statement shows the importance of further study on the elderly population and housing. The Elderly-Friendly Housing Concept is viewed as a suitable housing concept for this specific generation. Thus, it is significant to conduct a study on elderly-friendly housing design features preferences in enhancing the quality of life of the Malaysian ageing population.

3. Research Aim and Research Objectives

This study on Elderly-Friendly Housing aims to provide a comprehensive overview of the Elderly-Friendly Housing Concept, and the Housing Design Features Preferences for the Malaysian Ageing Populations.

The research objectives proposed for this study are as follows:

(i) To determine the Elderly-Friendly Housing/Dwelling Design needs and preferences features for the ageing population in Malaysia.
(ii) To suggest the suitable Elderly-Friendly Housing Concept embedded with Elderly-Friendly dwelling design features in enhancing the elderly quality of life for the Malaysian ageing population.

4. Research Methodology

This exploratory study adopted a mixed-method research strategy (combinations of qualitative and quantitative). The individual expert survey being part of the initial data collection to provide a comprehensive overview and then followed by the final questionnaire survey to gain greater insight into the issues. The survey findings help to finalise the final concept and features of the elderly-friendly housing needs and preferences. As the elderly population in Malaysia anticipated to increase in future years, thus the inclusion of the elderly-friendly housing design features in Malaysian housing development is vital.

5. Main Findings and Discussions

5.1 Research Objective (i) - To determine the elderly-friendly housing design needs and preferences features for the ageing population in Malaysia.

Mortality and longer lifespan contribute to the escalating numbers of the elderly (senior) population worldwide. The figures of the elderly (seniors) population expected to rise in the future continually. Studies on various issues concerning the elderly (senior) population (generation) show how this generation is still significant to the society and community.

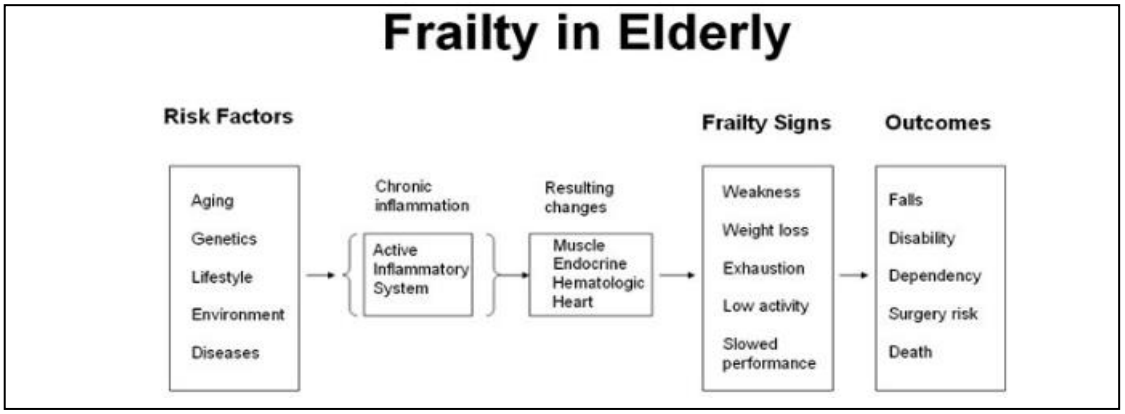

Figure 1: Pathogenesis of the frailty syndrome: current understanding of potential underlying mechanisms and hypothetical modal pathways leading to frailty.
(Chen et al., 2014)

On the other hand, the need and preferences for elderly-friendly housing are challenging issues in Malaysia. The choices of the elderly (senior) housing provisions in Malaysia are limited and relatively new both by the public or private sector. Frailty is primarily seen as a state of increased vulnerability and functional impairment. Frailty is caused by cumulative declines across multiple systems (Rockwood, 2005; Hoover, 2013). The various causes and contributors of frailty are physical, psychological, social, or a combination of these. In addition, frailty may also include loss of muscle mass and strength, reduced energy and exercise tolerance, cognitive impairment, and decreased physiological reserve, leading to poor health outcomes and a reduced ability to recover from acute stress (Clegg et al., 2016). The ordinary or normal frailty faced by each elderly generation indicates the usual disability faced by each person as they aged.

5.1.1 The Common Habitual Actions of the Elderly (Ordinary/Normal Elderly Frailty) - The Elderly-Friendly Housing Design Features Needs and Preferences

The needs for Elderly-Friendly Housing Design features based on the Common Habitual Actions of the Elderly (Ordinary/Normal Elderly Frailty) are as follows:

(i) An older person may be unstable in their gait and unable to recognise changes in the level of the floor surface.
(ii) An older person may be unable to see clearly and may be having problems in accommodating changes in lighting levels.
(iii) An older person would have decreased stamina.
(iv) An older person may have difficulties in wayfinding.
(v) An older person may fail to bend, stoop, or stretch.
(vi) An older person may be weak in griping and may have difficulties in turning and manipulating taps, switches, door handles and the like.
(vii) An older person may have difficulties in pushing to open heavy doors.

5.1.2 The Preferences of Elderly-Friendly Housing Design Features

In overall, the data analysis and findings show that the Malaysian generations (Baby Boomers, Generation X and Generation Y) prefers to age-in-place and live independently. However, they also found to be willing to move to another location and live with their family members if required to or having facing problems with the health condition. The results also indicate the generations support the idea of incorporating elderly-friendly housing design features in Malaysian housing development. The embedment of the elderly-friendly housing design features for the Malaysian ageing population

can be made on two (2) main form; (i) existing housing unit/apartment converted; and (ii) a new housing unit from the developer (proposal of suitable housing concept with elderly-friendly features). The six (6) main elderly-friendly housing design features preferred by the Malaysian generations (by ranking) are as follows:

(i) Elderly-friendly Bathroom features
(ii) Elderly-friendly Bedroom features
(iii) Elderly-friendly Floor features
(iv) Elderly-friendly Kitchen features
(v) Elderly-friendly Living Room features
(vi) Elderly-Friendly Staircase features

Table 1: The Elderly-Friendly Housing Design Preferences by Generations - 3 Main Preferred Features

The Elderly-Friendly Housing Design Preferences			
Generation	**Baby Boomers**	**Generation X**	**Generation Y**
Elderly-Friendly **Bathroom**	1) Walk-in Shower 2) Grab/Holding Bars 3) Raised/Elevated Toilet Seat	1) Switches 2) Walk-in Shower 3) Raised/Elevated Toilet Seat	1) Walk-in Shower 2) Grab/Holding Bars 3) Switches
Elderly-Friendly **Bedroom**	1) Mobility aids 2) Call Button 3) Bed	1) Call Button 2) Electrical Switches and Outlets 3) Bed	1) Mobility aids 2) Bed 3) Electrical Switches and Outlets
Elderly-Friendly **Floor**	1) Floor material 2) Floor Design	1) Floor material 2) Floor Design	1) Floor material 2) Floor Design
Elderly-Friendly **Kitchen**	1) Refrigerator 2) Cupboards 3) Countertops height	1) Refrigerator 2) Stove 3) Cupboards	1) Manoeuvring 2) Cabinets 3) Cupboards
Elderly-Friendly **Living Room**	1) Lighting 2) Electrical Cords 3) Intercom system	1) Electrical Cords 2) Lighting 3) Intercom System	1) Lighting 2) Electrical Cords 3) Furniture
Elderly-Friendly **Staircase**	Staircase Geometrical Design: 1) Staircase Configuration 2) Number of steps per flight Staircase Handrail design: 1) Handrail existence 2) Handrail height 3) Handrail wall clearance Staircase Lighting: 1) Lighting Switches 2) Consistency of Lighting 3) Illumination level Staircase Steps Design: 1) Riser height 2) Going depth 3) Nosing	Staircase Geometrical Design: 1) Numbers of steps per flight 2) Staircase configuration Staircase Handrail design: 1) Handrail existence 2) Handrail height 3) Handrail cross-section Staircase Lighting: 1) Lighting Switches 2) Consistency of Lighting 3) Illumination level Staircase Steps Design: 1) Going depth 2) Riser height 3) Nosing	Staircase Geometrical Design: 1) Staircase Configuration 2) Number of steps per flight Staircase Handrail design: 1) Handrail existence 2) Handrail surface texture 3) Handrail-wall clearance Staircase Lighting: 1) Lighting Switches 2) Consistency of Lighting 3) Illumination level Staircase Steps Design: 1) Going depth 2) Step finishing material 3) Nosing

Ageing-in-place is a universal concept known as vital to new housing design. The establishment of elderly-friendly housing and environment will permit the elderly (senior) generation to enjoy life autonomy which much needed in achieving the goal of healthy and active ageing.

5.2 Research Objective (ii) - To suggest the suitable elderly-friendly housing concept embedded

The prefix "multi-" designates a home that would be well equipped for both circumstances. Both multi-generational house plans and multi-family homes offer flexible housing options. However, if one is building or buying a new home, it may be helpful to understand a more specific definition for each of these terms. Multi-generational house plans accommodate different generations under the same roof – literally. There is no major division between lodgings; all the bedrooms, bathrooms and public spaces are encompassed in the same house. Plans for multi-generational homes often create privacy by dividing bedrooms into separate wings, or by including a bathroom with every bedroom. The kitchen, dining room and other communal areas are generally shared.

6. Conclusions

The continuous upsurge of the population together with increasing numbers of the ageing population will render Malaysia with an ageing nation status by the year 2030. The projection of the elderly in Selangor from the year 2020-2040 shows the highest growth can be seen with the subgroup of the 85 years old of age and above. The increasing numbers of the elderly population with expands of life age up to nearly 80 years old have resulted in all sectors worldwide to start focussing on this generation, and this includes the housing segments in particular. Scientific studies show that today's seniors enjoy above-average income and assets. The senior generation is now the wealthiest in the world. The growth of the ageing population and their high purchasing power will in the future make them one of the most important customer groups and a decisive driver for the success of companies in many industrial sectors (Bloom et al., 2011). The financial volume, size and sophistication of the 'silver market' offers opportunities for the business which are capable of responding to their demand. The elderly (seniors) generations or the 'grey hair' consumers is unique and equipped with distinct needs and preferences.

In the housing aspect, the elderly's (senior) needs are based on the frailty faced because of ageing and thus demonstrated their preferences of elderly-friendly housing design features. This study reveals some critical findings on the elderly-friendly housing design features preferences by the Malaysian generations (Baby Boomers, Generation X and Generation Y). The study found that the elderly (senior) generation prefers to age-in-place and live independently. It was also discovered that this generation furthermore is willing to move to another location and live with family members if they have to do so. The main reason for the elderly mobility decision is due to the health condition, or the late-life moves due to the need for assistance by the elderly (senior) in performing daily life activities. Family/family members and spouse/partner/husband or wife are perceived as the primary influence of the elderly (senior) housing selection decision-making. Most importantly, the study uncovers the two (2) prime preferred forms of elderly-friendly housing are such as; (i) existing housing unit/apartment converted; and (ii) a new housing unit from the developer.

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Pedestrians Level of Satisfaction of Walkways. Case Study: Commercial area in Kota Bharu, Kelantan

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Abstract. Pedestrian satisfaction of walkways is a crucial factor in encouraging people to walk. Studies show that pedestrian satisfaction is related to factors of safety, convenience and comfort. Pedestrians or people who walk rather than use a vehicle can gain various benefits including improving one's health, lowering dependence on cars thus lowering carbon emission, reducing traffic and parking cost. Other factors of pedestrian satisfaction include design and maintenance of pedestrian walkways. This study records the perspectives of sixty eight users of pedestrian walkways in a commercial area in Kota Bharu, Kelantan and evaluate respondents' level of satisfaction of pedestrian walkways. The survey was conducted after the movement control order in November 2021 and enumerators adhered to strict social distancing and procedures. Using questionnaires, data were collected, analysed and the findings tabulated. The evaluation leads to identification of the significant variables that contribute to pedestrian's satisfaction level. The most reported satisfaction of pedestrian elements were pedestrian walkway widths, information signages, facilities, lighting and surfaces. The perceived elements that respondents were unsatisfied with primarily included the design of the pedestrian walkway or landscape along the pedestrian walkways. Upon evaluation, this suggests some strategies for improvement including recommendations for facilities for the disabled and improved signage to further improve the quality of pedestrian walkways of the study area.

1. Introduction

Walking is a way of moving from one point to another on foot. The pedestrian is a key part of the city's traffic system while a pedestrian walkway is an important aspect of traffic management especially in an urban area. There are more than 500,000 road accidents including pedestrian deaths each year on the world's roads (WHO 2020). The lack of quality space, expose pedestrians to greater traffic accidents i.e. risk. Although sidewalk space is provided by the local authorities, a pedestrian-only streets or street plazas can be a more effective for protecting walkers. Pedestrian facilities must meet pedestrian specifications, guarantee protection, and provide comfort to pedestrians. The pedestrian walkway is closely linked to the environment, activities and human movements that use the pedestrian walkway. It is also closely related to the other supporting elements in which each element provided has its own unique function. The density of pedestrian flow and traffic volume is closely linked to the use of a walkway. However, when pedestrians haphazardly walk onto the road, accidents will happen. The aim of this study is to assess the pedestrians' perspective of walkways in the case study area, a commercial area. The objective is to evaluate their level of satisfaction of using the walkway thus suitable strategies or actions could be implemented by the authorities.

1.1 Pedestrians

Pedestrians are part of the road traffic. In an urban environment, pedestrians still contend with vehicles for the area. Despite the importance and benefits of walking, urban roads are a potential cause for

pedestrian harm. According to Sarkar (2021), in the modal hierarchy, pedestrians "encased in soft exposing shell" are the most vulnerable when exposed to conflicts and barriers. In dense urban areas, where walking is an important mode to complete short trips, there is a continual need for evaluation of the existing roads and walkways, so that appropriate actions can be taken to eliminate or redress conditions that compromise pedestrians' safety.

5.1. 1.1.1 Pedestrian Walkway

Pedestrian walkway is a part of the road management. Pedestrians always compete in an urban environment with vehicles for the area. Safe pedestrian walkways are essential in a commercial area as it can encourage more people to use the walkways and help stimulate the economic activities of a city (Sheykhfard & Haghighi 2020). Walking is a basic human activity and pedestrians are a part of every road environment. Everyone is a pedestrian at one point and another.

The density of pedestrian flow and traffic volume is closely linked to the use of a walkway. The assessment of pedestrian walkways is very different from the rating of vehicles traveling by road. The level of service has been described as a step towards describing current road conditions, conditions pedestrian, facilities and infrastructure and assessing service quality (Shekari & Shah, 2011). Large segments of road users consist of people of different ages, socio-economic backgrounds and educational levels. Disabled people that use wheelchairs and additionally belongs to the all pedestrian category.

Walkways are integral elements of streets and roads wherever the accessibility, comfort, safety, and efficient mobility of pedestrians is required. By separating pedestrians from vehicle traffic vertically if space is available, sidewalks and walkways increase pedestrian security. Paved (hydraulic cement concrete) surfaces along a road or street that are raised from the ground level and separated by a curb, is common of sidewalks and are usually constructed according to standardized requirements and drawings. Meanwhile, some pedestrian ways are shared and generally paved with bicyclists.

2. Classifications of pedestrian walkway:

2.1 Temporary Pedestrian Walkway

Pedestrian space is used for a specific purpose and at different times by each user. The concept pedestrian walkway not only creates business space, is offers a comfortable and safe pedestrian area and separate driveway for pedestrians to do their business. Temporary refers to the activities at the pedestrian involving the closing of the road during this period of necessity such as the night market.

Figure 1: Temporary Pedestrian Walkway
Source: https://www.vanguardgroup.co.nz/product/strongwall/

2.2 Permanent Pedestrian Walkway

The pedestrian walkway continues to be divided into seven types (NACTO 2020) -

a. Pedestrian zone - A pedestrian zone in urban areas is a project where there is no access to the environment by private vehicles

Figure 2: Permanent Pedestrian walkway

Source: https://www.gpsmycity.com/discovery/stroget-area-leisure-walking-tour

b. Pedestrian Street - The footpath is only for pedestrians, although this area does not allow motor vehicles.

c. Sidewalk - a special area with a pedestrian building in the middle of the road. It is the main place in large cities, as different business activities occur along this path

d. Footbridge - This footbridge is a bridge in the form of a road crossing system

e. Semi-Mall - These roads differ slightly from those of other roads, as private cars cannot enter the area but are tested at speed limits

f. Underground Pedestrian - It is a tunnel concept and is equivalent to having a bridge

g. Rooftop Pedestrian Walkway - The provided pedestrian path is fitted with a constructed roof.

5.2. 3. Elements of Safe Pedestrian Walkway

Safety and security are important element of a good and effective walkable environment. A safe footpath makes for easy strolling and decreases the feeling of fear of an accident or crime (Zakaria & Ujang, 2015). Pedestrian strength is needed to increase safety as the streets are going to be more alive and vibrant (Jacobs, 1969). The components of the pedestrian safety are also associated with motorist behaviour, and crossing exposure and security. Urban development is necessary if secret and obscure niches are to be avoided in order to reduce street crime (Newman, 2008). Darkened niches can hide and expose the consumer to crime, particularly in places with low pedestrian intensities.

4. Research Methodology

The questionnaire survey was conducted in a largely commercial landuse/area in Kota Bharu.

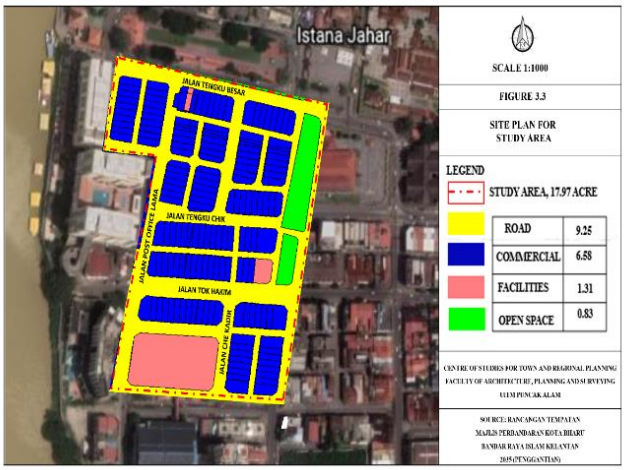

Figure 1: Site Plan of Study Area

In this study, data was obtained through a survey using a questionnaire. An enumerator each was stationed at Jalan Tok Hakim, Jalan Tengku Chik, Jalan Post Office Lama and Jalan Tengku Besar, Kota Bharu. Each enumerator distributed the questionnaire randomly to pedestrians/users of the street. This data collection used a sampling method by means of purposive sampling also known as judgment, selective or subjective sampling is a reliable random sampling method based on the justification and criteria of the researcher to determine the sample population to participate in the study (Black, 2013, Saunders et al., 2019).

Upon the end of MCO restrictions in Kota Bharu on 8th May 2021, the researchers collected the data during the recovery phase in November 2021. However, the public generally was still very cautious and public interaction was very minimal. The enumerators and respondents wore masks and kept strict social distancing. Data was collected from 68 respondents. Questionnaires were distributed to pedestrians, in front of commercial lots and in front of the mosque. The responses in the questionnaire used a Likert type scale from "*1"* (least satisfied), "2" (unsatisfied), "3" (neutral), "4" (satisfied) to "*5"* (most satisfied) and the respondents selected/ticked their preferred response.

Table 1: Respondents Average (Mean) Response Score of Pedestrian walkway elements

Elements	***Mean (M)***
Pedestrian_walkway_width_by_standard_5_feet	3.3881
Surface_of_pedestrian_walkway	3.3433
There_is_a_safety_signage	3.2985
Information_signs_are_easy_to_read	3.2836
Information_signs_for_motorists_clear	3.2239
Information_signs_for_pedestrians_clear	3.2090
Information_signs_for_disables_clear	3.1791
Facilities_disability_well_maintained	3.1642

There_is_a_clear_track_to_cross_the_road	3.1343
Pedestrian_walkway_through_ area_of_crime	3.1194
Height_and_width_pedestrian_walkway_make_it_easy_for_users	3.1045
There_is_a_lamp_for_night_use_for_safety	3.0597
Facilities_for_the_disabled	3.0000
Adequate_street_lighting	3.0000
The_surface_of_pedestrian_walkway_is_well_maintained	3.0000
Landscape_along_the_pedestrian_walkway_is_well_maintained	3.0000
Design_of_the_pedestrian_walkway_attractive_and_comfortable	2.9254
Landscape_along_the_pedestrian_walkways	2.8955

Table 1 displays the means score for 20 perceived satisfaction items, ranked in descending order by mean value. The most reported satisfaction of pedestrian elements (mean response ≥3) involved pedestrian walkway widths followed by information signages, facilities, lighting and surfaces. The perceived elements of pedestrian walkway that were least or unsatisfied with reported (mean response ≤3) primarily included the design of the pedestrian walkway or landscape along the pedestrian walkways. This is consistent with analysis by Bhaduri et al (2019) which found that pedestrian walkway width was a strong factor in influencing pedestrians' perception of being satisfied with the walking environment.

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The Development UiTM BTech. Course Application for Students

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Abstract. This paper is about the development of a UiTM BTech application (app) course for students using Flutter Flow. The students will be able to learn and gain knowledge from taking the course in this app. The app offers a course on Introduction to Occupational Safety and Health and Calculus for Technologies with notes, examples, and videos. The traditional method of learning by using college textbooks may be less interactive, whereas books are typically just text and images. Books are also less accessible depending on the subject and author; they can be more expensive to purchase and can be heavy and bulky, making them difficult to carry. With the Flutter Flow coding platform, an interactive course app can be built that will include interactive elements, such as tutorials and videos, which can make learning more engaging and effective and will be delivered entirely through a mobile app. Project planning, analysis, design, development, and implementation are the five (5) phases of this project's methodological framework. Following this research, two main courses on occupational safety and health and calculus for technologies, a tutorial for calculus, and a contact us tab have been successfully coded. Students and lecturers have given positive feedback towards the use of this app.

1. Introduction

The use of technology in higher education has increased significantly in recent years, with many universities offering online courses and resources to students [1]. In order to meet the needs of a tech-savvy student population and prepare them for the demands of the modern workforce, attempts are being made to reinvent the way students learn by using this device by developing an application that is only dedicated to providing students with knowledge within the campus syllabus [2] [3].

The purpose of this study is to create mobile application that will provide students with knowledge of an introduction to occupational safety and health (OSH) and calculus for technologists. The development of this course app may allow students to have easy access to knowledge without having to rely solely on the textbook. Occupational safety and health (OSH) are frequently linked to high-risk professions, including those in construction, industries that use large machinery and equipment, and pesticide-related jobs in agriculture [4]. In Malaysia, institutions of higher education have implanted an awareness of OSH in undergraduates even before they reach the industry, as the understanding and application of OSH should not begin only at the workplace [5], [6]. Meanwhile, calculus for technologists is an important branch of mathematics that plays an important role in learning and degree completion at the university level, particularly for engineering courses [7].

OSH and calculus for technologists may not seem to have a direct connection at first glance, but there are a few ways in which these two fields can intersect. Calculus can be used to model and analyse safety systems. Engineers and technologists who work in the field of OSH may use calculus to model and analyse safety systems and processes, such as the design of safety barriers or the analysis of accident data, and use the calculus to analyse data on the effectiveness of different safety measures and determine the best ways to reduce the risk of accidents and injuries. These two courses are very important for undergraduate students to prepare themselves for industry. Students can access this course via the mobile app thanks to the development of a new Bachelor of Technologies app course. This course app

will provide students with the knowledge and skills they need to succeed in their studies and future careers and will be delivered entirely through a mobile app [8], [9]. Finally, interactive elements such as tutorials and videos, as well as the elimination of the need to rely on textbooks as the primary source of knowledge, will make learning more engaging and effective.

2. Methodology

Flutter Flow is the programming tool used in this study. Flutter Flow is an online app builder whose major focus is to make it possible to create high-performance, high-fidelity applications from a single code base for desktop operating systems (Windows, macOS), Android, the web, and iOS. With Flutter, programmers can create applications with just one code base that can work with multiple operating systems.

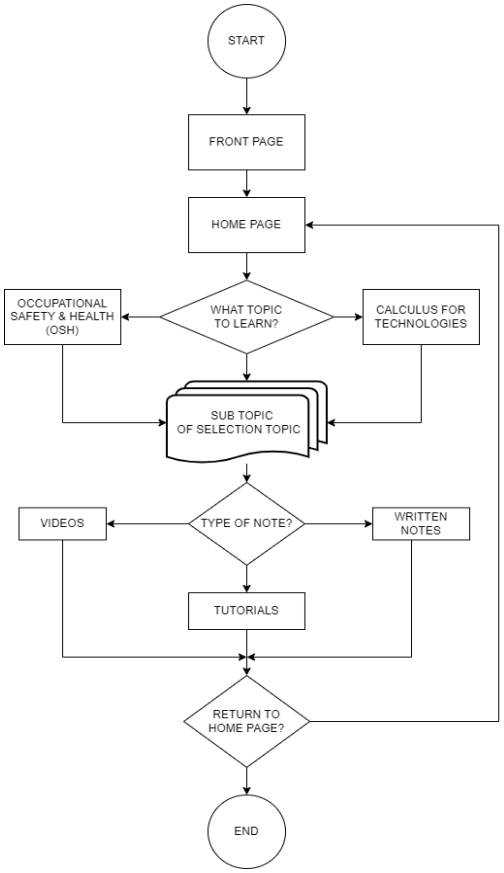

Figure 1: Flowchart of the Application

The above flowchart illustrates how the app will function. When a user launches a program, they are greeted by the main page and must click the "START" button to navigate the homepage. The option to choose the preferred course topic will be available on the home page. The tutorial part is also accessible from the home page. The app will display the subtopic under the main subject when the user has previously chosen that. There will be sections for videos, notes, and examples that pertain to each subtopic's chosen subject. The user can then return to the home page by tapping the home button, and the app will continue to run until the user exits it.

3. Results And Discussion

As a result, in this paper the BTech course app successfully coded and have four major section including Occupational safety and health, Calculus for Technologists, Tutorial Calculus for Technologists and Contact Us.

3.1 **Occupational safety and health**

5.3. We will provide knowledge and focus on the identification and control of hazards in the workplace that can cause injury, illness, or death to people in the OSH section. The OSH section aims to prepare students for careers in occupational safety and health, such as safety managers, health and safety engineers, or occupational health nurses, when they are in universities. These sections cover a wide range of topics, including safety policy, hazards, risks, and dangers, fire safety, first aid, chemical safety, electrical safety, and health. It also will have the tab "frequently asked questions" to answer common questions people ask and a "reference" tab. Every topic will have its own note with a video for better understanding.

Figure 2: Topic selection in OSH section

3.2 Calculus for Technologists

Calculus for Technologists is a course or programme of study that focuses on the application of calculus concepts and techniques to problems in the field of technology. In the section on calculus for technologists, students may learn how to use calculus to solve problems related to technology, such as modelling the behaviour of machines or systems, analysing data, or optimising processes. The course may cover topics such as sequences and series, vector analysis, and multiple integrals. This section will provide a detailed note and video that relate to the question, and it also has a tutorial question with a complete answer to make it easier for students to study and understand.

Figure 3**:** Topic selection in calculus section

4. Conclusion

This paper is about the development of an UiTM BTech App Course for students using Flutter Flow. The students can learn and gain skills or knowledge from taking the course with this application. The app offered a course on occupational safety and health and calculus for technologies with notes, examples, and videos. With the Flutter Flow coding platform, the interactive course app successfully be built where it will include interactive elements, such as tutorials and videos, which can make learning more engaging and effective that will be delivered entirely through a mobile app.

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Evaluating the Residential Outdoor Environment for the Elderly using the Seniors' Outdoor Survey Tool

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Abstract. As China's elderly population grows, residential areas need to provide an outdoor environment for their physical and mental health in good condition. Many studies have found that better outdoor environments in residential areas can improve the health of the elderly and increase their happiness. The Seniors' Outdoor Survey (SOS) tool was developed as an effective and reliable assessment tool to evaluate the needs and preferences of the elderly in outdoor spaces. The SOS tool is used to evaluate Shuiqinggou Park in Qingdao, Shandong Province, China. The outdoor environment is divided into three parts for five domains of evaluation. The final average score of the whole environment is 84.35, the percentage is 86.9% compared with the total score, the Inter-rater ICC among trainers is 0.917, and the T-test value is 0.799. The results of the tools show that Shuiqinggou Park is a favourable outdoor space suitable and safe for the elderly. The study's findings can help project managers and designers identify the essential outdoor characteristics for future construction and maintenance prioritization.

1. Introduction

As China's elderly population grows, so does the need for their well-being. The residential outdoor environment is the main space for physical activity for the elderly, positively affecting their physical and mental health. Under the background of ageing in China, an environmental assessment was used to evaluate the outdoor environment and whether the outdoor environment is suitable for the elderly.

1.1. Outdoor spaces for senior citizens

Better outdoor environments in the residential area also increase residents' satisfaction with the environment, indirectly increasing the occupancy rate [1]. It is crucial to improve the residential outdoor environment of the elderly, and how to evaluate whether the environment is suitable for the elderly is an important task. Many scholars have been actively using SOS tools in recent years, so this study will use them to evaluate environmental characteristics.

1.2. Environmental assessment

The Seniors' Outdoor Survey (SOS) tool has now been developed, which initially organized 63 items into seven domains and demonstrated high reliability among raters. In 2018, Bardenhagen [2] quantified the level of support for each project to develop a numerical weighting based on resident preferences,

behavioural outcomes, and expert opinions. In the end, a straightforward formula emerged that produced satisfactory results:

Item Rating * Item Weighting * 2 Multiplier + 60 Addend = Item Score

This tool provides automatic scoring and, eventually, a fixed format for researchers to use [2].

2. Methodology

The SOS tool (the Seniors' Outdoor Survey) was developed as a valid and reliable method to assess the outdoor Spaces of facilities based on the extent to which they support the needs and preferences of elderly residents all over the world based in the USA [2] [3] [4] [5] [6]. The SOS tool developed through the research project has been extensively tested.

2.1. The SOS Tool

2.1.1. Tool structure. The tool is designed to evaluate 60 items of outdoor environment characteristics on a 1-7 scale (1= worst, 7= best). These characteristics are organized according to the categories of environmental aspects contained in five domains[3].

2.1.2. Trainers. The trainers can choose any person, including managers, activity users, maintainers, professional researchers, etc.

2.2 Environmental profiles

2.2.1. Study sites. This study site is the outdoor environment of Shuiqinggou residential areas in Qingdao, Shandong Province, China. Qingdao is a coastal city in eastern China. It is in the northern temperate East Asian monsoon region, which has a warm temperate monsoon climate. It is shown in Figure 1.

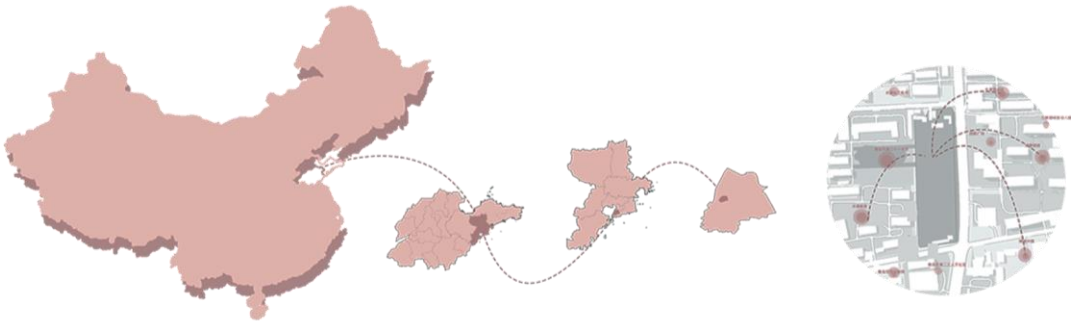

Figure 1: Location plan of Shuiqinggou residential outdoor environment

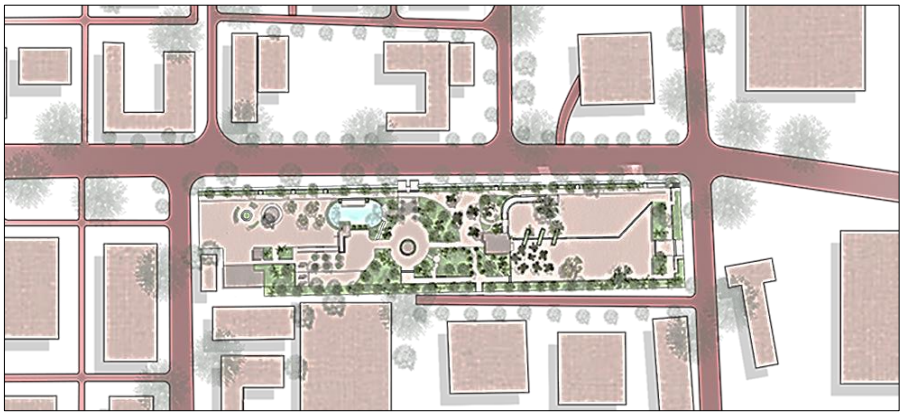

Figure 2**:** Plan of Shuiqinggou residential outdoor environment

2.1.2. Residential outdoor environment. Because the residential outdoor environment of Qingdao Shuiqinggou is relatively large, it is divided into three parts according to the environmental characteristics.

2.3 Data Collection

2.3.1. Site investigation. In order to increase the validity of the study, three raters were selected for this evaluation.

2.3.2. Data entry and analysis. The collected data is entered into a Microsoft Excel™ spreadsheet. Then the data was calculated on the SPSSPRO website using reliability statistics.

3. Results and Discussion

Table 1 compares the assessment and reliability of Space by three trainers.

Table 1: A score of the five domains of the SOS

Outdoor Space	Park entrance			Centre park			Community passive park area		
	T1	T2	T3	T1	T2	T3	T1	T2	T3
Access to Nature	81.44	75.23	78.79	85.2	82.84	86.71	81.67	81.94	80.93
Outdoor Comfort and Safety	73.21	72.09	77.19	78.54	76.29	80.46	82.19	80.96	81.12
Walking and Outdoor Activities	88.63	87.29	88.64	88.96	87.86	89.06	89.24	89.44	89.19
Indoor Outdoor Connection	84.35	86.91	88.00	85.96	85.91	86.76	88.76	90.58	90.58
Connection to the World	85.44	81.78	83.22	87.67	83.22	84.67	89.22	87.67	90.00
Average Score	82.61	80.66	83.17	85.27	83.22	85.53	86.22	86.12	86.36

Table 2: Analysis of SOS score results and validated by Inter-rater ICC and T-test

Outdoor Space	Average Score	Full Score	Percentage	Inter-rater ICC	T-test
Access to Nature	81.64	95.50	85.5%	0.856	0.859
Outdoor Comfort and Safety	78.01	94.81	82.3%	0.904	0.953
Walking and Outdoor Activities	88.53	99.30	89.2%	0.657	0.721
Indoor Outdoor Connection	87.53	100.00	86.7%	0. 887	0.721
Connection to the World	84.88	95.00	89.3%	0.872	0.953
Average Score	84.35	97.10	86.9%	0.917	0.799

Note:

1) *A computable form was downloaded directly from the website: Accesstonature.org and a scale of 1-7 was filled in to display the different scores. Because of the weighting, the full score for each item is different.*
2) *Percentage=Average Score/ Full Score.*
3) *T1 is for a 68-year-old trainer; T2 is for a 45-year-old trainer; T3 is for a 21-year-old trainer.*

Combined with the sixty items'-scores of the SOS tool, the space is explicitly analyzed as follows:

3.1. Park entrance

The average score of the three trainers scored from 80 to 84, the lowest of the three spaces. Of the five domains, "Outdoor Comfort and Safety" scored the lowest.

"Access to Nature" is also not exceptionally high at the Park entrance. It is suitable for the elderly to gather together for square dancing or carry out community performing arts activities in the big square.

（Figure 3)）

3.2. Center park

The three trainers' average score was 83 to 86. Of the five domains, the "Outdoor Comfort and Safety" score is also the lowest in Center park.

The other four domains have relatively high scores, indicating that the area is relatively good in "Accessing to nature", "Walking activities", "Indoor and outdoor connections", and "Connections to the world". In the specific items, the score for gardening work was lower. In this space, most of the staff engaged in horticultural work. It can be considered making a local gardening space, encouraging the residents to adopt and participate in the horticultural work(Figure 4).

Figure 3: Park entrance

Figure 4: Center park

Figure 5: Community passive park area

3.3. Community passive park area

The five domains' scores in this space are the highest. The average score is above 86, indicating that this space condition is excellent. In the centre of the space, a corridor twisted with vines has a good effect of wind and rain (Figure 5). Moreover, some sports venues are suitable for under-shade activities in this space. The entire space was without interruption in personnel from 6 pm to 9 pm, especially the elderly, and the number of active people has been high.

4. Conclusion

Through the analysis of Qingdao Shuiqinggou Park using SOS tools, the residential outdoor environment is suitable for the elderly based on four domains; "Accessing to nature", "Walking activities", "Indoor and

outdoor connections", and "Connections to the world". This SOS tool is successful in use with excellent results in Shuiqinggou residential environment.

SOS tool can easily and quickly understand the main problems existing in park environmental characteristics. The SOS tool is also practical and extensive. It is relatively simple and beneficial to investigate the outdoor environment. In the future study, the primary data will be combined with the questionnaire survey and interview to make the results closer to the elderly daily activities in the outdoor environment.

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The Implementation of Smart City Concepts in the Area of Greater Kuching, Sarawak

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Abstract. This research is to study the implementation of Smart City concept in Greater Kuching, Sarawak. This study is conducted at Central Business District of Kuching which are being managed by Dewan Bandaraya Kuching Utara (DBKU) and Majlis Bandaraya Kuching Selatan (MBKS). The purpose of this study is to assess public's perceptions on the idea of implementing Smart City in Greater Kuching and also attempts to assess the awareness of the respondents and readiness of local authorities in implementing the Smart City concept in Kuching by employing both quantitative and qualitative analysis approach. There were 160 respondents participated in the survey and key personnel from DBKU and MBKS were interviewed. The findings of this study reveal that people are accepting the implementation as they are aware with current technological evolution and the local authorities are ready to be improving the current services in realising the Smart City agenda. The findings also show that the local authority need to improve the services in urban public space which adapt Smart City technologies.

1. Introduction

Smart City implementation in Greater Kuching, Sarawak, is the subject of this study. An intelligent and sustainable city, as defined by the United Nations Economic Commission for Europe (UNECE) in 2020 refers that smart city utilizes ICTs to improve quality of life, productivity, services, and competitiveness. The implementation of Smart City aims to meet the economic, social, environmental, and cultural needs of the present and future generations while at the same time protecting the environment and cultural heritage. In general, a smart city is an urban region that relies on technology and electronics to collect data, which is then utilised to efficiently manage assets, resources, and services, resulting in improved operations for the entire city. Smart city implementation, according to McLaren and Agyeman (2015), requires the utilisation of data. It will be processed and analysed to keep track of and manage the traffic, transportation system, power plants, utility networks, water supply networks (including waste management), solid waste management, criminal records for crime investigation, and the information systems in schools, libraries hospitals and community services.

2. Background of Study

The Premier of Sarawak, Datuk Patinggi Abang Johari Openg stated that the smart city concept would be expanded throughout major towns in the state. He further added that Kuching, Sibu, and Bintulu will be transformed into smart cities in stages over the next few years (Malay Mail, 2021). Sarawak has established Sarawak Multimedia Authority (SMA) in 2017 which is responsible for the implementation and proposal of smart city concepts in the state. SMA will help to prepare the Ministry of Local Government and Housing in embracing the paradigm shift, which is linked to smart initiatives (Ministry of Local Government and Housing Sarawak, 2020). Sarawak Multimedia Authority (SMA) is a

regulatory body that regulate and facilitate the development and implementation of Sarawak's communication, multimedia, and digital economy initiatives. To understanding the concept of Smart City implementations, there are few criteria has been selected in satisfying the requirements of this study. Below is the theoretical framework of this research:

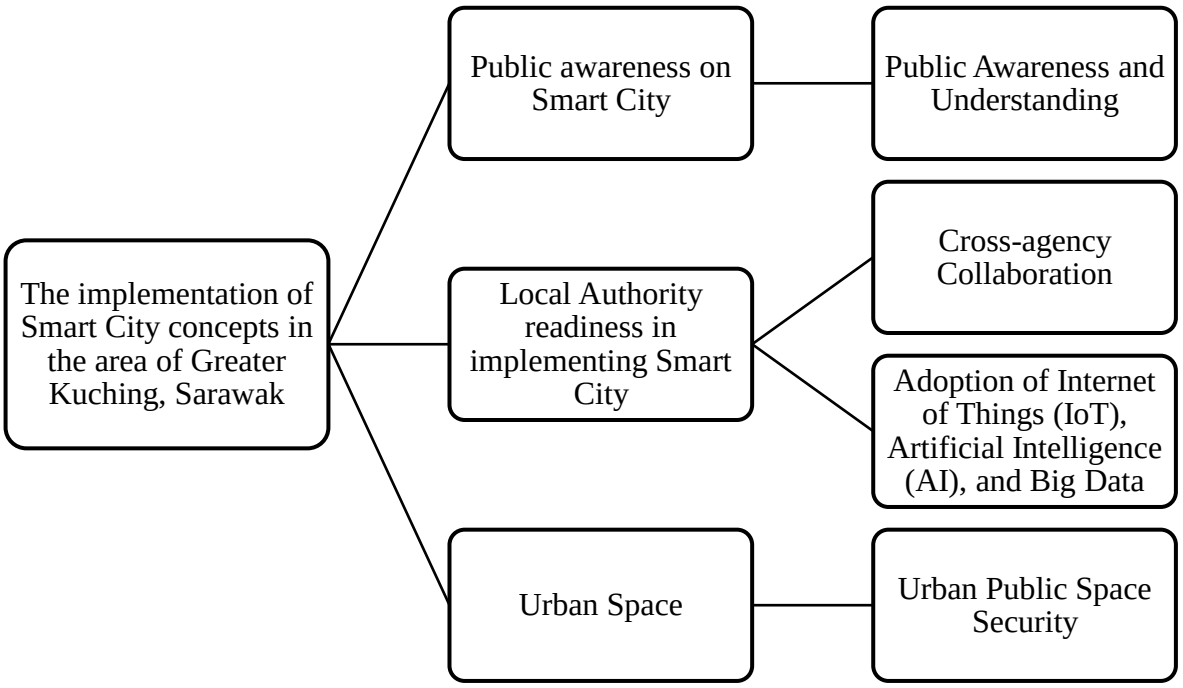

Figure 1: Theoretical Framework

The framework is also drawn from the literature review, which is focused on three major ideas namely, public awareness on Smart City where and important component in public awareness is public participation. These two elements are crucial in realising Smart City concept in Greater Kuching. The second component in the framework is Local Authority readiness in implementing Smart City which relates with cross-sector collaboration, which adapt Smart City that incorporates the of Internet of Things (IoT), Artificial Intelligence (AI), and Big. The last component in the theoretical framework is urban space and security within the urban space.

3. Analysis and Findings

3.1 Demographic Background

The demographic backgrounds of the respondents are taken into consideration in this study. A total of 50 percent of respondents were male and another 50 percent were female. Statistic revealed that most of the respondents are at the age range of 25 – 34 years old, which is 53.8 percent followed by 26.9 percent are at the age range of 18 – 24 years old. On the other hand, 14.4 percent are at the age range of 35 – 44 years old, followed by 1.3 percent are at the age range of 65 – 74 years old. The least respondent is from the age range of 55 – 64 years old with 0.6 percent. Based on the statistic, 51.9 percent of the respondents are from Bumiputera ethnic, followed by 36.9 percent Malays and 11.9 percent are Chinese. For occupation, most of the respondents are from private sector, which cover 39.4 percent of the

respondents, followed by government sector on 25 percent. Meanwhile, 23.1 percent of the respondents are student, followed by 7.5 percent are not working. 4.4 percent of the respondents are self-employed, and 0.6 percent of the respondent is retired.

Table 1: Demographic Background

Variable	Label	N	%
Age	18 – 24 years old	43	26.9
	25 – 34 years old	86	53.8
	35 – 44 years old	23	14.4
	45 – 54 years old	5	3.1
	55 -64 years old	1	0.6
	65 – 74 years old	2	1.3
Gender	Male	80	50
	Female	80	50
Ethnic	Malay	58	36.3
	Bumiputera	83	51.9
	Chinese	19	11.9
Education Level	Secondary School	12	7.5
	Diploma/Matriculation/STPM	35	21.9
	Bachelor's Degree	97	60.6
	Postgraduate – Master's or PhD	16	10.0
Occupation	Student	37	23.1
	Government Sector	40	25
	Private Sector	63	39.4
	Self-Employed	7	4.4
	Not Working	12	7.5
	Retired	1	0.6

3.2 Awareness of Smart City

Table 2: Results of Awareness of Smart City

Statements	Respondent's Responses									
	Strongly Disagree		Disagree		Undecided		Agree		Strongly Agree	
	N	%	n	%	n	%	n	%	n	%
Familiar with the concept of Smart City implemented in Greater Kuching.	10	6.3	17	10.6	65	40.6	48	30	20	12.5
Interested in inquiring further information about Smart City.	0	0	0	0	7	4.4	68	42.5	85	53.1
Aware of technological information presence in Greater Kuching Smart City	10	6.3	18	11.3	41	25.6	65	40.6	26	16.3
Kuching Smart City is interconnected with Wi-Fi and 5G technology.	7	4.4	11	6.9	48	30	66	41.3	28	17.5
Agree that active participation of citizen is important in implementing Smart City.	0	0	3	1.9	7	4.4	63	39.4	87	54.4
Smart City is related to Global Sustainable Development Goals (SDGs)	2	1.3	2	1.3	32	20	63	39.4	61	38.1
Smart City is also incorporate with Green City.	3	1.9	1	0.6	25	15.6	69	43.1	62	38.8

42.5% of respondents are agreed and strongly agreed that they are familiar with the concept of Smart City implemented in Greater Kuching. However, there are 16.9% who are undecided with the statement. 77.5 percent of the respondents agreed that Smart City is related to the Global Sustainable Development

Goals (SDGs), while 20 percent are undecided, and 2.6% disagreed. 93.8% are agreed that active participation of citizen is important, while 4.4% are undecided on the statements. During observation, some of the shop owners at Kuching Old Bazaar promote their place by documenting of history and lifestyle. Cultural mapping that covered over 100 shop houses from the units of old bazaar, producing videos, providing 40 information plaques with scannable QR codes, and setting up websites to promote the area to tourists. This view is similar to the view posed by Georgiadis et al. (2021) that the technologies play an important part of digital urban transformation in which the public can gather more information regarding tourist sports within the city. Organisers are also using street arts like mural commissions and events such as intercultural mooncake festival and the "Three Goddess Parades". This has been emphasised by Bednardska-Oljniczak et al. (2019) that public engagement is the key part in sustaining the smart city ideas. Businesses in Kuching are adapting new norm like accepting cashless transaction system like Sarawak Pay and Touch N Go e-wallet which bring benefit to the business owners and consumers as well. The informants opined that this initiative is a good initiative in promoting Kuching Old Bazaar as tourist destination as the tourist will get the information from the fingertips. At the same time, the business owner could use this as an opportunity to promote their business.

3.3 Local Authority Readiness

This section will discuss the perceptions of public towards the Local Authority readiness and the initiatives that have been done by two respective Local Authorities. The discussion in this section is based on the data collected from questionnaires and additional information that has been obtained during the interview with the informants from both local authorities. The survey results on the Local Authority readiness are shown in Table 3.

Table 3: Results of Local Authority Readiness

Statements	Respondent's Responses									
	Strongly Disagree		Disagree		Undecided		Agree		Strongly Agree	
	n	%	n	%	n	%	n	%	n	%
Local Authority engaged the citizen in regard to the implementation of Smart City programmes.	4	2.5	10	6.3	47	29.4	59	36.9	40	25
The Local Authority work together with stakeholders in implementing Smart City.	1	0.6	10	6.3	39	24.4	65	40.6	45	28.1
The Local Authority provides comprehensive Smart City policies.	6	3.8	16	10	45	28.1	50	31.3	43	26.9
The Local Authority provide adequate resources in implementing Smart City	9	5.6	26	16.3	42	26.3	48	30	35	21.9
The bureaucracy in Local Authorities has knowledge in implementing Kuching Smart City.	13	8.1	15	9.4	59	36.9	39	24.4	34	21.3

68.1 percent of respondents perceived that the Local Authority are working together with the stakeholders in implementing Smart City in Greater Kuching. However, 24.4 percent of the respondents feels unsure on the statement, and 6.9 percent disagreed. In terms of policies, 58.2 percent recognized the local authority in providing comprehensive Smart City policies as 28.1% are unsure, and 13.8% disagrees.

3.4 Cross Agency Collaboration

One of the approaches in engaging citizen in regard to the implementation of Smart City programme is via exhibition, community events that have been organised by Local Authorities, State Government and Private Sectors. With current unity, political stability and rapid developments, these initiatives attracted foreign companies to expand their business in Sarawak. Informants say Sarawak is undergoing a transformation towards digital economy, and the infrastructure development will attract foreign companies. They also highlighted that the current e-governance system like TALIKHIDMAT and other e-government services does enhance public engagement. Informants from DBKU and MBKS told researcher that the Sarawak Government has a five-year development plan to transform Kuching into a Smart City. Although the redevelopment takes place, it will not affect the existing historic building as the historical symbols will be preserved. Informants in Sarawak have told researchers that the local authorities are providing adequate resources with the funding from the State Government and a joint collaboration with state-owned GLCs for implementing Smart City initiatives. In terms of resources, informants said the local government has provided adequate funding for the implementation of the project.

3.5 Involvement of Internet of Things (IoT), Artificial Intelligence (AI) and Big Data

TALIKHIDMAT serves as a one-stop shop for the public to contact government departments and non-government organisations in Sarawak about public services. It was established by the Premier of Sarawak Department to improve the agencies' current communication systems. The public will receive a prompt response if correct management and strategy are used. MBKS have conducted Customer Satisfaction Survey in 2016 and 2017 in which to gather information on customer satisfaction level for overall performance of MBKS. In 2018, MBKS conducted public consultation on assessment rates regarding the efficiency of assessment rates collection that will help customer to plan when to pay their rates. MBKS has also launched a community app known as QMunity App which that aided Sarawak authorities in tracking people's travels and, if required, contact tracing during the COVID-19 pandemic. MBKS also provide e-booking services to book public facilities and services under its jurisdiction. DBKU on the other hand, in collaboration with PP Telecommunication Sdn. Bhd. have installed a public Wi-Fi at Kuching Waterfront. DBKU Digital Survey aimed to get a response on customer satisfaction level. E-submission is intended to serve as a single portal or one-stop online service. All these initiatives are seen as a transformative process in which a city government is able to adjust its mode of governance to become smarter in terms of public services delivery which is similar to what has been discussed by Pratama and Imawan (2019).

3.6 Urban Public Space Which Smart City Adopt

In this section, it will discuss the perceptions of public towards the urban space in Smart City in Greater Kuching. Urban space also refers to open space which denoting to streets, parks and recreational areas, plazas, and other outdoor spaces. The discussion in this section is based on the data from questionnaires and some information that have been attained during the interview. The survey results on the urban space which smart city adapt are shown in Table 4.

Table 4: Results of Urban Public Space Which Smart City Adopt

Statements	**Respondent's Responses**									
	Strongly Disagree		**Disagree**		**Undecided**		**Agree**		**Strongly Agree**	
	N	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Smart City in Greater Kuching adopt Parks and Central Square.	1	0.6	9	5.6	52	32.5	53	33.1	45	28.1
There is an internet connection in Kuching urban space.	5	3.1	13	8.1	33	20.6	63	39.4	46	28.7

Tells of cultural history and cultural assets available in Greater Kuching.	1	0.6	6	3.8	34	21.3	65	40.6	54	33.8
Creative place making is found in urban space of Kuching.	2	1.3	15	9.4	37	23.1	57	35.6	49	30.6
Emerging technologies help to improve public areas.	3	1.9	0	0	18	11.3	68	42.5	71	44.4
Old Heritage Trails in Kuching adapts smart technology.	6	3.8	9	5.6	45	28.1	59	36.9	41	25.6
CCTV are installed in strategic areas in enhancing the security of urban space.	5	3.1	6	3.8	21	13.1	54	33.8	74	46.3

Survey finds that 61.2 percent of the respondents agreed that Smart City in Greater Kuching adopt parks and central square. Out of 160 respondents, 17.4 percent agreed that there are tells of cultural history and cultural assets that available in Greater Kuching. The survey also finds out that 62.5 percent agreed on the Old Heritage Trails adapts smart technology, where 28.1 percent are not sure, and 10.7 percent disagreed. The goal is to meet UNESCO's requirements and recognise Old Kuching as a smart historic city, allowing it to stimulate community economic growth and improve quality of life. These can be achieved by enabling smart heritage development, empowering communities, and delivering high impact outcomes that are based on the strategic goals of its five thrusts. The Kampung Heritage, Historical Building Heritage, Business Heritage, and Riverfront Heritage are the four components or development sectors of OKSHe. However, OKSHe could facilitation the dissemination of placemaking stories and visuals in an innovative method to make the targeted places in OKSHe interesting as what has been discussed by Stokes et al (2018).

3.7 Urban Public Space Security

Based on the information gathered from the informants, both DBKU and MBKS adopt the Smart City in their parks and central square. The installation of CCTV in parks and public area is one of their initiatives. According to them, it is aimed for crime prevention and other safety reasons. The Ministry of Local Government and Housing Sarawak and Sarawak Multimedia Authority would deploy 800 CCTV cameras across 200 places in Greater Kuching Smart City, according to the sources. It's scheduled to be finished by the end of 2021. The CCTV cameras are placed in the DBKU, MBKS, Majlis Perbandaran Kota Samarahan (MPKS), and Majlis Perbandaran Padawan (MPP) zones, and they provide real-time footage and data to the Sarawak Integrated Operation Centre (SIOC) on a regular basis, 24 hours a day, 365 days a year. This installation of surveillance camera aims to prevent crimes which has been discussed by Chui et al., (2019).

4. Discussion and Conclusions

Discussions

Residents of Greater Kuching in Sarawak are aware of the implementation of the Smart City initiatives. Stakeholders such as business owners and the private sector received the initiative positively. There is a need for the government to provide sufficient sophisticated and user-friendly infrastructure facilities to realize this initiative. The residents also think that the community needs to be educated in terms of the use of information technology.

In the public sector, informants from both local authorities believe that those in authority should learn more about new technologies and collaborate with other stakeholders and the general public in exchanging technological information and ideas. The present master plan is in line with Smart City goals. As a result, individuals must be educated in terms of technology, and the government must establish a proper infrastructure to support the initiative's implementation.

For urban space, Greater Kuching is capable of becoming a gateway to other cities in Sarawak as per its physical and indescribable history. The OKSHe initiative is aimed to emphasise Smart City element which aims to encouraging smart heritage development, empowering communities, and delivering high

impact outcomes. By improving the security of urban space, the State Government make a great decision by implementing CCTV cameras across various places in Greater Kuching Smart City. This will help in reducing crime, disaster management and other purposes as the footage and data are centralised under the SIOC. Overall, this study proves that residents in Greater Kuching response positively with the implementation of Smart City in Greater Kuching.

Conclusions

Residents of Greater Kuching in Sarawak welcome the implementation of Smart City. Residents are aware that active public participation is essential in realising this initiative. In this study, it was proven that residents are interested to know more about the development of a Smart City as well as aware of technological advances such as Wi-Fi and 5G technology.

The importance of educating the citizens in the use of information technology and the expertise of young people in technology development in realizing this initiative is also in line with the Global Sustainable Development Goals (SDGs). At the local government level, local authorities are aware of the importance of public participation in improving the development of Smart City in Greater Kuching. Although the master plan proposed by the Sarawak Government is comprehensive, it is a requirement for the government in providing sophisticated infrastructure which inline with the Smart City concept. Greater Kuching is a potential to become a good model of the implementation of Smart City as this city owns it remarkable physical and indescribable history.

The OKSHe initiative is a kickstart in developing smart heritage, smart community which will lead to high impact outcomes. Apart from that, Sarawak Government leads a good decision by initiate the Sarawak Integrated Operation Centre (SIOC) intended to reducing delinquency activities, risk management and other purposes. On the other hand, researcher wants to recommend Sarawak Government to create a master plan in regarding of Smart City as it is only limited to Greater Kuching. Unlike some local authorities in Peninsular Malaysia, local authorities do have Smart City master plan in managing their city under their jurisdiction.

By having master plan, this will help Local Authorities and the Sarawak Government to track and identify the effectiveness of every action or initiative and they are able to achieve every key performance indicator (KPI) annually. The researcher suggested that the research should examine more precisely about the effectiveness of smart city initiative in terms of urban connectivity in Greater Kuching, Sarawak. Future research should employ both qualitative and quantitative methodology as a tool to evaluate Smart City initiative. Perhaps the scope of the study needs to be expanded not only on Greater Kuching area, but also other cities in Sarawak such as Sibu, Bintulu or Miri.

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Teaching and Learning-Assessment (TnL-A) through IERA-Stages: Strategies for BQS406 Content Development

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Abstract. Education system in any countries can be considered as one of the foundation of its economic growth and development. Through a proper education content development, people will be provided with the skills and knowledge that lead to self improvement and nation's growth. The enrichment of content development in education is among the important and actual tasks of teaching and learning nowadays by expanding the scope of knowledge and skills, increasing creativity and quality of students. Therefore, this study aims to highlight the implementation of course content for Principles of Economics (BQS406) through the IERA-Stages: Strategies for BQS406 Content Development. The main objectives were to highlight the adaptation of IERA-Stages: Strategies for BQS406 Content Development to the teaching and learning methods and form of assessment, and to determine the implementation of those strategies in the related course. An extensive literature review was done to obtain the content development for education, at large. The strategies implementation was done to the 80 students of Semester 01; BQS406 course, to obtain the outcome in depth. There were four stages in IERA-Stages; Identifying, Extending, Refining and Applying and the implementation of those components was through teaching and learning methods such as lecture, discussions and meeting sessions, while the assessment involved quizzes, game-based activities, progress and final presentation. The outcomes showed that students had developed and improved their communication and teamwork skills among them. Therefore, by implementing appropriate strategies of teaching and learning and form of assessment, the course will be more well-structured, interactive and informative.

1. Introduction

The success of any countries depends on the knowledge and understanding, skills and peoples' competencies, and these can be achieved through a proper teaching and learning in education system. The educational institutions today are experiencing a digital transformation, where in teaching and learning, they need to future-proof the content strategy to keep up with the transformation. For example, they need to understand students' objective and respond to the needs with interactive and engaging content. With the availability of different content formats, many educational institutes need to put extra effort to keep the content consistent and strategic [2].

[4] stated that to develop any course content for better teaching and learning process, a thorough planning and revision are essential. The syllabus content, teaching methods, type of coursework or projects and others need to be included. Educators need to understand who the students are, what their needs are and how to assess their learning. This is supported by [2] that the content required a clear structure and one have to define the purpose of strategies the educational content development. Moreover, to enable students to learn independently, teaching and learning content need to include content personalisation, incorporate video content and offering content on mobile.

[4] highlighted that the academicians should also emphasise on the implementation of the content in the classroom, either through face-to-face, online or hybrid methods. They must use variety techniques in creating innovative and creative teaching and learning environment to ensure the students understand

and enjoy the process [3]. They must include practical experiences to students, such as teaching and learning through case studies, stories, experiments, video content, mobile-use content, podcasts and others [2]: [4]: [5].

In order to support Malaysia education system, University Teknologi MARA through its Education 5.0 @ UiTM, also emphasised on the interactive teaching and learning method. The main objectives are to capitalise and control on technology to ensure all courses are efficient and students' learning experiences are meaningful and exciting [1]. Therefore, this study is the enhancement of the research done previously and it is aim to highlight the adaptation of IERA-Stages: Strategies for BQS406 Content Development to the teaching and learning approach and form of assessments though out the semester.

2. Research Methodology

Extensive literature Review was done to obtain general information on the related teaching and learning approach, and planning and implementation of content development in the education institutions. In addition, document analysis related to the framework of IERA-Stages: Strategies for BQS406 Content Development was outlined. This was an essential process to have a better understanding in retrieving the stages and what were the teaching and learning approaches, and form of assessment outlined for the BQS406 content. Later, an experimental method was used, to test whether the teaching and learning methods and form of assessment implementation suitable for the student's interactions and learning process in class.

The approach was emphasised to the 80 students of Semester 01 under the subject of Principles of Economics (BQS406), in Quantity Surveying Studies, College of Built Environment, UiTM Shah Alam. As mentioned by [3], this course was selected on which to fulfil the requirement of the college, to reduce the Final Assessment based course to the non-exam based course. In addition, due to the transformation of learning approaches towards digitalisation and technology competitive, there was an enhancement towards the BQS406 teaching and learning and assessment approaches.

3. Result and Discussion

3.1. The adaptation of IERA-Stages: Strategies for BQS406 Content Development to the teaching and learning methods and form of assessment

Table 1 shows the detail stages of content development for the Principles of Economics (BQS406) course as there were four stages in the IERA-Stages: Strategies for BQS406 Content Development; identifying, extending, refining and applying. In addition, the teaching and learning method, assessment and activities involved in the assessment were outlined. This course already embedded the discussion and meeting session to ensure two-way communication involved. By implementing such method, it will develop their communication skills, the ability to do work independently and to be able to manage a good teamwork. For the assessment activities, interactive approach such as game-based (kahoot!) activities, other online platform quizzes and setting an online platform meeting (google meet, webex, others) to present their progress and final presentation were done to motivate them on the self learning approach. Nevertheless, the assessment was also done in a form of document submission to ensure the students still have the knowledge in reporting a proper content of coursework.

Table 1. Four stages in IERA-Stages: Strategies for BQS406 Content Development and the teaching and learning and form of assessment adopted

Stages	Teaching Methods	Assessment	Activities
Stage 1 Informing	• Lecture	• Tutorial	• Documentation

Stage 2 Extending	• Discussion • Meeting Session	• Test • Game-Based Activities • Coursework	• Quizzes • Kahoot! game • Progress Presentation • Final Presentation
Stage 3 Refining			
Stage 4 Applying			

3.2. To determine the implementation of those strategies in the related course

Table 2 outlined the syllabus content for the Principles of Economics (BQS406) course though out the fourteen week of lectures. The main topics were outlined for this course; microeconomics and macroeconomics, and there were nine sub topics under these two main topics. Based on the implementation of above-mentioned approaches and activities, the implementation of teaching and learning methods were; microeconomics (Lecture and Discussions) and macroeconomics (Lecture, Discussion and Meeting Session).

For the activities, since microeconomics was an introduction topic to students and focused on the household activities, an interactive approach were used to attract the student engagement to the course content; quizzes, game-based, forum session and all assessment for microeconomics were individual based. This was done to encourage the students' self motivation and self learning.

As for macroeconomics topic, the course content was related to long term nations economic, therefore the activities involved with teamwork. Students need to do discussions upon the related topic given to each group, and they need to present their outcome in a form of progress presentation and final presentation. The assessments were evaluated based on individual (during final presentation) and group assessment during discussion, progress presentation and report submitted to the lecturer. To be fair for grading, a peer review was also done.

Table 2. Implementation of Teaching and learning, Activities and Assessment based on framework of IERA-Stages: Strategies for BQS406 Content Development

	LECTURE												
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	MICROECONOMICS							MACROECONOMICS						
INTRO	Basic Eco Concept	Demand & Supply			Market Equilibrium	Elasticity Of Dd & Ss		Govt Policies	National Income		Business Cycle & Unemployment	Inflation	Int. Trade	Feedback
	ACTIVITIES • **QUIZZES ; TEST** • **GAME-BASED ; KAHOOT** • **FORUM SESSION ; DISCUSSION**							ACTIVITIES • **PROGRESS PRESENTATION** • **DISCUSSION** • **FINAL PRESENTATI**						
	ASSESSMENT **INDIVIDUAL ASSESSMENT**							ASSESSMENT • **INDIVIDUAL ASSESSMENT** • **GROUP ASSESSMENT** • **PEER REVIEW**						

3.3.

3.4.

3.5. The TnL-A framework through IERA Stages: Strategies for BQS406 Content Development

Figure 1 shows the overall outlined of adaptation of IERA-Stages framework and the implementation of teaching and learning, and the assessment approaches for the course of BQS406.

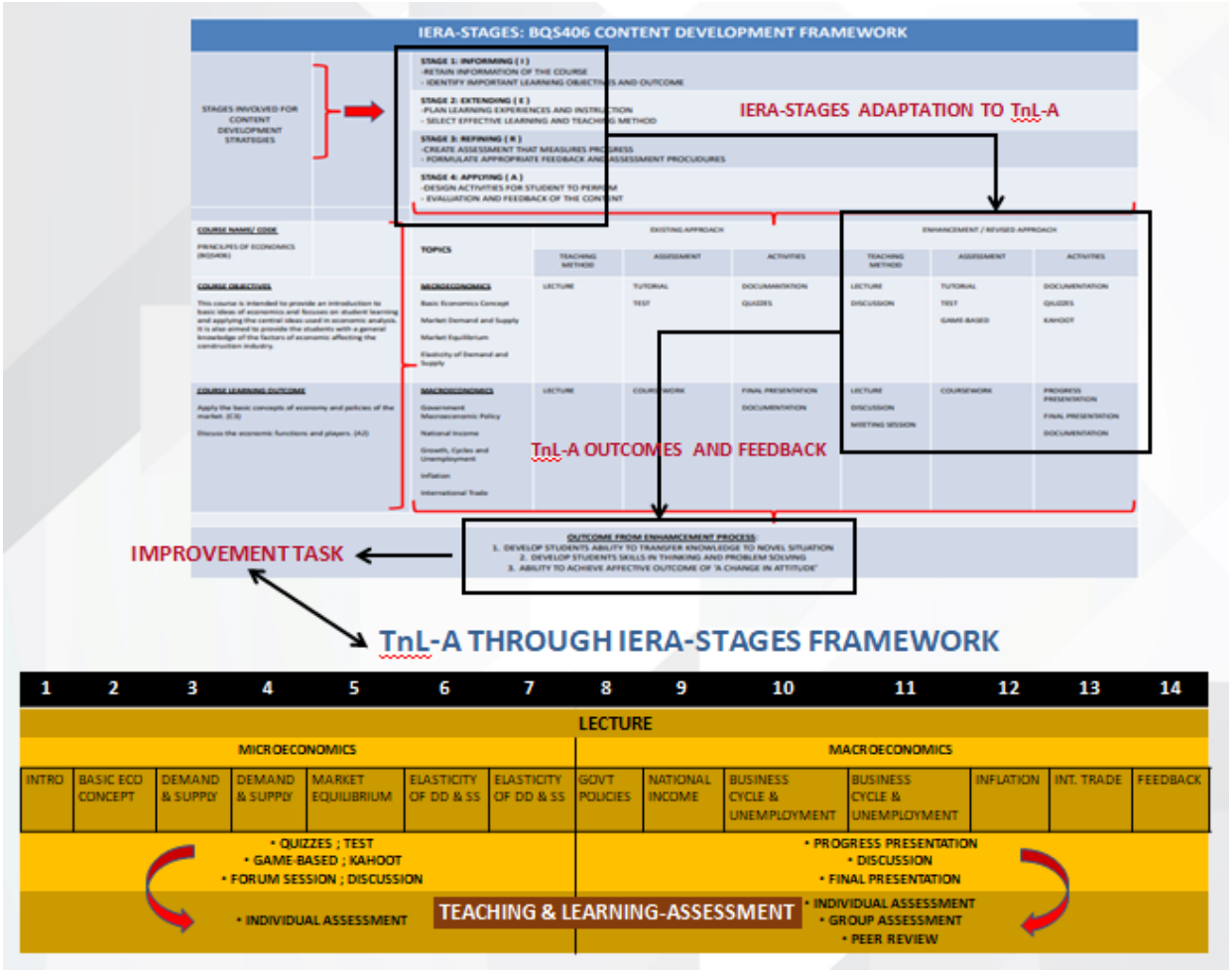

Figure 1. TnL-A Through IERA-Stages Framework

4. Conclusion

The components involved in the strategies, teaching and learning, activities involve and the assessment form for BQS406 content development were chosen to suit the syllabus content, the Professional Board requirement, the adaptation of current academic situation and others. This study was done to enhance the BQS406 content, which it has more interactive learning approach and additionally help to improved the Quantity Surveying Studies' syllabus. Moreover, this study helps to reinforce the UiTM education. Therefore, to develop content, effective strategies and methodology should be implemented. Academicians should play a major role in course content and imparting knowledge and skills to the students.

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