PERSPECTIVES IN ARCHITECTURE AND BUILT ENVIRONMENT

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CONTENT

PREFACE

This volume is a compilation of some important research work conducted by researchers from the faculty of Architecture and Built Environment at the Infrastructure University Kuala Lumpur (IUKL). The various chapters in this book look at a wide range of issues in the field of Architecture and Built Environment from the perspectives of sustainable development, culture and heritage, technology and innovation and health and well-being.

Looking at architecture from the perspective of health and general wellbeing, Nur Balqis binti Ahmad Safawi, Zairila Juria binti Zainal Abidin highlight the importance of designers having a good grasp on the medical and cognitive aspects of dementia sufferers so as to improve the fit between new home designs for dementia patients and the elderly. In their paper "Design Criteria for Dementia Elderly in Improving their Wayfinding Ability" highlight an important principle that architectural designs should be purposeful and where needed customizable to the special needs of the users to improve usability and overall quality of life. This emphasis on the quality of life is later presented on a wider conceptual framework that links quality of life and sustainable development. Similarly, in "A Review of the Principles of Governing Sustainable Landscape design", Manteghi et al. emphasise that successful environment and landscape design needs to be studied together with cognitive and human factors as "part of the dynamic development of the cultural environment and landscape". The importance of being near to human needs and close to design is further emphasised by Sharyzee Mohmad Shukri et. al In their thematic review of Biophilic street designs, they present an overview of Malaysia's biophilic street design standard and suggest that "policy makers and designers might use the Biophilic Streets Design Standards to turn theoretical and innovative discussions about biophilic urbanism into workable projects and urban interventions".

In "A Review on the Usage of Vetiver Grass in Landscape Design", Mohd Suhail Bin Sahimi et al. look at how the proper use of vetiver grass adds to the aesthetic value and as hedges and decorative plants can act as sustainable options in landscape design to "protect riparian zones and at the same time act as an active bio filtration element". With reference to Putrajaya Wetland, they note that "the major consideration in designing these wetlands should be to control storm water pollution which is able to trap the pollutants derived from upstream sources, control the inflow of flood water from Langat catchment area, and retain water for domestic use".

Looking at architecture from a historical and cultural perspective, Azrin Abu Seman, Muhammad Danial, Hana Hani Isamil Attiya Hassan present an interesting analysis of Masjid Jamek Seremban as an important part ofMalaysia 's historical and cultural heritage. The chapter looks at the mosque's architecture in the context of Seremban 's and Melaka 's religious and cultural history as an historical trading centre. The chapter highlights how the design of the mosque including its various units including its roof speaks to important historical events within the region. Such architectural icons, they emphasise, need to be carefully preserved as they are historical and traditional architectural icons of the nation.

The chapters in this volume also incude research on sustainable cities covering a wide range of important issues such as land policies and sustainable transport, equitable housing, construction waste policy in Malaysia, real estate investment trusts and the use of artificial intelligence in the construction industry. In their research, Fazleemardyana Omar et al. analyse the impact of price fluctuations on the productivity of contractors and other players in the industry. They point out that understanding this relationship would help us to better measure the performance of the construction industry. Overall, the contributions in this volume by researchers from the Infrastructure University Kuala Lumpur (IUKL) cover a wide range of important issues that fill important gaps in the literature and provide insights into some several dimensions of sustainable development as it relates to the field of Architecture and Built Environment. The book makes a useful reading to anyone interested in the field as well as for other researchers in related disciplines.

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DESIGN CRITERIA FOR DEMENTIA ELDERLY IN IMPROVING THEIR WAYFINDING ABILITY: A LITERATURE REVIEW

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ABSTRACT
The complexity of healthcare buildings is comparable to their occupants that may have different health situations. Among the users are those with cognitive and/or visual challenges such as Down syndrome, age-related decrements such as dementia, and those with limitations of vision. It has been documented that wayfinding has been an issue in healthcare facilities, which has negative impacts on patients, visitors, caregivers' time, and the organization's bottom line. This issue can be more challenging for people with illness, low vision, cognitive disorders, and limited physical mobility. The aim of this chapter is to provide an overview of the design criteria for dementia elderly and wayfinding theories that will improve their ability in navigating the intended space.

Keyword: dementia, elderly, wayfinding, design, spatial abilities

1. INTRODUCTION

Global population ageing has significant repercussions and affects many facets of human life. World population is predicted to reach 8 to 9.6 billion people in 2050 (Tobi, Fathi & Amaratunga, 2017).

As the population ages and life expectancy increases, the number of people suffering from dementia will continue to rise. Patients with dementia are well known to have diminished cognitive abilities, making it impossible for them to manage their daily lives without help from caretakers. Those with dementia experience wandering, depression, delusions, hallucinations, agitation, sleep disturbances, and other behaviour that have a significant impact on their lives and those around them (Tseng & Fang, 2022).

Spatial disorientation and declining wayfinding abilities are among the early symptoms of dementia, which is one of the major issues that people with dementia face while using the healthcare system. Wayfinding difficulties are associated with negative psychological and physiological consequences (Jamshidi *et al*., 2021) that resulted in limiting a person's ability to perform activities of daily living (ADLs) autonomously and eventually, possibly leading to institutionalization (Marquardt, 2011).

1.1 Aim & Scope

This chapter is aimed to find the relationship between the design criteria for dementia elderly and their wayfinding abilities in dementia homes. The scope will be focused on the indoor environment of the dementia homes and the ability of dementia elderly to navigate within that setting based on their spatial recognition of the space.

1.2 Methodology

The study question was addressed by conducting literature review that is divided into two parts; (1) the design criteria for dementia elderly and (2) wayfinding factors related to dementia elderly.

A theoretical framework will be developed for the most appropriate design criteria for the dementia elderly that will support and improve their wayfinding ability, particularly architectural features affecting spatial orientation and navigation.

2. ELDERLY AND DEMENTIA

In several literature reviews, the term elderly is used to characterise an older individual. While some authors may refer to them as senior citizens, others may simply refer to them as older folks. According to the United Nations World Assembly on Ageing, those 60 years of age and older are categorized as an elderly (Safawi & Rahim, 2013). The rate of growth of the elderly population has already exceeded the growth of the young population, and this gap is expected to widen over time. The number of people of 60 years and older are more than doubled from approximately 1 million to 2.2 million between 1991 and 2010. By 2040, there will be around 7 million elderly or 17.6% of the expected population of 40 million (Tey, et.al, 2016). The rapid increase in the aging population and the growing number of people affected by dementia has created an urgent need for effective interventions to support dementia care (Jakob & Collier, 2017).

Dementia syndrome is caused by the gradual deterioration of brain matter and is characterized by alterations in some of the higher cortical functions. These disabilities can impede a person's capacity to judge and make decisions as well as their orientation and spatial abilities, perception, memory, and recall, arithmetic function, learning, speech, and language (Kuliga, Berwig & Roes, 2021).

2.1 Design for Dementia

According to Hoof & Kort, 2009, the establishment of the dementia home was based on three pillars: (i) general understanding of construction and building design; (ii) literature research; and (iii) focus sessions with delegates of clients' groups. Based on Lee et. al., 2007, the authors add up that the crucial design strategies applied to upgrade the health supportive design setting must incorporate more extensive factors for example geographic physical, social and cultural organisational and conditions. Lee et. al., 2007 further continue, elderly who move into a new setting from being freely living at home might begin to feel lost his or her own identity and lack of place in the new society.

Mitchell, Burton, and Raman, 2004, support this statement; moving individuals with dementia to a new domain can affect their levels of uncertainty and confusion. Mitchell, Burton, and Raman, 2004 further clarify, during an era when their lives are changing explicitly and irreversibly from every angle, it is by and large advantageous for individuals with dementia to have the stability of staying in the well-known surroundings of their own homes and local neighbourhoods until residential care is absolutely necessary.

According to Mitchell, Burton, and Raman, 2004, elderly care home design approach which does not endeavour to support social network may be inclined to separate the elderly from the community activities and resources. Therefore, if possible, the physical building, the community, and services need to be designed so that everything is under one roof, which will provide access for integration. Based on Lee et. al., 2007, the small approach or grouping of residents rooms is proposed in the physical environment to encourage chances of casual social connection among occupants.

As suggested by Hoof & Kort, 2009, the centre should have an open and accessible floor plan of which the caretaker need to put up with the dementia behaviour and at the same to keep in

contact with one another, the building should have open floor plan with a minimal number of walls. It is known from the institutional settings that corridor or long hall can build up anxious feeling towards dementia elderly. As indicated by Mitchell, Burton, and Raman, 2004, the configuration of the built environment will have a large impact on the individual. Dementia care homes ought to build up an immediate link between the design of the internal environment and the perceptual and wayfinding abilities of residents.

Besides that, Hoof & Kort, 2009, based on Fleming et al., 2003; stated that one of the way to cater the decline in cognition is to make certain of the surrounding environment, including furniture, would have been well known to persons with dementia in their initial adulthood. Aside from the familiarity of the surrounding that should be the concern, there is also the need for safety inside the house, given the chances of the danger of wandering, (kitchen) fires, medical kit and falls.

Another issue related to the elderly with dementia is the high chances of fall occurrences, which is much bigger during night, for example, when individuals need to walk a long way for them to reach the toilet (Hoof & Kort, 2009). Sliding door between bedroom and bathroom is very efficient as a shortcut for the elderly especially during the night.

According to Lee *et. al.,* 2007 and Hoof & Kort, 2009, based on Cohen-Mansfield et al., 1990, for the interior design of the house, one could enhance the home environment by various intercessions. According to Lee et.al., 2007, the surrounding relationship with home might be review through appearance and setup of both external and internal of the building. These homes are planned with the intention to resemble a homelike setting.

It is hypothesised that reflection and monotonous for example the wallpaper prints, can be experienced as depth, which can bring out fear, anxiety and confusion for individual with dementia (Hoof & Kort, 2009). In light of this speculation, the dementia home is finished with pastel hues without examples and prints. In order to reduce confusion and perhaps lessen the number of fall episodes, doorsteps, and colour accent on floors are avoided. Hoof and Kort, 2009 continue, so as to diminish the danger of falls, so as to diminish the danger of falls, walkways are kept free of clutter, and all furniture that might be grabbed for support must be stable.

To enable independent or assisted use of sanitary fittings, the bathroom and toilet space are equipped with grab bars and handles. In the case of a wheelchair user, this individual should be able to adapt with the toilet seats and washbasins in height. To allow free movement in the toilet by the wheelchair user, the bathroom should not have a bath tub but instead is equipped with roll in shower that would allow the freedom of movement for the individual or for the carer to assist. Moreover, the mirror should be mounted to the movable system that would allow it to tilt in order to ease the wheelchair user or smaller people to look in the mirror (Hoof & Kort, 2009).

Table 1: Potential design principles and solutions for dementia friendly indoor and outdoor environment (adopted from Mitchell et.al., 2003)

Internal design for dementia guidance	Potential equivalent in outdoor environment
Ensure environment is familiar	
● Small, domestic style buildings and gardens of a design familiar to older people ● Furniture, furnishing, artwork, wall and floor coverings of similar design found in private homes ● Well defined spaces: bedroom, bathrooms, living rooms, gardens resembling those in older people's private homes	● Small scale street blocks with buildings and open spaces in design familiar to older people ● Architecture façades and features in designs familiar and understandable to older people ● Clear and unambiguous design and/ or appearance of buildings and open spaces giving unequivocal representation of identity of place or building
Ensure environment is legible	
● Facility to follow the building line, rather than recessed, and visible from 60m along the street in both directions ● Simple layout with non-uniform, short, direct routes ● Minimum corridors no longer than 22m in length with no blind bends ● Uninterrupted visual access to all areas, ideally with unobstructed view at least 6-30m in both directions ● Doors fronting directly onto corridor ● Simple, explicit signs giving essential information only ● Sign fixed to wall at eye level (around 1400m – 1700m above the floor level) ● Messages on signs separated from each other ● Signs with non-glare lighting and non-reflective coverings ● Realistic, unambiguous graphics with no abbreviations	● Building to follow building line with good visual access along the street ● Short streets laid out on a deformed grid based on an adapted perimeter block pattern rather than on a uniform grid with 90 degrees junction ● Directly connected routes with few nodes and junctions and no blind bends ● Visual access along streets of at least 6m – 30m. ● Building facing the street with clearly visible and identifiable entrance ● A visual hierarchy with wider streets for main routes/ centres, narrower streets for secondary/ side streets ● Simple, explicit signs giving essential information only ● Sign fixed to wall at eye level (around 1400m – 1700m above the floor level) ● Messages on signs separated from each other ● Signs with non-glare lighting and non-reflective coverings ● Realistic, unambiguous graphics with no abbreviations
Ensure environment is distinctive	
● Variety of architectural features, such as doors and door furniture of different styles, materials, and colours ● Explicit, traditional designs for architectural features rather than ambiguous, modernistic styles	● Variety of styles, materials and colours or architectural features and street furniture ● Explicit, traditional designs for architectural features rather than ambiguous, modernistic styles.

• Where complete visual access is not possible, distinctive wayfinding cues positioned at point where visual access ends • Strategically placed cues of visual interest, such as potted plants, pictures, and clocks to identify routes, areas, and uses • Distinctive ornaments and bright or scented plants and trees to act as cues at main entrance and in garden areas • Avoidance of colours on the blue – green spectrum or those that fade or are difficult to see in bright sunlight, for example, yellow	• Way findings cues positioned where visual access ends, especially decision points, such as junctions and turnings • Landmarks directly accessible from the street to identify places, to act as cues to location and route, and to divide routes • Latent cues, such as familiar traditional style street furniture and flowering/ scented trees and shrubs, placed at decision points such as junctions/ nodes • Avoidance of colours on the blue – green spectrum or those that fade or are difficult to see in bright sunlight, for example, yellow
Ensure environment is accessible	
• Facilities cited in residential areas close to services and facilities • For unavoidable level changes, gentle slopes with a minimum gradient of 1 in 20 rather than steps • Slopes and steps clearly marked and lit, with guard and handrails on both sides, smooth, non-slip, non-glare surfaces, and nearby seating	• Services and facilities located no further than 5 to 10 minutes walking distance or residential areas • For unavoidable level changes, gentle slopes with a minimum gradient of 1 in 20 rather than steps • Unavoidable level changes clearly lit, marked, with guard and handrails on both sides, smooth, non-slip, non-glare surfaces, and nearby seating
Ensure environment is comfortable	
• Doors with lever type handles and no more than 2 kg of pressure to open • Background noise kept to below 60 decibels • Use of sound absorbing materials, for examples acoustic ceiling tiles, wall hangings, upholstery and curtain fabrics • A balanced level of stimulation without clutter • Defined resting area every 100m • Right angle seating to enable those with poor hearing and/ or vision to converse, with a clear space (80cm minimum width) next to seating for wheelchair users • Sturdy seating with soft coverings • Seating with continuous backrest, protruding armrest, non-protruding	• Doors with lever type handles and no more than 2 kg of pressure to open • Pedestrianized areas to reduce traffic noise, fumes, and danger • Acoustic barrier, such as planting and fencing, to reduce street and background noise • No unnecessary street clutter, such as extraneous signs and advertising hoardings • Seating or resting areas every 100m in a defined space with a choice of seating in shade, sun and under shelter • Right angle seating to enable those with poor hearing and/ or vision to converse, with a clear space (80cm minimum width) next to seating for wheelchair users • Sturdy public seating in materials that do not conduct heat or cold for example wood

legs and a rolled leading edge not more than 43cm high ● Small, well-defined gardens with seating and shelter from the elements and visual access to the building entrance and/ or toilets.	● Public seating with continuous backrest, protruding armrest, non-protruding legs and a rolled leading edge not more than 43cm high ● Small, well-defined open spaces with access to adequate facilities such as toilets, seating, shelter, lighting, and refreshment
Ensure environment is safe	
● Residential areas domestic and non-ambiguous in style to encourage use. Dangerous or staff areas disguised or non-domestic in style to discourage entry ● 2 -5 times the level of standard illumination ● Indirect lighting for a good illumination level with reduced glare ● No areas of deep shadow or glaring light ● Alarms/ sirens/ auditory cues on low frequency and at suitable pitch for people with hearing impairment ● Provisions for longer reaction time ● Corridors at least 2 m wide to enable less ambulant and wheelchair users to safely pass oncoming people ● Well maintained, plain, smooth, level, nonslip, non-reflective floor coverings ● Flowing in clear colour contrast and material to walls and furnishings ● Changes in texture or colour of floor coverings to indicate potential hazards ● Coniferous or narrow leafed trees, whose leaves do not stick to outdoor paving when wet, nearest to paths	● Familiar, unambiguous designs, building styles, and landmarks for spaces open to the public. Disguised features for private or dangerous areas ● Street lighting bright enough for older people that do not cause light pollution, for example, high-pressure sodium lamps ● Street lighting which illuminates pavement edge without creating glare of deep shadows in movements areas ● Design, orientation, and layout spaces and buildings that avoid creating areas of deep shadow or glaring sunlight. ● Alarms/ sirens/ auditory cues, for example at road crossing, on low frequency, and at suitable pitch for people with hearing impairment ● Provision for longer reaction time, for example at road crossing ● Wide footpath ● Well-maintained, plain, smooth, level, nonslip, non-reflective paving ● Grates and drains flush with paving with openings smaller than walking stick or shoe heel size ● Paving in clear colour contrast and material to buildings and surrounding greenery ● Changes in texture or colour of paving to indicate potential hazards ● Coniferous or narrow-leafed trees, whose leaves do not stick to outdoor paving when wet, nearest paths

2.2 Wayfinding for Dementia Elderly

Wayfinding is simply defined as the process of determining a route and navigating from an origin to one or more destinations in a physical setting when the destination is not directly visible (Jamshidi & Pati, 2021). It is an essential aspect of design both in outdoor and indoor environments; in the latter case, mainly in such complex environments as large hospitals and airports. It could lead to being lost, losing a flight or not being able to find the emergency exit while a building is on fire (Jamshidi & Pati, 2021).

As for dementia elderly, they may begin to experience a number of signs and symptoms including, intellectual deficits, mild to severe memory impairments, deteriorating language and sentence formation skills, shorter attention spans, reduced judgement and decision-making abilities, and deficits in spatial orientation and wayfinding (Kleibusch, 2018). Thus, this condition results in spatial disorientation which is "misperceiving immediate surroundings, not being aware of one's setting, or not knowing where one is in relation to the environment" (Mahoney, Vilocer, & Hurley, 2000).

The notion of wayfinding was preceded by spatial orientation, which refers to a person's ability of mentally imagining or representing a physical setting and of situating him or herself spatially within that representation (Passini, Pigot, Rainville & Tétreault, 2015). The ability to perceive the spatial layout or environment depends on the person's cognitive mapping ability, that is the ability to know, remember, and navigate from one location to another is dependent on the information obtained from the environment by the working memory (Kleibusch, 2018). Individuals with dementia that have created less detailed cognitive maps may lead to decreased motor and sensory abilities, increased safety concerns, confusion, fear or anxiety, increased difficulty in learning and adapting to the environment, also reduced abilities in spatial orientation and wayfinding (Davis, Therrien & West, 2009).

According to Passini, Pigot, Rainville & Tétreault, 2000, wayfinding is a major prerequisite of mobility and, thus, of independence and personal autonomy. Three major factors affect the mobility of an Alzheimer's patient in the context of a nursing home: (a) the person's psychological and mental state, (b) the physical environment, and (c) the caregiving environment. They also stated that wayfinding strategy for dementia elderly with Alzheimer is environmentally dependent, making only small demands on memory and spatial understanding, by suggesting by creating small-scaled settings with simple but not monotonous circulation routes that allow for a variety of experiences, including wandering. Other than that, the physical environment can provide the correct information to solve wayfinding problems; such as in the architectural nature including features of interior design and of a graphic nature.

Thus, designing a space or place for people with dementia has to include the most appropriate approaches that will assist them in better wayfinding ability. Their decisions in wayfinding have to be based on the environmental information that is readily accessible in the design of that space (Passini, Pigot, Rainville & Tétreault, 2000).

3. CONCLUSION

Designing a space or place for dementia elderly requires a thorough understanding of the wayfinding abilities of the users. Their ability to navigate the indoor or outdoor environment is influenced by cognitive mapping, spatial orientation, mobility and design criteria that support their wayfinding.

It is essential to the dementia elderly to create a clear mental mapping of their space in order to better navigate the environment. Spatial features for the dementia day care should include the potential design principles and solutions that ensure the built environment is familiar, legible, distinctive, accessible, comfortable and safe.

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A REVIEW OF THE PRINCIPLES GOVERNING SUSTAINABLE LANDSCAPE DESIGN

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ABSTRACT
The meaning of the landscape is complex, and is never been simple or linear to be able to provide the formation of a platform and a diverse scope for experiencing that ultimately leads to various narratives of people from their surroundings. From the point of view of the landscape architecture encyclopaedia, landscape planning is a kind ofplanning based on intelligent management and using the vast space ofthe earth to provide a safe life for humans, plants, animals and available resources known in it. This type ofplanning is trying to deal with the changes and developments affecting the environment and landscape issues to deal with existing or subsequent disturbances and inadequacies in the possible process of intervention in urban landscapes and to prevent them provide the right solution. To improve the environmental quality of natural landscapes and turn natural landscapes into ecosystems and lively and dynamic arenas in the city, the concepts and principles related to sustainable landscape design will be discussed. The concept of sustainable development can be explained in the field of financial, natural and human resources, which is trying to improve the economic, social and cultural levels, and make sustainable human development possible. A better understanding of sustainable development takes place in the simultaneous attention to economic, social, political and environmental debates " . Principles of Sustainable Landscape Design Environment and landscape design is a conscious process of organizing, planning and creating physical changes in the environment and landscape. Environment and landscape design is the creation of exciting, meaningful and sustainable environments and landscapes. Therefore, a successful environment and landscape design, with the link of cognitive and human factors, is a part of the dynamic development of the cultural environment and landscape.

Keywords: Sustainable landscape, Sustainable development, Environmental Design, Natural Resources

1. INTRODUCTION AND STATEMENT OF THE PROBLEM

Cities with the highest human origins have a relationship with their citizens by establishing a logical dialogue with humans and their surrounding nature. However now, the thoughtless expansion and growth of the cities on the one hand and human encroachment, natural bans and disturbing the balance of its constituent elements, on the other hand, have destroyed today's cities (Lee, Arts, & Vanclay, 2021). What is certain is that enjoying the exciting manifestations of nature is special for humans, and humans are the main inheritors of resources and natural landscapes are the remains of their ancestors (Fang, Zhou, Tu, Ma, & Wu, 2018). But now the question is, is the treasure and resources left by the past enough to be called "heritage" for the human who is born of nature and finds his identity, peace and comfort in the basis of these natural landscapes? Shouldn’t this be a legacy? Should they redefine today’s value and see it as a great wealth and not a perishable inheritance? Eternal and living wealth to add to it every day, not to leave it without reflection and witness its gradual death (Sisto, Cappelletti, Bianchi, & Sica, 2022).

Unfortunately, natural elements like rivers, mountains, hills, etc, which flow life to the city and could be in the context of the cities are left without proper planning. These elements are not only landmarks but they play a role in the form of a living and dynamic ecosystem, an ecological and bio-environmental structure (Lee, Arts, & Vanclay, 2021). They balance the cities and become the memory of the visitors. Memories that lead to the formation of identity collectively, become citizens and are considered an important factor in the recognition of a city (Huang, McDonald, & Seto, 2018).

Concurrently, it seems that the principles of sustainable landscape design should be a solution for landscape architecture to achieve the above goals. Thus, to improve the environmental quality of natural landscapes and turn natural landscapes into ecosystems and lively and dynamic arenas in the city, the concepts and principles related to sustainable landscape design will be discussed.

2. THEORETICAL FRAMEWORK OF THE RESEARCH

2.1 *Landscape and Landscape Architecture*

The landscape is that part of the environment in which we live and understand it through our perceptions. We cannot run away from it or look at it as an additional optional place or a space to spend our free time (Remesar, 2021). It is obvious that the level of people's perception of their environment and the surrounding landscape depends on their level of preparation and their abilities depend on their capacity and environmental conditions, which itself has layers of form, function and meaning. Therefore the meaning of the landscape is complex, layered and ambiguous and is never been simple or linear to be able to provide the formation of a platform and a diverse scope for experiencing that ultimately leads to various narratives of people from their surroundings. It seems that the city is a living entity and an image in the memory of the presence of citizens and artists who have been trying to build it since long ago (Hansen, 2010). Therefore, human which arose from nature only in a natural landscape that is a clear manifestation of human culture and gentle feelings can calm their tired and troubled soul, reads and searches for their lost identity (Lin & De Meulder, 2012). The identity that is hidden in the layers of these symbols. It is clear to everyone that "opinions" confirm or deny personal memories from long ago (Lee, Arts, & Vanclay, 2021). A past Society and culture even record a past beyond individual experience or human memories, and memory is the centre of identity. Unfortunately, today, people, by unreasonable encroachment on the environment and natural sanctuaries around them, have broken their relationship with nature and have created the causes of their anonymity (Madanipour, 2013).

From the point of view of the landscape architecture encyclopaedia, landscape planning is a kind of planning based on intelligent management and using the vast space of the earth to provide a safe life for humans, plants, animals and available resources known in it. This type of planning is trying to deal with the changes and developments affecting the environment and landscape issues to deal with existing or subsequent disturbances and inadequacies in the possible process of intervention in urban landscapes and to prevent them provide the right solution. This field is related to planning in other fields, including user planning, land and natural resources planning and environmental planning. Based on this, landscape planning links a bridge between planning policies and special development projects (Lin & De Meulder, 2012).

Landscape design is introduced in the dictionary of landscape architecture as "Any systemization related to the human activity in the external environment is called landscape design". Green space next to a comprehensive urban plan as part of it provides open space and

green applications on a scale intermediate and implementation project on a micro-scale (Hansen, 2010).

The values of the design goals are limited to water, environment, landscape, recreation, nature protection and industry options. The other most important point of view expressed in the landscape design is the point of view of the "Bettle McCarty" company. In which the landscape design process has the following procedure:

1. Employer's requests review.
2. Data collection and site analysis.
3. Limitations, key resources and facilities identification.
4. Resource maps and strategic alternatives preparation.
5. Market evaluation and investment opportunities identification.
6. Program standard preparation and development attitude.
7. Sustainable master plan preparation.

Evaluation is often considered in the design stage and allows the designer to review the design's success in the sustainable development framework (Lin & De Meulder, 2012).

2.2 Sustainable Development

The concept of "sustainability" requires a precise balance between today's and tomorrow's needs, between private motives and general actions in the narrowness of greed and social sympathy (Carmona & Wunderlich, 2013). "Sustainability models" need to change the basic structure of human investment and the use of clean technology and environmental protection. In such a way it becomes accessible in the context of the new global ethics that emphasizes international and global solidarity. "Sustainable development" is considered a concept that continued the provision of people's needs and satisfaction along with increasing the quality of human life. The concept of sustainable development can be explained in the field of financial, natural and human resources, which is trying to improve the economic, social and cultural levels, and make sustainable human development possible (Madanipour, 2013). Economic, social and cultural Improvement, along with the rights of the future and social justice for the residents, is considered the goal of sustainable development. In general, sustainable development should help poor people, because they destroy the environment more than others without their will. Development should not degrade the quality of the environment and should not reduce productivity over a long time. Development should consider important issues such as health control, appropriate technology, food sustainability, and supply of healthy water and biological shelter along with human initiatives and special emphasis is placed on increasing social welfare (Hansen, 2010). Sustainable development includes a concept of economic growth that causes well-being and creates opportunities for all the people of the world, as it is not considered fair for a few to take away the world's natural resources for their benefit. Based on this, sustainable development in the definition of the desired form of an economic, environmental, and social system presents ideals from an Economic point of view: A sustainable economic system must be able to produce goods and services that continuously reduce the controllable level of government and foreign debt and prevent the creation of imbalance between different economic sectors so as not to harm agricultural and industrial production. Environment point of view: A sustainable environmental system must protect vital resources and prevent the overexploitation of renewable resources and the depletion of irreversible resources, as well as actions that lead to the destruction of the environment (Olwig & Rose, 2016). Social point of view: A sustainable social system must have an equal distribution of resources and equality of facilities and social services including; health, education and upbringing, gender equality, political responsiveness and participation. A better understanding of sustainable development takes place in the simultaneous attention to economic, social, political and environmental debates" (Carmona & Wunderlich, 2013).

In sustainable development, economic, financial, commercial, energy, agricultural, industrial, and other policies are designed in a way that will lead to a development that is sustainable from the economic, social, and ecological points of view (Andersson, 2021). Sustainable development models should be based on four principles to enable social satisfaction and life improvement.

- People should be at the centre of attention. Protecting the environment has a vital aspect, but it is not just a goal.
- Development models should be based on compatible technology with the environment.
- Environmental values should be reflected in decision-making processes with strong motivation.
- Sustainable development models should be created based on universal participation and attention to society's situation.

Therefore, it is obvious that one of the most important concerns of today's designers is creating different urban spaces and views to achieve a sustainable design (Lee, Arts, & Vanclay, 2021). Steps must be taken to create a sustainable balance between the urban spaces and its natural environment, for a social and self-sufficient perspective that can cover its costs and achieve the (bioenvironmental, social) components and economic (general) sustainability (Andersson, 2021).

2.3 Principles of Sustainable Landscape Design

Environment and landscape design is a conscious process of organizing, planning and creating physical changes in the environment and landscape. Environment and landscape design is the creation of exciting, meaningful and sustainable environments and landscapes (Carmona & Wunderlich, 2013). The environment and the landscape's design will be seen in the form of creating harmony between the cognitive landscape, cognitive science and cultural factors. These factors are constantly changing and every new element that enters the environment through the design will cause it to change (Madanipour, 2013). Therefore, a successful environment and landscape design, with the link of cognitive and human factors, is a part of the dynamic development of the cultural environment and landscape.

George F. Thompson and Frederick Steiner as Landscape design theorists include the basic principles of sustainable landscape based on the principles of ecology and creativity. This aspect is inspired by the ecology of natural characteristics in direct connection with culture. Battle McCarthy believes that landscape can be investigated and analysed in three categories productive, protective and attractive (Madanipour, 2013).

Productive landscapes: the landscape can be planned in a way that maximizes its use and productivity, the productivity of the landscape can be considered under the following headings: oxygen production, carbon dioxide removal, thinking solution for prime lands, food production, wood production, wildlife diversity, resource mobility, energy potential, recreational resources, healthy environments, employment capacity.

Protective landscapes: the landscape protects people and buildings. The value of landscape protection can be examined under the following headings: climate change, pollution absorption, flood prevention, safety, preservation of historical appearance and natural.
Attractive landscapes: Usually, landscapes are associated with their visual qualities and cognitive beauty, but rarely other qualities such as mood, sensory appeal, cultural association, intellectual stimulation and reactions are considered.

Therefore, according to the definitions, some of the design principles and standards of sustainable structures are presented in table1.

Table 1: Principals of sustainable landscape design (Authors, 2022)

Principles of sustainable landscape design	protective	Ecological	● Protecting the natural basis from noise and weather pollution. ● Protecting the region's biodiversity (plants, animals) ● Removing destructive factors of natural ecosystems ● Protection from the presence of waste and industrial, domestic, etc.
		Physical	● Protection of the substrate from destructive factors such as erosion ● Protection of the physical and structural characteristics (land slope, soil, bodies, floor, etc.)
		Functional	● Protection of attractive natural, cultural and historical functional elements of the region
	Development and Improvement	Ecological	● Improving the ecological quality of the natural landscape by increasing the presence of native plants and animals ● Removing uses and activities incompatible with the natural environment ● Design and development according to the specific bio-environmental characteristics of the region ● Ecological basis improvement to reduce soil erosion ● Educational promotion programs in the soil and environmental protection
		Social	● Creating different recreational experiences to attract more domestic tourists (native and non-native) ● Tourism Development within the range and natural capacity of the region ● Creating optimal tourism facilities ● Improving the visitors' security ● Respecting cultural characteristics and native identity to create diverse spaces in natural settings for the frequent presence of people ● Providing extensive facilities for welfare, entertainment, etc., following the principles and standards of bio-environmental protection to create more motivation in people to be in natural habitats and landscapes ● Varied and flexible design
		Physical	● Development and design according to the physical and structural characteristics (topography, etc.) of the natural landscape ● Use of local materials ● Use of natural concepts and schemas in adopted design to the surrounding environment
		Functional	● Design integration and development of recreational, cultural, social, etc. with functions to prohibitions and natural scenery zoning

		Economical	● Attracting public and local participation in the preservation, beauty, health and sustainability of natural landscapes ● Attracting tourists and developing tourism activities in the region

3. SUMMARY AND CONCLUSION

Natural habitats and sanctuaries are the greatest potentials of cities if properly organized, beautified and synchronized with the needs of today's human beings. Not only they balance life they will bring back the lost environment of the cities. They can bring beautification spiritual and psychological in a public arena and a social bed, alive and dynamic, to its visitors submit (Olwig & Rose, 2016).

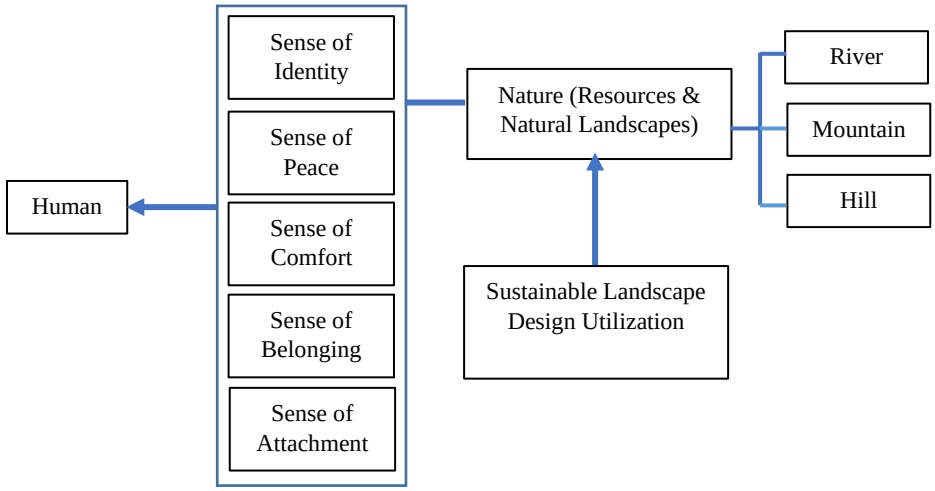

Figure 1: The principles of sustainable landscape design in organizing and beautifying nature, resources and landscapes, provide reasons for creating familiar relationships between the city and people.

These natural scapes are still facing problems such as the loss of plant and animal species, erosion, severe noise and bio-environmental pollution, the indiscriminate presence of automobiles, the reckless placement of factories and industrial spaces adjacency to natural prohibitions and the presence of sewage and urban waste. Therefore, given all the mentioned matters regarding the importance of the natural areas and their high production and protection capacity, in the first step, we should try to preserve all the ecological, social and economic values based on sustainable principles and standards. By applying the appropriate principles and criteria to the unique individual values in addition to protecting, developing and improvement of the social, economic and bio-environmental capacity of these aspects, it is necessary to synchronize these areas with local needs (Carmona, 2021). Action must be taken to protect these great treasures for future generations. This importance is only possible in the shadow of the precise knowledge of the designers socially, economically, ecologically, and culturally with the evaluations of the cognitive and ecological landscape.

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A REVIEW ON THE USAGE OF VETIVER GRASS IN LANDSCAPE DESIGN: A CASE STUDY AT PUTRAJAYA WETLAND

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ABSTRACT
Vetiver grass promises a beautiful choice of many plant species and is ideal for creating hedges or decorative plants, which leads to a beautiful landscape design in space that is either as simple as in a backyard or at the toughest area as in sloppy land. VG can be attributed to changing the environment to be healthier and safer for the end user. In relation to the application of VG in wetlands, Putrajaya Wetland is chosen as a case study for the research. The application of VG in landscape design could benefit the economy, environment and ecology of a site. VG is used as a decorative hedge on roadsides, roundabouts, riversides, ponds, resorts, and hillsides. Since reservoirs have become popular recreational sites for recreational activities, and efforts to vegetate the banks have been unsuccessful in the past, in relation to VG strong characters, species of VG are resistant to survive in the water for a long period of time. The research method concludes the strategy and chronology of the methodology used in identifying and assessing the usage of VG in landscape design specifically at Putrajaya Wetland. With the rising issues of climate change and flood in Malaysia, it is important to manage riparian zones to maintain and improve water quality, slope protection and biodiversity. Therefore, this research is significant in exploring VG as part of the landscape design element to protect riparian zones and at the same time act as an active bio filtration element.

Keywords: Vetiver grass, Landscape Design, Wetlands, Putrajaya

1. INTRODUCTION

Vetiver grass (VG) promises a beautiful choice of many plant species and is ideal for creating hedges or decorative plants, which leads to a beautiful landscape design in space that is either as simple as in a backyard or at the toughest area as in sloppy land. Successful landscape design indicates that the VG has a very attractive morphological appearance, which makes it highly recommended as an ornamental plant. In addition, it also helps to improve environmental quality such as quality of water can be enhanced, reduce soil erosion and others. The end result is that VG can be attributed to changing the environment to be healthier and safer for the end user.

In relation to the application of VG in wetlands, Putrajaya Wetland is chosen as a case study for the research. Known as a premier eco-tourism park, Putrajaya Wetland is one of the best wildlife sanctuaries which attract a variety of fauna and place thousands of plant species with the largest man-made freshwater body. This chapter presents the result of a study carried out at Putrajaya wetland for usage of vetiver grass in landscape design.

2. MORPHOLOGY OF VETIVER GRASS

2.1 Introduction of Vetiver Grass

Vetiver grass (VG), scientifically known as *Chrysopogon zizanioides*, originates from India in the Poaceae (Graminae) family. It also comes from the same grass family which includes lemon grass, maize, sorghum, and sugarcane (Darajeh et al., 2014). VG has been distributed throughout the equatorial and Mediterranean regions of many countries worldwide which include all the continents of the world except Antarctica (Danh et al., 2009). VG has been used for a long time in land conservation by means of soil and water by the World Bank (Darajeh et al., 2014).

VG is an alternative to the conventional, engineered soil conservation systems available today. VG is widely used in mine rehabilitation and waste water management systems for domestic and commercial properties. It is also widely used to improve agricultural pastoral land. When the VG is planted in single rows, the plants will form a hedge which is highly effective in slowing down and spreading run-off water, reducing soil erosion, conserving soil moisture and trapping sediment and farm chemicals (Terefe, T. N. (2011). Although other hedges can do that, VG has an extraordinarily deep and massively thick root system which binds the soil and makes it difficult to be dislodged under strong water flows on riverbanks and flood plains. Its deep and fast growing root system makes it drought tolerant and highly resistant to pests, diseases and fire.

The application of VG in landscape design could benefit the economy, environment and ecology of a site. However, stated that the applications of VG are still limited due lack of policy, exploration and interest (Gnansounou et al., 2017). The have listed several environmental benefits of VG which are (Abate & Simane, 2001):

- flood management,
- soil and water conservation,
- stabilising slopes,
- protecting river banks and dams,
- mulching and enhancing the organic content of degraded soils,
- mitigating and adapting to climate change, and
- VG as feed.

2.2 Usage of Vetiver Grass

2.2.1 Aesthetic values

Vetiver grass (VG) has beautiful fine stem flower heads with light purple flowers, turning to mauve colour later. The stems are stiff and erect and can go up to 2 metre high, which can be trimmed to form neat hedges. VG has no stolons, very short rhizomes so it does neither invade nor compete with nearby plants. VG has a massive and penetrating root system that can grow very fast up to 3 to 4 meters in the first year. This massively thick root system can penetrate hardpan, enhances the structural strength and organic content of the soil and at the same time makes it very tolerant to drought. (Truong et al., 2006).

New shoots develop from the underground crown making VG resistant to fire, frosts, traffic and heavy grazing pressure. The new shoots of VG continuously form from the crown so the base is always thick, active and resumes fast growth. New roots grow from nodes when buried by trapped sediment. VG will continue to grow up with the deposited silt eventually forming terraces, if trapped sediment is not removed. (Truong et al., 2006)..

2.3 Design values and approaches

VG can make a city greener by using few design approaches. For example, hedges along roads and ponds make a nice boundary, much more pleasing to the eyes than concrete panels and other artificial objects. Besides that, parks and resorts planted with VG usually attract the visitors more than decorations with other natural or artificial objects (Chomchalow, 2012).

VG also has a very effective way of sequestering carbon emissions and encountering the effects of global climate change. As a result, VG can make a city cooler, also will resolve an issue ofurban heat island and promote GBI (Green Building Index) (Chomchalow, 2012).

VG is a beautiful ornamental plant for gardens, patios and decks. The bush of the VG is so large that it hides unsightly structures. Grown as a hedge, VG planted close together in line, it forms a dense, uniform, and attractive hedge under tropical and subtropical climates. It also forms an aesthetically beautiful barrier for an unsightly view (Chomchalow, 2012).

The examples of the various uses ofVG in landscaping are the following:

i) As a decorative hedge, VG is used as a decorative hedge on roadsides, roundabouts, riversides, ponds, resorts, and hillsides. As a result, this approach will promote a good visual quality in landscape design.

ii) For dual purposes in beautifying the landscape and environmental protection, VG that act as hedges have been used to stabilize soils and control erosion in amenity sites such as golf courses, water parks, urban areas and recreational areas. This fits the purpose of a sustainable environment in landscape design.

iii) For reservoir landscaping, a common problem found around reservoirs is the barren strip on the shore caused by the fluctuation of the water level. Since reservoirs have become popular recreational sites for recreational activities, and efforts to vegetate the banks have been unsuccessful in the past, in relation to VG strong characters, species of VG are resistant to survive in the water for a long period of time

2.3.1 Floating Vetiver Island (FVT) as design alternatives in landscape design

FVT offers landscape design with additional alternatives for landscape architects to implement VG at site. The Floating Vetiver Island (FVI) system, a relatively new method of treating man made wetlands (Kusin et al. 2019), could help retention and detention ponds in urban areas to achieve a natural look in landscape design (Fgure 1). Additionally, due to its excellent tolerance to many sorts of pollutants, vetiver grass (*Vetiveria zizanioides*) was utilised as the treatment vegetation in the FVI which would be beneficial in harsh urban climate.

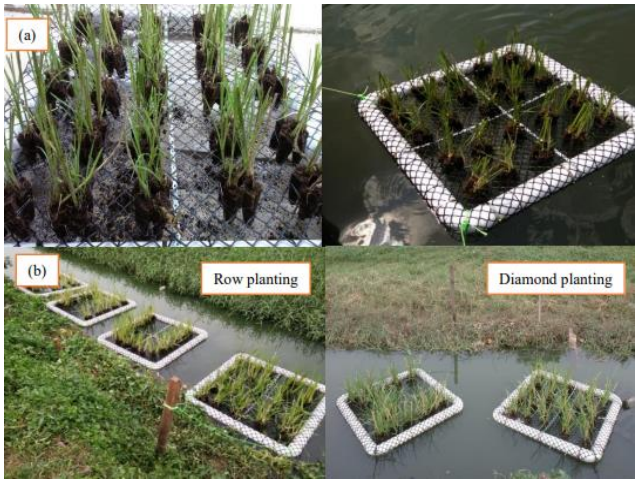

Figure 1: Floating Vetiver Island (FVI)

3. CASE STUDY: PUTRAJAYA WETLAND

Putrajaya Wetland is located in Presint 16, Putrajaya. It was the first man-made wetland in Malaysia completed in 1998·The wetlands occupies 2155 hectares¸ consists of 138 hectares of Wetland Park and 1977 hectares of wetland areas· Due to its size, Putrajaya Wetland is known as the largest constructed freshwater wetlands in the tropics. In fact, Putrajaya Wetlands are considered as Putrajaya's kidneys due to its role to ensure the balance of ecosystems in Putrajaya through natural water filtration. The process involves 2 major rivers flowing into Putrajaya, which are Sungai Chua and Sungai Bisa along with other 3 rivers. Besides that, Putrajaya wetlands also act as a wildlife sanctuary which attracts a huge variety of animals to the combined terrestrial-aquatic wetland environment.

Therefore, the design of Putrajaya Wetlands has been involved with extensive study and research to ensure the design successfully achieved their role. The major consideration in designing these wetlands should be to control stormwater pollution, which is able to trap the pollutants derived from upstream sources, control the inflow of flood water from Langat catchment area, and retain water for domestic use. As the wetland will control the pollution of pollutants, deposits and nutrients is naturally carried out through over 70 species of ravens grown in 24 cells. The plant's species is dominated by a wide range of aquatic plants, fruiting trees, flowering trees and bushes and shrubs (Rajpar & Zakaria, 2013). All plant species play an important role to act as a filer in controlling the water quality. Today, Putrajaya Wetland not only became a place for water filtration but popular among the local community and tourists for recreational activities including jogging, picnic, cycling and glamping activities. This trend has influenced Malaysians to choose wetland as their leisure destination (Ahmad et al. 2012).

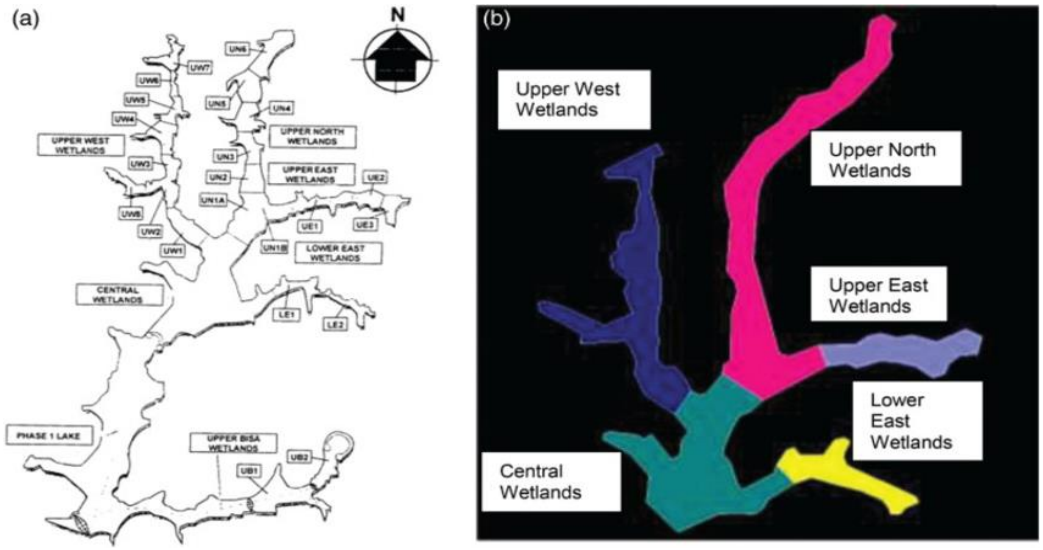

Figure 2: Putrajaya Wetland.

4. RESEARCH METHOD

The research method concludes the strategy and chronology of the methodology used in identifying and assessing the usage of VG in landscape design specifically at Putrajaya Wetland. A desk study was firstly developed to identify the relevance of the selected case study area followed by secondary data collection gathered via literature review from books, journals and publications. The phrases reviewed are VG, application and landscape design.

5. CONCLUSION

Protection of water is getting more challenging with rapid urbanization and development. With the rising issues of climate change and flood in Malaysia, it is important to manage riparian zones to maintain and improve water quality, slope protection and biodiversity.

Therefore, this research is significant in exploring VG as part of the landscape design element to protect riparian zones and at the same time act as an active bio filtration element. VG is a sustainable and biological method to filter water and stabilize slopes which are also benefiting the ecology and environment. This research will be able to assist landscape architects or policy makers in adapting VG in the riparian zone.

This chapter is also in line with the Sustainable Development Goal, 2022, which are 6) clean water and sanitation, 11) sustainable cities and communities, 13) climate action, 14) life below water and 15) life on land. Lastly, VG offers a greener and cheaper solution to water protection, thus exploring landscape design incorporating with VG is crucial in balancing between development and nature.

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THEMATIC REVIEW ON CRITERIA OF BIOPHILIC STREET DESIGN FROM 2013-2022: ANALYSIS OF THEME AND TREND IN BIOPHILIC STREET DESIGN CRITERIA

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ABSTRACT
The purpose of the article is a systematic review of the total of 25 literature to the latest year of 2022. The concept of biophilic being near to human needs and close to nature makes biophilic dramatically popular in architecture such as space design, pedestrians, streets, building design and city planning. The increasing interest on the part of architects, planners and urban designers in biophilic design and much new writing and literature appearing in the last several years. The tenets of the research are to analyze and interpret the findings for the current criteria of biophilic street design. A systematic review of research articles is carried out to identify the current state of academic insight regarding the criteria of biophilic design. On the Web of Search using the keywords "Biophilic Street design", "Biophilic pedestrian", "biophilic urbanism ", "Biophilic Street", "biophilic cities " and "urban street". Later the codes were grouped into several themes to answer the research question. The original 25 codes were divided into four primary categories: biophilic design, biophilic street design, human nature relationships, and sustainability in biophilic cities. There has been the same number of research and publications on the topics of biophilic street design and sustainability in biophilic cities.

Keywords: Biophilic Street design, Biophilic Pedestrian, Biophilic Urbanism, Biophilic Street, Biophilic Cities

1. INTRODUCTION

By 2050, urbanization and population growth are projected to add 2.5 billion people. In fact, Malaysia is ranked among East Asia's most urbanized countries, where consequently, Malaysia faces challenges in meeting the needs of urban population and expansion. The Malaysian government focuses on strengthening the enabling environment, promoting sustainable consumption and production, conserving natural resources, and strengthening against climate change and natural disaster. Hence, together with these federal-government-centric efforts, the researchers, local governments, developers and consultants have tried to promote a new city concept that best fits to human being and connect with the nature, including two most usable terms to describe eco-friendly cities, namely biophilic cities and green cities (K Z M Arof 2020).

The trend towards urbanization is increasing rapidly globally, particularly in developing nations, with the proportion of total urban dwellers on the planet set to reach more than 70% by 2050 (Zhang 2016). Hence, together with these federal-government-centric efforts, the researchers, local governments, developers and consultants have tried to promote a new city concept that best fits to human being and connect with the nature, including two most usable terms to describe eco-friendly cities, namely biophilic cities and green cities.Design that seeks to purposefully create human nature relationships or uses these to increase human wellbeing can be termed ‘biophilic design’ (Kellert et al. 2008). ‘Biophilia’, meaning an innate love or attraction to the living world, was coined by psychologist E. Fromm in 1961 (Landis 1975, Eckardt 1992).

The biophilic cities movement seeks to reframe nature as essential infrastructure for cities, seamlessly integrating city and nature to provide abundant, accessible nature for all residents and corresponding health and well-being outcomes. Urban biodiversity planning and biophilic cities have significant synergies in their goals and the means necessary to achieve them. Cities that are examples of urban environments where human-nature relationships and opportunities for nature experiences clearly exist and are purposefully designed can be termed 'biophilic cities' (Beatley 2011). These are cities where ecological restoration, architecture, landscape architecture, and urban planning are deliberately used to heighten the physical, psychological, and economic benefits that contact with nature can bring to city inhabitants (Beatley 2016a, 2018). Hence, the purpose of the article is to do a systematic review on the total of 25 literature to the latest year of 2022 is to discuss on the question of:

RQ1: What are the current criteria of biophilic street design?

1.1 Criteria of Biophilic Design

Biophilia is an inherent human inclination to natural systems and processes that urges humans to affiliate with other forms of life. Biophilia advanced the idea that the contact with nature plays a fundamental role in human physical and mental well-being. Subsequently, the term biophilic emerged as popularized by Harvard myrmecologist and sociobiologist, E.O. Wilson that was originally rooted from the word biophilia. It defines biophilic as the innately emotional affiliation of human beings to other living organisms, hence part of ultimate human nature. The concept of biophilic that is near to human needs and close to nature makes biophilic dramatically popular in architecture such as spaces design, pedestrians, streets, building design and city planning. In the perspective of city planning, biophilic is about understanding cities as places that already harbor much nature and places that can become, through bold vision and persistent practice, even greener and richer in the nature they contain (K Z M Arof 2020).

There is a growing recognition of the need for daily contact with nature, to live happy, productive, meaningful lives. Recent attention to biophilic design among architects and designers acknowledges this power of nature. The increasing interest on the part of architects, planners and urban designers in biophilic design and much new writing and literature appearing in the last several years. Biophilic design holds that good design, at the building, site, city and regional scale, must include nature and natural elements, Timothy Beatley (2013). Given the impacts (current and potential) of global climate change, an increasingly volatile climate and the already serious range of disasters and hazards faced by cities around the world, global resource conflicts and constraints, long term decline in global oil supply and a global economic system that seems increasingly susceptible to vicissitudes and flux, resilience resonates well as a concept and goal, and we consider it a potent version or flavor of urban sustainability, Timothy Beatley (2013). For example, Portland has emphasized the installation of "green streets": portions of roadways and sidewalks that become stormwater collection facilities through the creation of bioswales. Pittsburgh has sought to make its riverfront accessible by investing in walking and biking trails, and even a "water trail," as well as new waterfront parks such as the South Shore Riverfront Park, Timothy Beatley (2017).

2. METHODOLOGY

The term thematic review using ATLAS.ti 22 as the tool as being introduced by Zairul (2020) is implemented because the method of this study applies thematic analysis procedure in a literature review. Clarke & Braun (2013) define thematic analysis is a process of identifying the pattern and construct themes over thorough reading on the subject. The following step is to identify the pattern and construct category to understand the current trend of biophilic street design. The tenets of the research are to analyze and interpret the findings for the current criteria of biophilic street design. The selection of literature was performed according to several selection criteria: 1) publication until 2022, 2) Have at least keyword(s) of biophilic or urbanism, 3) focusing on biophilic street design. There is no limit on the country of origin that was made to expand more the information and findings since there are less studies being made on the topics.

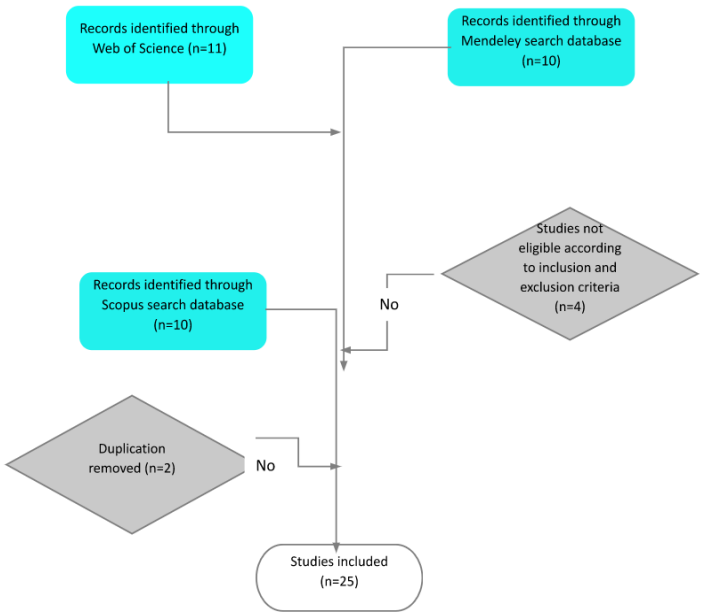

Figure 1: Inclusion and Exclusion criteria in the thematic review

A systematic review of research articles is carried out to identify the current state of academic insight regarding the criteria of biophilic design. If accessible, published articles were extracted from the Scopus using few keywords related to the research topic which are TITLE-ABS-KEY (biophilic AND street AND design), TITLE-ABS-KEY (biophilic AND design), TITLE-ABS-KEY (current AND biophilic AND design), TITLE-ABS-KEY (street AND biophilic AND urbanism) and TITLE-ABS-KEY (biophilic AND urbanism). On Web of Search (WoS) using the keywords "Biophilic street design", "Biophilic pedestrian", "biophilic urbanism", "biophilic street", "biophilic cities" and "urban street". Lastly, using the Mendeley database was also used to extract Elsevier publications using keywords "biophilic street design", "biophilic elements", "biophilic cities" and "urban street". This resulted in about 31 publications considering the results from these three databases. As this review is limited to peer-reviewed journals, articles and thesis, eligible inclusion and exclusion criteria and after some duplications, found 6 publications were removed. After removing duplicates and scanning of all abstracts to remove articles irrelevant to the topic of this research, there are a total of 25 papers as a basis for review.

Table 1: Search setting from Scopus, Web of Science and Mendeley

SCOPUS	TITLE-ABS-KEY (biophilic AND street AND design) TITLE-ABS-KEY (biophilic AND design) TITLE-ABS-KEY (current AND biophilic AND design) TITLE-ABS-KEY (street AND biophilic AND urbanism) TITLE-ABS-KEY (biophilic AND urbanism)	10 results
WoS	Biophilic street design (Title) and Open Access and 2018 or 2019 or 2020 or 2021 or 2022 (Publication Years) and Open Access Biophilic pedestrian (Title) and Open Access and 2018 or 2019 or 2020 or 2021 or 2022 (Publication Years) and Open Access Biophilic urbanism (Title) and Open Access and 2018 or 2019 or 2020 or 2021 or 2022 (Publication Years) and Open Access Biophilic street (Title) and Open Access and 2018 or 2019 or 2020 or 2021 or 2022 (Publication Years) and Open Access biophilic cities (Title) and Open Access and 2018 or 2019 or 2020 or 2021 or 2022 (Publication Years) and Open Access urban street (Title) and Open Access and 2018 or 2019 or 2020 or 2021 or 2022 (Publication Years) and Open Access	11 results
Mendeley	“Biophilic street design” (most relevant) “Biophilic elements” (most relevant) “Biophilic cities” (most relevant) “Urban street” (most relevant)	10 results

Next, all 25 metadata were transferred to ATLAS.ti 8 and created as primary documents. From the metadata established in Mendeley, several groupings were initiated automatically in the code group. The classification in ATLAS.ti 8 has made the sorting much easier and systematic. In the first round of coding, the publication country and date is sorted. Later the codes were grouped into several themes and to answer the research question on “What are the current trend of biophilic street design?” contributed to a final of five main categories to answer the research questions. The findings of this review will be divided into two parts; Quantitative findings and Qualitative findings.

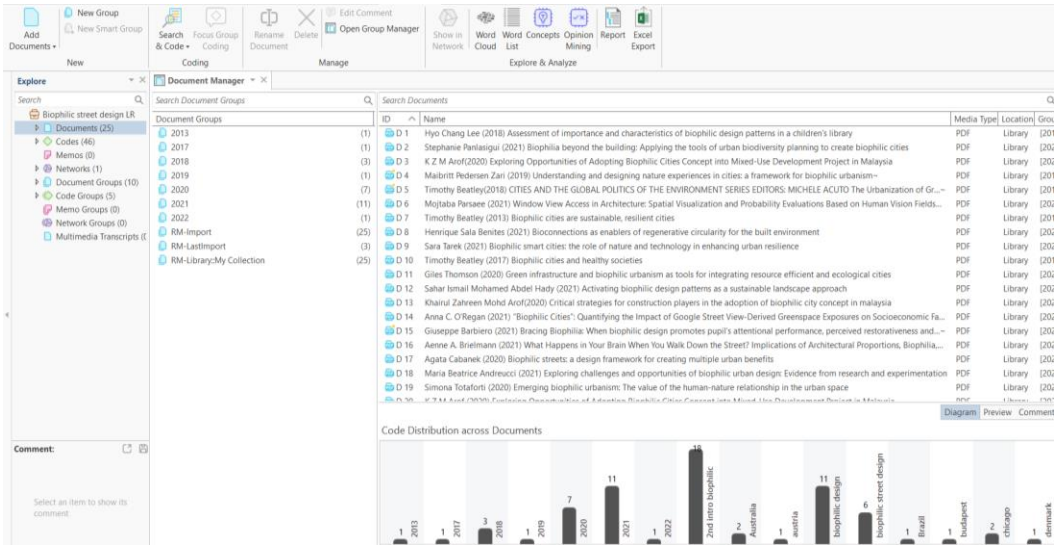

Figure 2: Sorted articles in Mendeley metadata

3. RESULTS AND DISCUSSIONS

3.1 Quantitative Findings

The proceedings and thesis were also included to examine the trends and pattern because database queries were rare in the architectural-based education. The articles are from various magazines, years, authors, and subject areas. The trend of publishing is shown to be increasing from year to year till 2021 in table 2 below. However, in 2022 there is a sharp decline in the amount of material published on subjects that at the very least contain the keywords "biophilic," "urbanism," or "street design." Since the term "biophilic" is still uncommon as of 2013, there aren't many studies or publications on the subject. Throughout the years 2017, 2018, and 2019, the numbers continuously rise. The publishing industry experiences an abrupt spike that lasts into the following year as a result of the Covid-19 virus that struck the world in 2020. Finally, the publication has abruptly decreased in the present year of 2022. This may be because there are so many publications that are still waiting and being worked on.

To obtain uniformity in the resulting sub-categories, the 25 research articles were evaluated in an iterative process that involved comparisons for similarities and differences. Table 2 lists the publications along with their placement in various subcategories. Additionally, the many viewpoints from the research to date have been highlighted. The perspective of the approach used to present the biophilic street design has been assigned to the research publications. The original 25 codes were divided into four primary categories: biophilic design, biophilic street design, human nature relationships, and sustainability in biophilic cities.

Table 2: Article reviewed based on publish date

	2013	2017	2018	2019	2020	2021	2022
Assessment of importance and characteristics of biophilic design patterns in a children's library			1				
Biophilia beyond the building: Applying the tools of urban biodiversity planning to create biophilic cities						1	
Exploring Opportunities of Adopting Biophilic Cities Concept into Mixed-Use Development Project in Malaysia					1		
Understanding and designing nature experiences in cities: a framework for biophilic urbanism				1			
Cities and the global politics of the cities and the global politics of the environment series editors: Michele Acuto The urbanization of green internationalism			1				
Window View Access in Architecture: Spatial Visualization and Probability Evaluations Based on Human Vision Fields and Biophilia						1	
Biophilic cities are sustainable, resilient cities	1						
Bioconnections as enablers of regenerative circularity for the built environment						1	
Biophilic smart cities: the role of nature and technology in enhancing urban resilience Gr=4						1	
Biophilic cities and healthy societies		1					
Green infrastructure and biophilic urbanism as tools for integrating resource efficient and ecological cities					1		
Activating biophilic design patterns as a sustainable landscape approach						1	
Critical strategies for construction players in the adoption of biophilic city concept in malaysia					1		
"Biophilic Cities": Quantifying the Impact of Google Street View-Derived Greenspace Exposures on Socioeconomic Factors and Self-Reported Health						1	
Bracing Biophilia: When biophilic design promotes pupil's attentional performance, perceived restorativeness and affiliation with Nature						1	
What Happens in Your Brain When You Walk Down the Street? Implications of Architectural Proportions, Biophilia, and Fractal Geometry for Urban Science						1	
Biophilic streets: a design framework for creating multiple urban benefits					1		

Exploring challenges and opportunities of biophilic urban design: Evidence from research and experimentation						1	
Emerging biophilic urbanism: The value of the human-nature relationship in the urban space					1		
Exploring Opportunities of Adopting Biophilic Cities Concept into Mixed-Use Development Project in Malaysia					1		
Preferences for Hotels with Biophilic Design Attributes in the Post-COVID-19 Era							1
The usage and perception of pedestrian and cycling streets on residents'well-being in Kalamaria, Greece			1				
Built environment determinants of pedestrian activities and their consideration in urban street design						1	
A comparative evaluation of utility value based on user preferences for urban streets: The case of Seoul, Korea						1	
From “streets for traffic” to “streets for people”: can street experiments transform urban mobility?					1		

Table 3: Documentation to a theme table

Authors	biophilic design	biophilic street design	human nature relationship	sustainability in biophilic city
(Lee & Park, 2018)	1			
\(Panlasigui et al., 2021)				1
(Arof et al., 2020)				1
(Pedersen Zari, 2019)	1			
(Rapoport et al., n.d.)	1			
(Parsaee et al., 2021)		1		
Beatley & Newman, 2013)				1
(Benites & Osmond, 2021)	1			
(Tarek & Ouf, 2021)	1			
(Beatley, 2017)				1
(Thomson & Newman, 2021)	1			
(Hady, 2021)	1			
(Kosanke, 2019)			1	
(O'Regan et al., 2021)	1			
(Barbiero et al., 2021)			1	
(Brielmann et al., 2022)			1	
(Cabanek et al., 2020)		1		
(Andreucci et al., 2021)	1			
(Totaforti, 2020)			1	
(Khozaei et al., 2022)	1			
(Panagopoulos et al., 2018)	1			
(Gerike et al., 2021)		1		
(Seo & Kim, 2021)		1		
(Bertolini, 2020)		1		
(Benites & Osmond, 2021)		1		

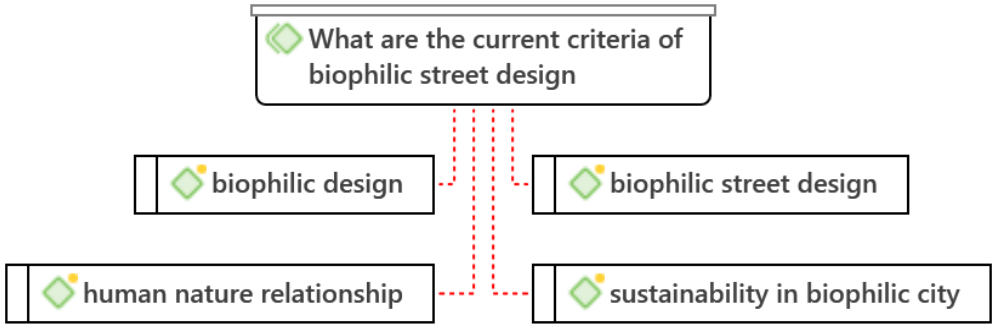

Figure 3: Documentation theme diagram

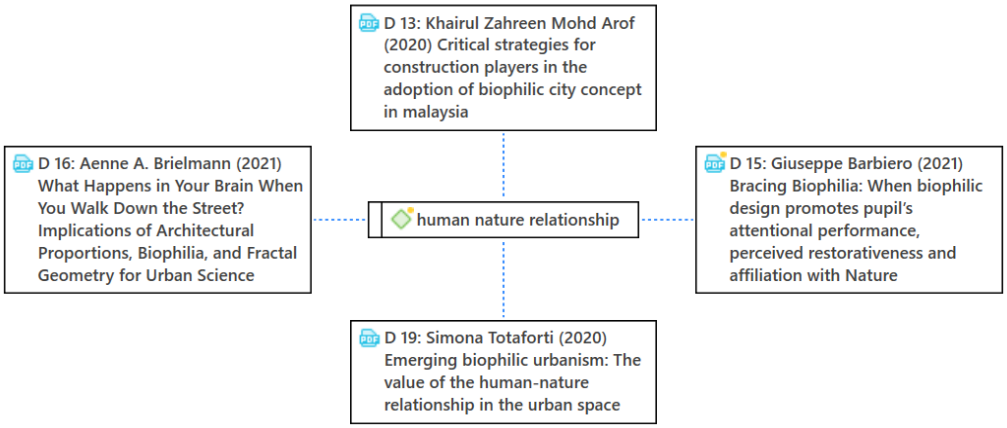

Figure 4: Articles under human-nature relationship theme

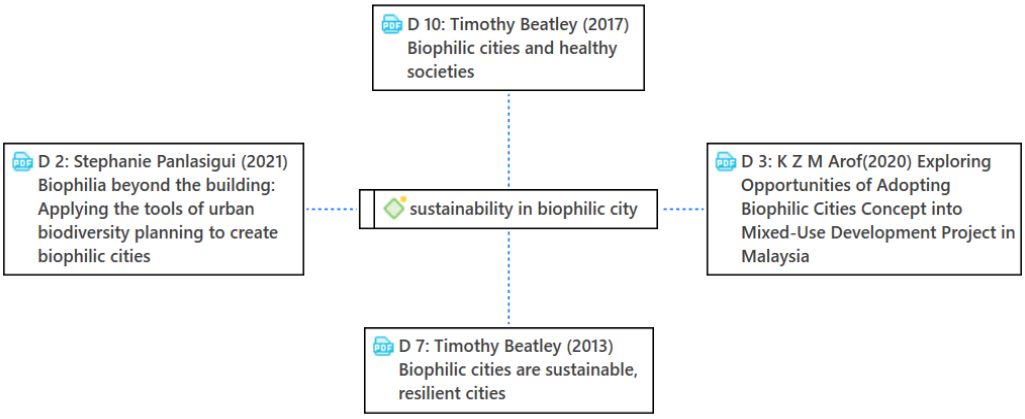

Figure 5: Articles under sustainability theme

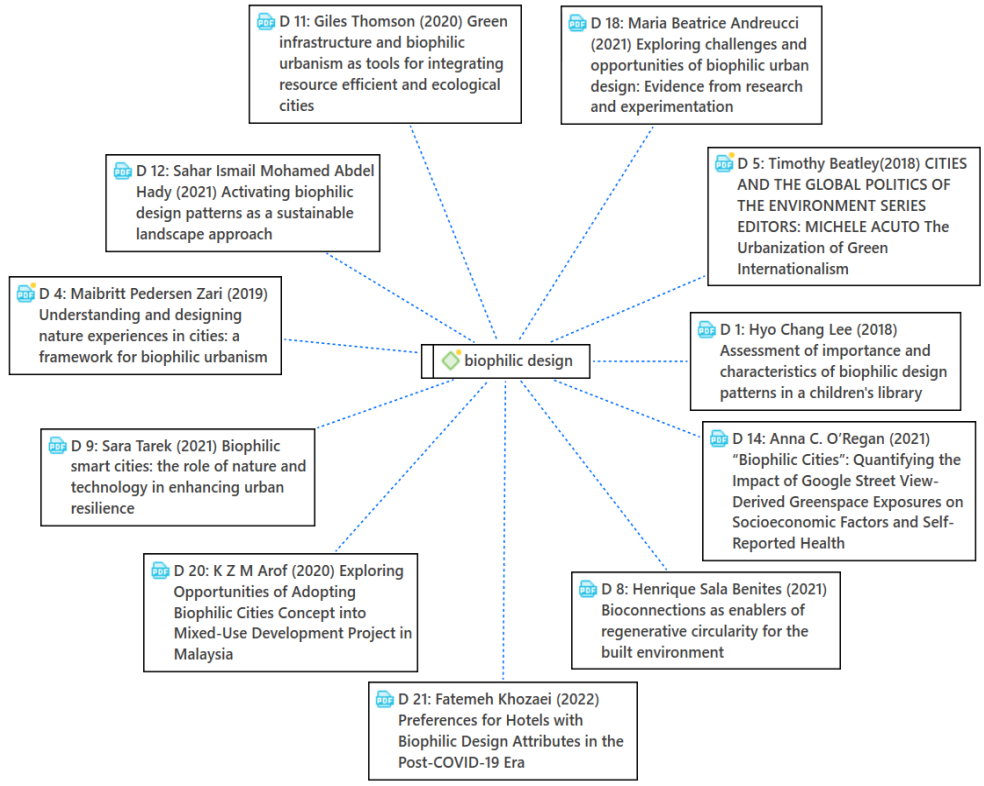

Figure 6: Articles under biophilic design theme

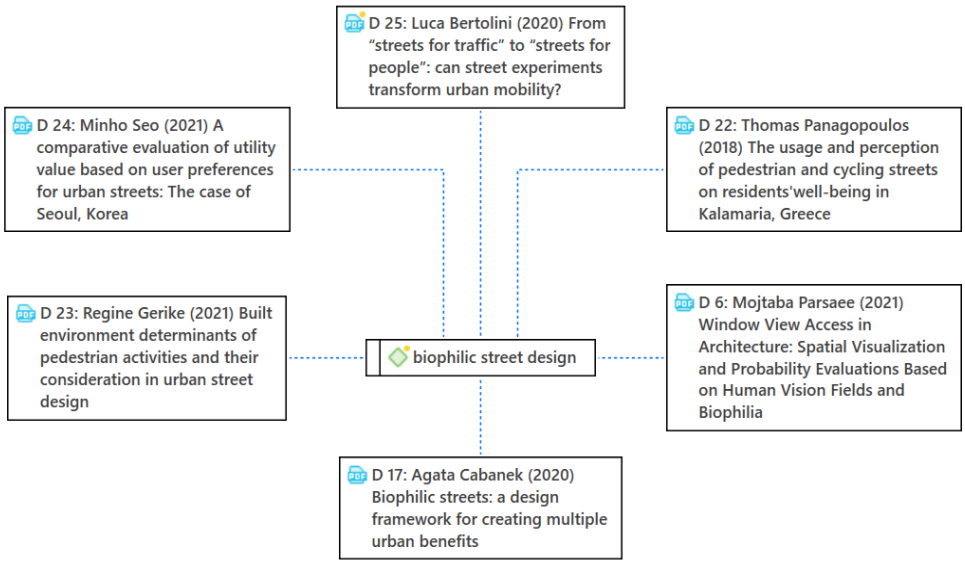

Figure 7: Articles under biophilic street design theme

The year and country where the study was done were used to analyze the pattern. The study discovered that there were existing or current cooperative learning practices. Since there were studies conducted in every theme category over these two years, the inquiry-based pattern that was presented in 2020 and 2021 is still applicable as one of the topic requirements for biophilic street design. There has been the same number of research and publications on the topics of biophilic street design and sustainability in biophilic cities. Although the sustainability of biophilic cities has long been investigated, biophilic street designs have only just begun to get attention. In the human-nature relationship, although only four projects report on it, it remains as the core and fundamental understanding on biophilic design where the importance of biophilic design affects human daily lives both physically and mentally. Further, the biophilic design theme topic has become much popular in recent years and has given an impact towards implementation of biophilic in design and human lives.

Table 4: The theme according to year

Theme	2013	2017	2018	2019	2020	2021	2022	Totals
biophilic design	0	0	2	1	2	5	1	11
biophilic street design	0	0	1	0	2	3	0	6
human nature relationship	0	0	0	0	2	2	0	4
sustainability in biophilic city	1	1	0	0	3	1	0	6
Totals	1	1	3	1	9	11	1	27

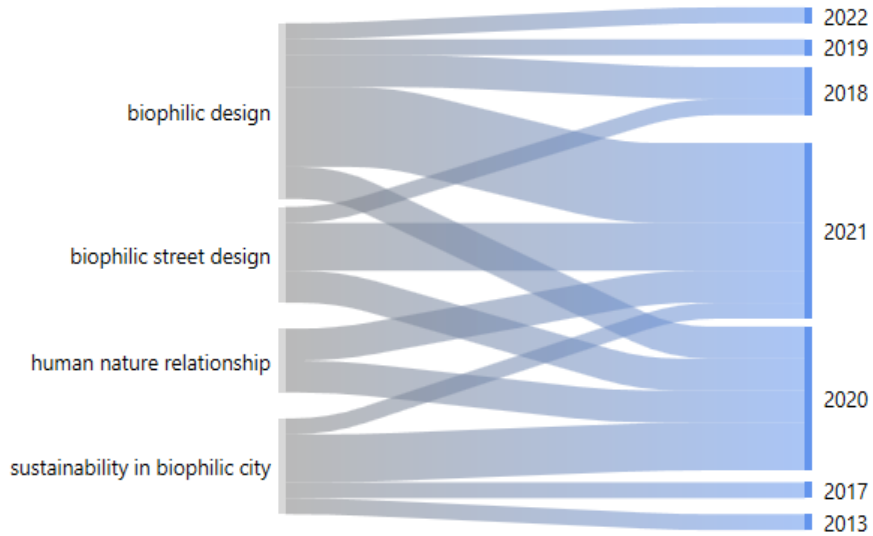

Figure 8: Documentation theme to year diagram

The trends of biophilic street design were seen rather popular towards emerging countries such as Malaysia, Singapore and New york. There are also quite a number of publications reported from other countries such as Australia, Chicago, Germany and Sweden. Other countries that have publications are Austria, Brazil, Budapest, Denmark, Egypt, Greece, Iran, Ireland, Italy, Korea, Lisbon, London, Madrid, Netherlands,New Zealand, Qatar, Romania, San Francisco, Spain, Switzerland, Texas, United Arab Emirates, United Kingdom, United States and Vietnam. This shows there has been increasing trends throughout the year where it was at peak during the year 2021.

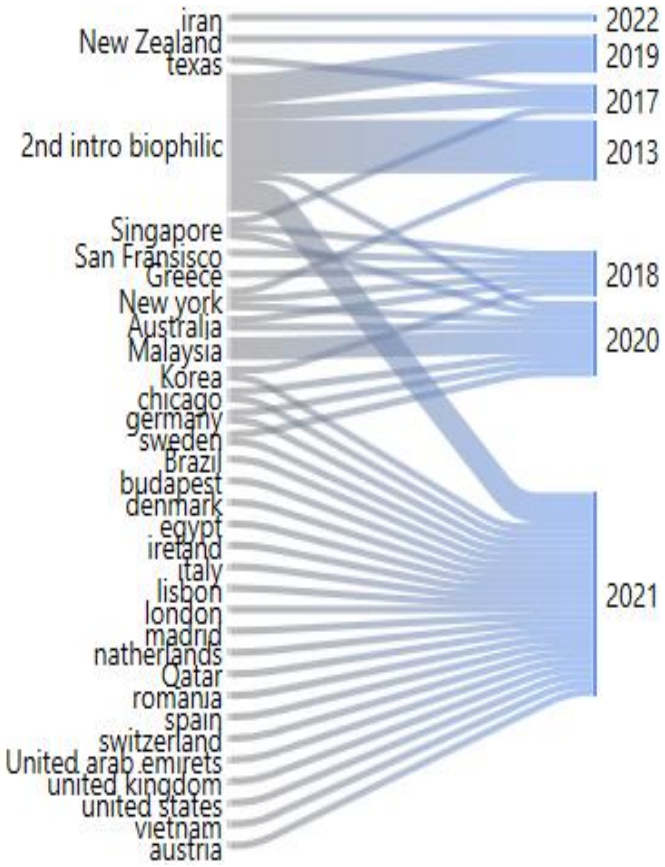

Figure 9: Publication countries to year diagram

Table 5: The distribution article according to country

Country	2013	2017	2018	2019	2020	2021	2022
Australia	0	0	1	0	1	0	0
Austria	0	0	0	0	0	1	0
Brazil	0	0	0	0	0	1	0
Budapest	0	0	0	0	0	1	0
Chicago	0	0	0	0	1	1	0
Denmark	0	0	0	0	0	1	0
Egypt	0	0	0	0	0	1	0
Germany	0	0	0	0	1	1	0
Greece	0	0	1	0	0	0	0
Iran	0	0	0	0	0	0	1
Ireland	0	0	0	0	0	1	0
Italy	0	0	0	0	0	1	0
Korea	0	0	1	0	0	1	0
Lisbon	0	0	0	0	0	1	0
London	0	0	0	0	0	1	0
Madrid	0	0	0	0	0	1	0
Malaysia	0	0	0	0	3	0	0
Netherlands	0	0	0	0	0	1	0
New York	1	0	1	0	1	0	0
New Zealand	0	0	0	1	0	0	0
Qatar	0	0	0	0	0	1	0
Romania	0	0	0	0	0	1	0
San Francisco	0	0	1	0	0	0	0
Singapore	0	1	1	0	1	0	0
Spain	0	0	0	0	0	1	0
Sweden	0	0	0	0	1	1	0
Switzerland	0	0	0	0	0	1	0
Texas	0	1	0	0	0	0	0
United Arab emirates	0	0	0	0	0	1	0
United kingdom	0	0	0	0	0	1	0
United states	0	0	0	0	0	1	0
Vietnam	0	0	0	0	0	1	0

3.2 Qualitative Findings

3.2.1 Human Nature Relationship

Humans have a strong bond with nature, and while this bond has eroded through time as a result of our escalating reliance on industry, our need for nature for our bodily and psychological well-being has not. Since the dawn of humankind on the planet Earth, nature has served as a source of both physical and psychological wellness. Consequently, there had been a close and profound bond between humans and nature. These 4 articles cover the necessary information regarding the general knowledge of human-nature relationship before getting deeper into biophilic. First foremost, it is important to acknowledge the current difficulties to proceed with the human-nature relationship. Further explanation on the topics, there are few important elements that highlighted explained the importance categories of human nature relationship. Each of them is the response to the difficulties stated. Next, is the approach to human nature. The articles stated distinction yet quite similar data on how to make it work in the current years. This actively demonstrates that human nature relationship is beneficial both ways and s starting point into urbanization and biophilic studies.

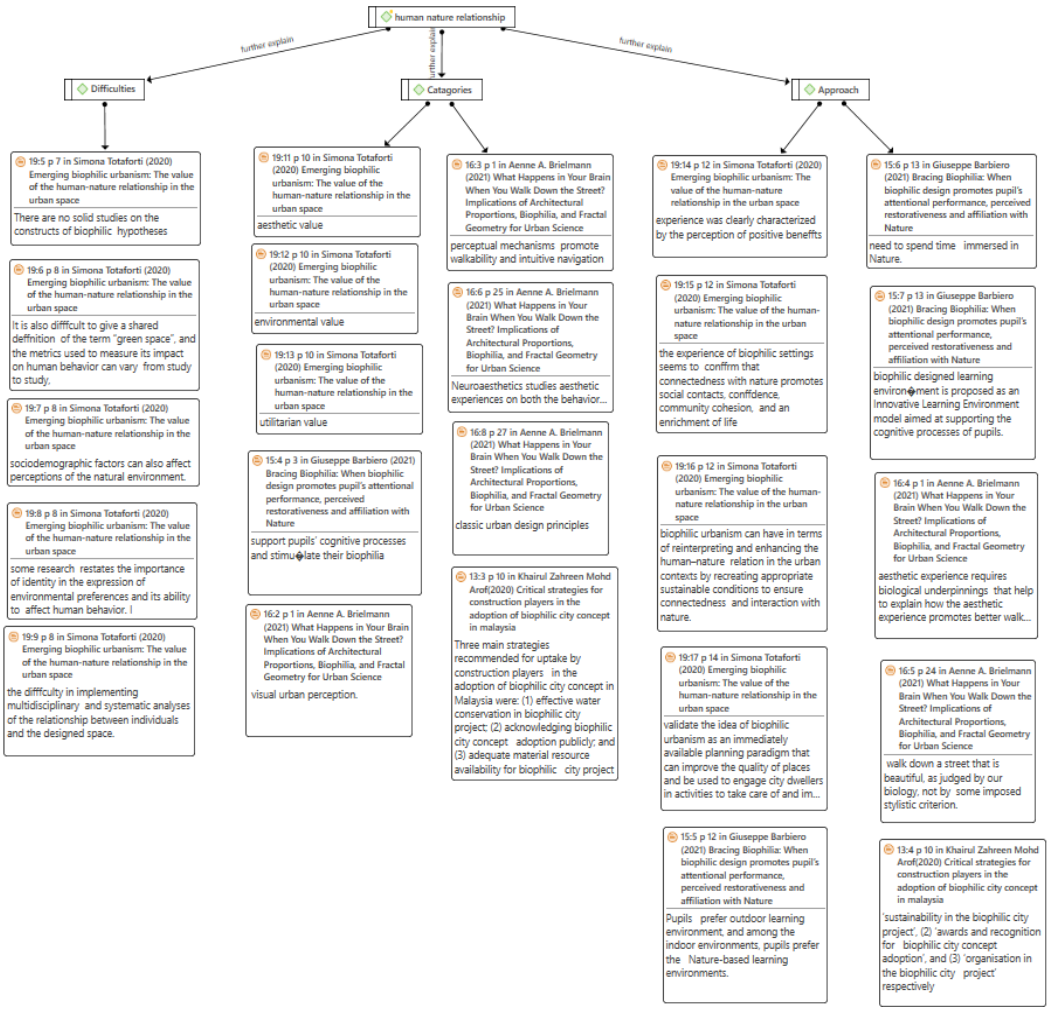

Figure 10: Network view of the articles under human-nature relationship theme

3.2.2 Sustainability in Biophilic City

"Green cities," or "biophilic cities," are merely concepts in which a city is planned to embrace nature as the primary element. In order to encourage residents to be more in touch with nature, many urban communities now lack the concept of "biophilic cities," which tries to reconnect people with nature. Engineers and architects are able to create cities and structures that try to be as linked to nature as possible by using a range of various design strategies. These green structures benefit the environment and human health, in addition to the environment. For this particular reason it is important to know the reasons or cause on why sustainability of biophilic sites is necessary in this current time. The humans are the users with the demand to improve wellbeing. Hence, focusing on the aims of sustainability in biophilic cities will assist a lot in the research. After that, analyzing the articles that already provide a few different criteria to make sustainability in biophilic cities work. These criteria for sustainability are also in relation to the topic of biophilic design later.

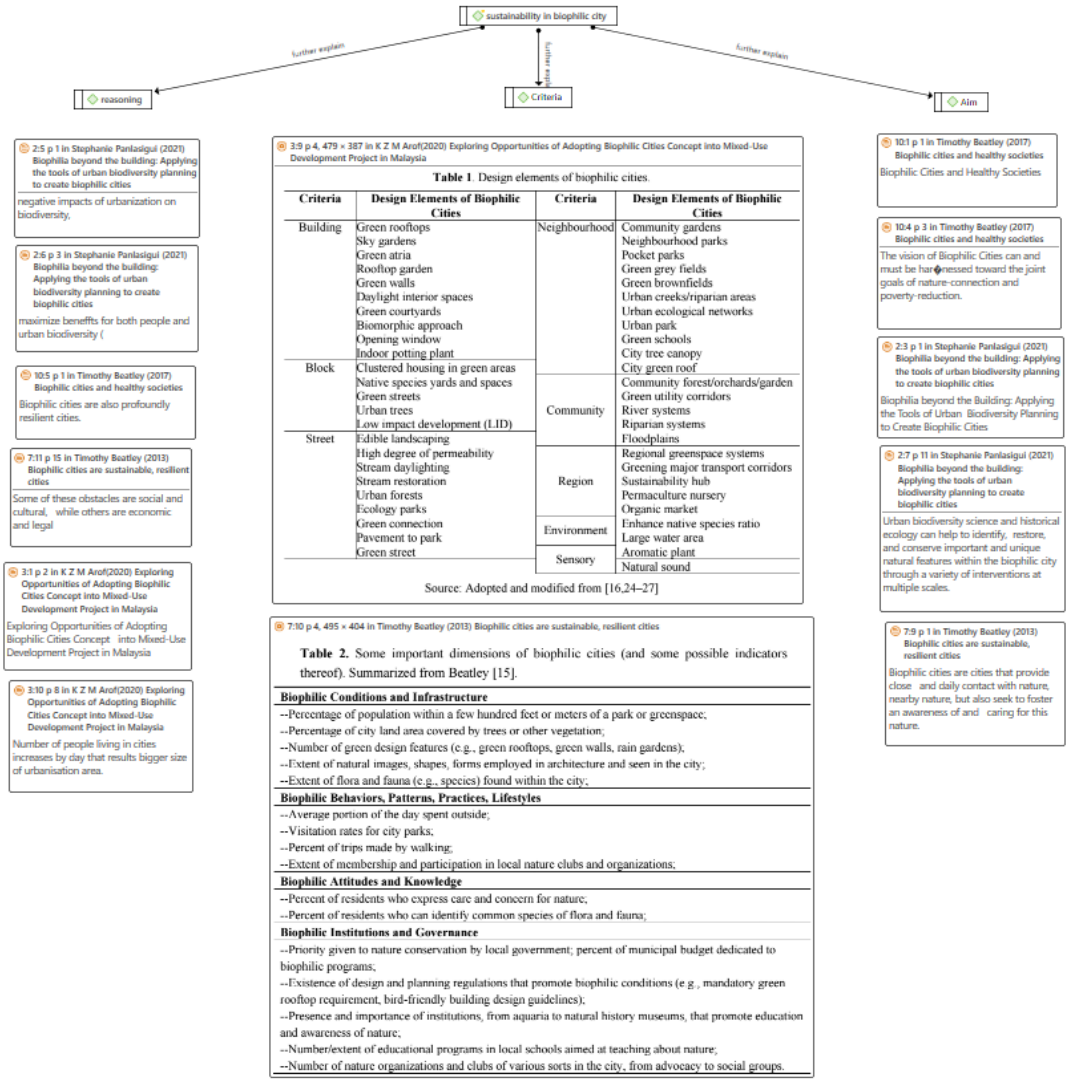

Figure 11: Network view of the articles under sustainability in biophilic cities theme

3.2.3 Biophilic Design

With the help of biophilic design, we can incorporate nature into our surroundings and create inspiring and rejuvenating spaces that connect people to their surroundings. There are numerous contributing aspects that can improve the space and well-being even if it can be challenging to find a space that can fit all biophilic design elements. Each article has stated few conceptions regarding the general understanding of biophilic design. These authors also highlighted their own aim of research that expands the knowledge of biophilic studies that can be used to assist this research. From here, we discover that there are few classifications of biophilic design that had been used in previous research before such as biophilic principles and patterns, biophilic experience and others. These data can be analyzed more to make it suitable to find the current criteria of biophilic street design.

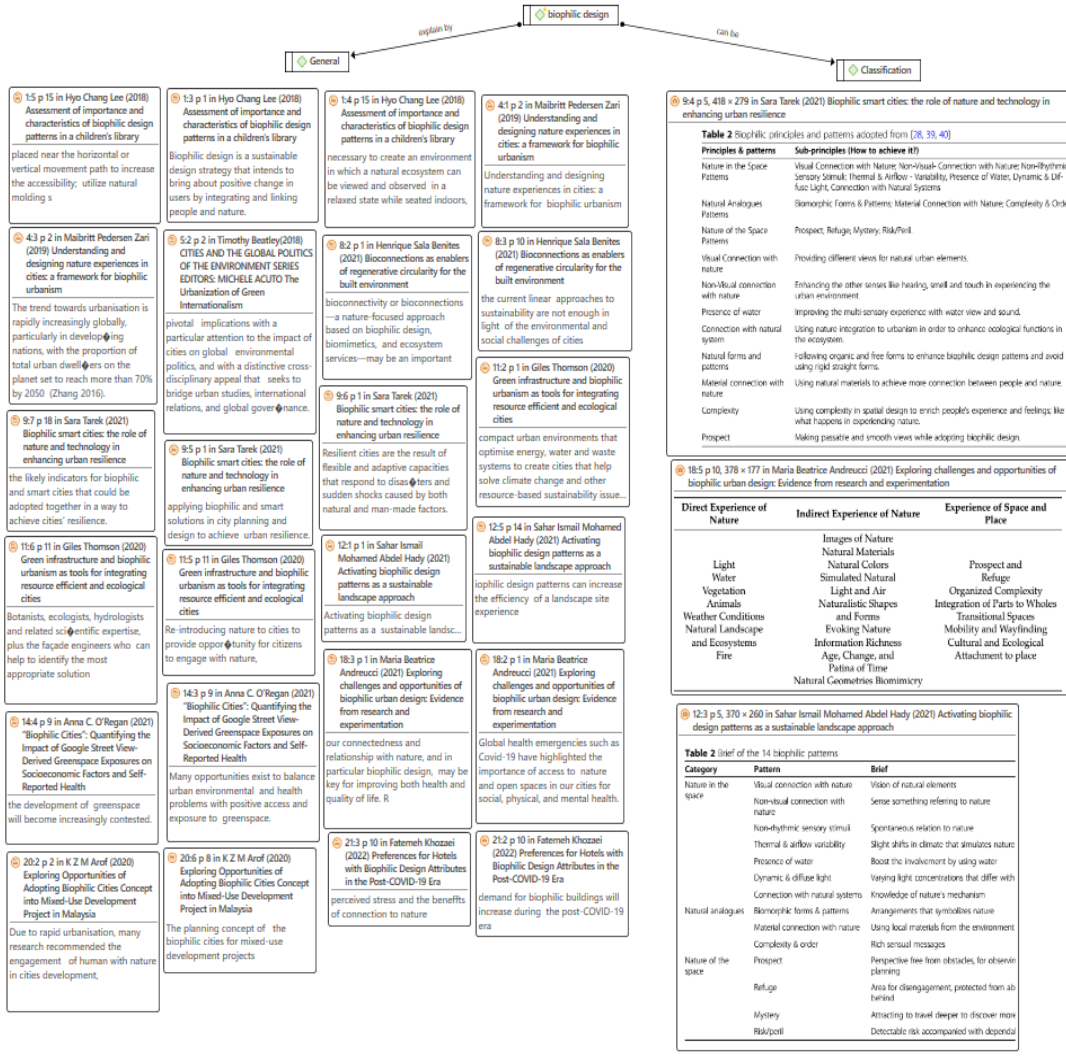

Figure 12*:* Network view of the articles under the biophilic design theme

3.2.4 Biophilic Street Design

Streets provide users with a variety of experiences, including nature experiences. Identifying the best design strategy for a particular road requires consideration of many site-specific circumstances and requirements. This includes the street's history, existing social, environmental, architectural and structural conditions, existing infrastructure, policies and regulations, project scale, zoning and land use, and future potential as a place. Included. There are 6 studies that are focused on biophilic street design that could assist in finding the current criteria of biophilic street design. First, as an introduction of the research, few data are collected more-in depth on urban streets where streets supposedly design for humans rather than only vehicles since the users are the one that experienced it in many ways. These are further explained in the next sub-topic, which is the importance of users as the main role in the design of urban streets. Lastly, there are few articles that research on the biophilic criteria for streets or pedestrians. Based on the research, the biophilic street criteria are a more in-depth study from the collective data on the few of the general biophilic design classification above where environmental, physical, mental users and other important aspects are taken into the criteria list.

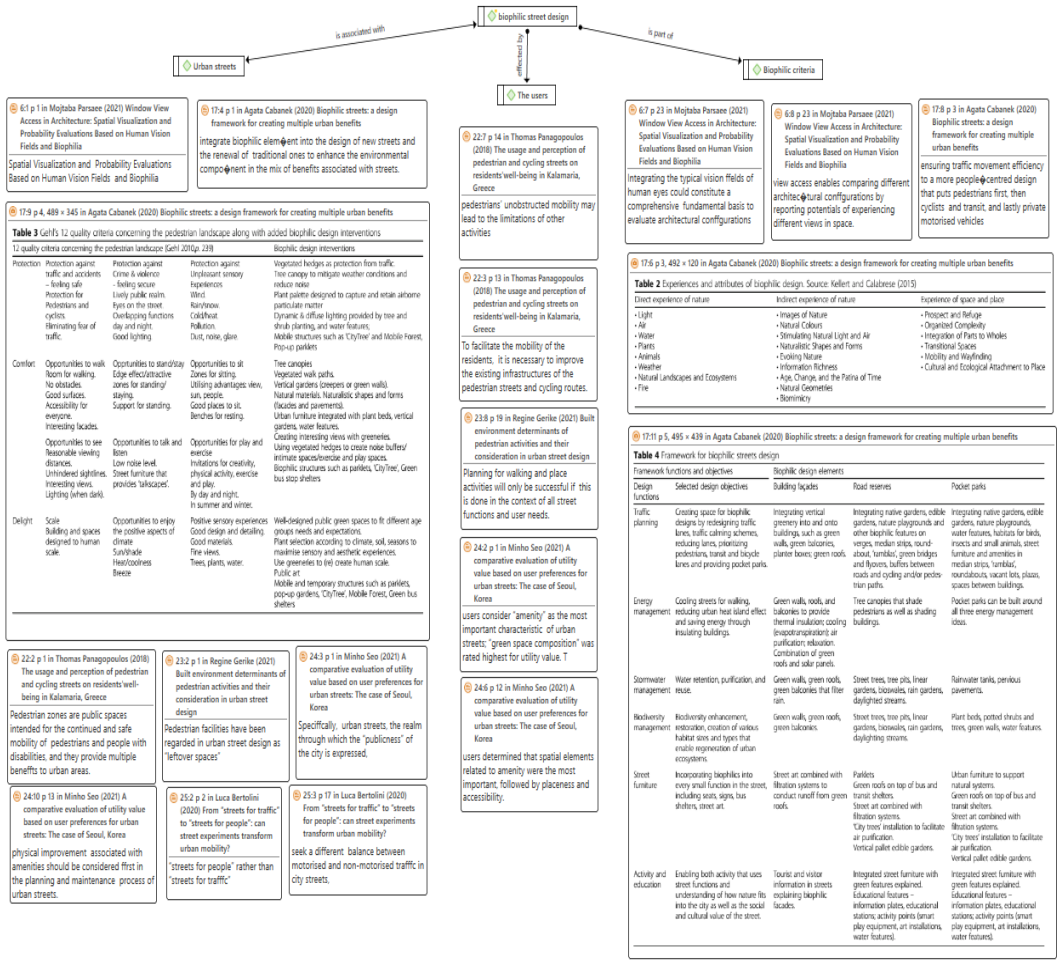

Figure 13: Network view of the articles under the biophilic street design theme

The pandemic outbreak caused people all over the world to awaken to the importance of nature and its enduring impact on our evolutionary process and day-to-day existence. Public areas that had formerly been lush and green had now become health risks, but the absence of the natural environment's physical and psychological stimulation was causing just as much devastation. This prompted designers to direct nature to flow out of constrained public spaces and into settings with consistent movement and activity. The result of this effort was the creation of Biophilic Streets, which turned a century-old theory into reality.

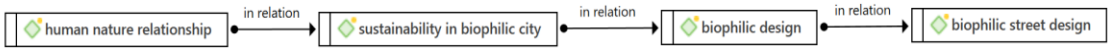

Figure 14: Network of the relation and flow of each theme

The primal human urge to feel a connection to the natural world is known as biophilia. Nature has always played a significant role in influencing both our physical and behavioral health. The streets have been the focus of public life in cities since they were first built, they provide the space and accessibility for close communal activity. To find current criteria of biophilic street design, these are each topic that relate to one another to further explain the research. First, it is important to study and get a general understanding on the human-nature relationship before going into depth on other topics. This two-way relationship was both taking care and receiving benefits and positive outcomes in the business world have been seen in the human-nature relationship such as better indoor air quality, natural light, and other advantages, for instance. Next, a study on sustainability in biophilic cities was taken. The world of nature itself is a never-ending source of creativity. It is a collection of motifs, textures, and patterns. Nature is the best designer there is. Nature has traditionally served as an inspiration for architects. Biophilic cities are those that not only offer frequent and close encounters with nearby nature, but also work to promote environmental awareness and conservation while also highlighting those resilient and sustainable cities are also biophilic cities. There are many ecological and green resources in cities and urban environments, including parks, trees, rivers, and riparian habitats. Efforts are being made to further improve the green aspects of these living and working environments.

After that, it is important to study the general understanding of biophilic design. However, there is less guideline for implementation. New research on biophilic design shows the positive effects of biophilic design on health, strengthening the empirical evidence for the link between humans and nature and raising its priority level in both design research and design practice. During the research studies, there are general criteria frameworks that have been studied that are frequently used and referred by the designer even to these current days. These criteria are later used to discuss and further explain the specific criteria for street design. Lastly, finding more research on biophilic street design or pedestrians. As mentioned before, even in biophilic design, there are few studies that cover topics. However, the topic regarding biophilic street design has even less research. A lot of effort has been taken by going through the articles to find the suitable topics for further research on biophilic design. Biophilic streets are intended to promote optional activities, aid in the development of a sense of community, and change the neighbourhood’s identity. Streets that include a lot of daily biophilic experiences also frequently provide opportunities for instruction, learning, and entertainment. A good biophilic street design gives benefits to the user and even the natures.

4. CONCLUSION AND FUTURE STUDIES

This study examined the themes and trends in biophilic design in the building sector from the 25 papers evaluated in this research. The results of the code-to-document analysis in ATLAS.ti 9 showed that biophilia, framework, nature, urbanization, and well-being were the themes and trends in biophilic design. By thoroughly defining the theme codes within biophilic design from the years 2013 to 2022 and further evaluating the patterns of the publications to date, this article has helped to analyze the criteria of biophilic street design. The 25 research later have been sorted out into indifferent categories that had been inserted inside tables, making the analyzing process easier. Based on the findings of the research papers, there's a lot of studies made regarding biophilic design and have many sub-topic research under it. However, there's not much study that focuses on biophilic street design even though there are many countries that have started to acknowledge the astonishing benefits of biophilic street design to humans and nature.

This study seeks to present an overview of Malaysia's biophilic street design standards and establish the groundwork for further investigation into its use and efficacy. According to this study, policy makers and designers might use the Biophilic Streets Design Standards to turn theoretical and innovative discussions about biophilic urbanism into workable projects and urban interventions. If the Framework is combined with other design methods and policies, such as water-sensitive, biodiversity-sensitive, regenerative, resilient, or ecological urban design, it may help improve urban infrastructure such that it offers restorative and health-promoting effects across any city. Biophilic design, which blurs the distinction between the natural world and man-made buildings, is broadly described as the integration of nature into contemporary architecture. Given that two thirds of the world's population will live in cities by 2050, nature should be viewed as a valuable asset in landscape design for urban areas rather than only a decorative element. Similarly, utilizing the natural world to benefit humans is more important than making a location ecologically friendly. The presence of nature significantly improves psychological and physical health, reduces stress and overstimulation, and promotes cognitive performance.

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THE MOSQUE'S TRADITIONAL HERITAGE AND THE CULTURAL VALUES OF THE COMMUNITY: A CASE STUDY AT MASJID JAMEK SEREMBAN, NEGERI SEMBILAN

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ABSTRACT
The site study project is to ensure and preserve the mosque's traditional heritage and to prolong the cultural values of the community. The location of the study is Masjid Jamek Seremban located within the city center of Seremban in Negeri Sembilan. Despite the history and culture of the surrounding site, the mosque was built as a temporary stop for travellers and to also serve as an Islamic educational institution for anyone who is interested. Initially, the land area of the mosque was resided by Indians and Malay-Indians that were street merchants and did not take care of the area properly, which caused the Majlis JHEANS to take over the area in 1990. Since the end ofthe 20th century, many scholars have been intrigued by the significance, aesthetic values and philosophical meanings of the most notable symbol of Islamic architecture; mosques. Linguistically, certain parts of Southeast Asian continent and most of the insular Southeast Asia belonged to the Austronesian world, covering the area more than a half way around the globe from Easter Island in the eastern pacific to Madagascar off the south-eastern coast of Africa. Although countless Indian merchants and missionaries visited Southeast Asia lands since early time, they never settled permanently in large scale in the region Based on the initial brief study ofthe mosque beforehand, the mosque is of traditional influences of Malaccan architecture. The mosque can also be seen to take influence from Archipelago architecture, which is the architecture that can be found within the islands of Southeast Asia, notably the traditions and style of the Minangkabau people. Afterwards however, all of the groups started their assigned tasks, the measuring team specifically had their tools and equipment ready to start the process of measuring the mosque. The sketch team took various images of certain angles of the mosque to start sketching the elevations and other component details.

Keywords Traditional mosques, Majlis JHEANS, Buddhist, Southeast Asia

1. INTRODUCTION

This chapter is to report, investigate, and observe the elements and components of a traditional, historical mosque that is located in Malaysia. This specific mosque, Masjid Jamek Seremban, has been around for many centuries hence the reason why this mosque was chosen for our site study. Like any group project, certain objectives have to be achieved throughout the whole project. The site study project is to ensure and preserve the mosque's traditional heritage and to prolong the cultural values of the community. It is also to ensure and preserve the history of the mosque itself since there are little to no written records except from word of mouth. Additionally the mosque has never been recorded by any other educational bodies. Nevertheless, in order to achieve the goals, there were a handful of objectives that were established.

2. LOCATION AND STATEMENT OF THE PROBLEM

The location of our study of Masjid Jamek Seremban is located within the city center of Seremban in Negeri Sembilan. Its location is placed in a strategic region where it is close to many tourist and important sites. The mosque, for example, is located only around 4km away from the Negeri Sembilan Minangkabau State Museum/Complex Centre (Muzium Negeri). Despite the history and culture of the surrounding site, the mosque was built as a temporary stop for travelers and to also serve as an islamic educational institution for anyone who is interested. Initially, the land area of the mosque was resided by Indians and Malay-Indians that were street merchants and didn't take care of the area properly, which caused the Majlis JHEANS (Jabatan Hal Ehwal Agama Islam Negeri Sembilan) to take over the area in 1990. This caused a reaction from the residents, a protest, but that was all settled when the Majlis JHEANS granted them a piece of land in the Temiang area. Although it was officially rebuilt and renovated in 1990, the mosque still serves as an important piece of history that conserves and preserves the traditional malay and chinese influences. Even though the history of the mosque itself is muddy and a bit muddled, its historical value and aesthetics still attracts many curious tourists and even local citizens to its vicinity. (Azrin & Muhammad Danial, 2022).

Since the end of the 20th century, many scholars have been intrigued by the significance, aesthetic values and philosophical meanings of the most notable symbol of Islamic architecture; mosques. Although Islam was introduced to Southeast Asia between the 13th, 14th and the 15th centuries and since then numerous mosques were erected throughout the region, but yet the Islamic architecture of this region remains little-known and poorly documented probably because these mosques have followed local building traditions and climatic conditions and do not resemble Islamic architecture of Middle East (Vlarseas, 1990; O'Neill, 1994; Michell, 1995).

As a result of strongly rooted and extremely vital pre-Islamic culture in theregion, traditional mosques in Melaka have wisely inspired from local traditions and environmental consideration rather than unfitting imitations from Middle Eastern architectural features. Different features in Southeast Asian mosques such as Minaret,Dome, Prayer hall, Iwan and Mihrab, which are the most predominant elements in Middle Eastern mosque architecture, have been altered or completely removed inSoutheast Asian mosques due to the influence of domestic or foreign cultures(Ghafar, 1999). The initial perusal on available records about Southeast Asian traditional mosques indicates the profound influence of Hindu-Buddhist architectureon these mosques. Southeast Asia architecture has adopted certain features from Hindu-Buddhist architecture, absorbed them and developed its own way of architecture, which illustrates a reflection of Hindu-Buddhist architecture beside the indigenous architecture of Southeast Asia (Ryan, 1971; Chen, 1998).

In order to study traditional Islamic architecture in Seremban, Negeri Sembilan into deeper layer is essential to get acquainted with various foreign cultures, which have influenced Melaka style mosque in different ways. This paper attempts to provide relevant materials concerning Melaka historical and architectural background. Austronesian heritage, Hindu-Buddhist architecture in Southeast Asia, Chinese architecture in Peninsula, and Southeast Asia mosque architectural style are the discussions, whichform the literature review section of this paper.

3. TRADITIONAL MOSQUE'S IN MALAYSIA

According to Ghafar (1999) Ahmad's work regarding architectural styles of Malaysia, there is three classification of a mosque in Malaysia which is according to the relative period which follows Vernacular Mosque, Colonial Mosque and Modern Mosque.While Tajuddin and Utaberta proposed aclassification of seven styles for the architectural language of a mosque in the Malay Archipelago. They are the Traditional Vernacular, the Sino-Eclectic, the Colonial, the North Indian, the Modern Vernacular, the Modernistic Expressionism, the Post-Modern Revivalism.

3.1 Austronesian Heritage

Austronesians, the descendants of whom form the basic population of Malay Archipelago, were the last group of various ethnic immigrants who reached SoutheastAsia (Blust, 1985). They spread from the Southern costs of Chinese mainland to Southern seas at some time between 4500 and 4000 BC and reached Sumatra, Malaya and Vietnam prior to 1000 BC (Bellwood, 1985). Linguistically, certain parts ofSoutheast Asian continent and most of the insular Southeast Asia belonged to the Austronesian world, covering the area more than a half way around the globe from Easter Island in the eastern pacific to Madagascar off the southeastern coast of Africa (Blust, 1985). Consisting around 1300 languages, they are spoken by the people of Madagascar, the Malay Peninsula, Malay-Indonesian archipelago, Micronesia,Melanesia and Polynesia (Waterson, 1997; Chen, 1998; Bellwood, 2006). Since the early days, the Austronesian had been active participants of the maritime trade and made contacts not only with India and China but had sailed far to the Middle East andeast coast of Africa (Wheatley, 1976). Research concerning the indigenous architecture in Southeast Asia, draws certain analogies between architectural practices found in different parts of this regionand despite their diversity, existence of recurring physical characteristic in these buildings indicates one shared provenance from thousands years ago: "Austronesianworld" (Waterson, 1990). The evanescent nature of main material used by the Austronesian make it hard for archaeologists to reassemble the structure, however, some findings have enabled experts to penetrate into some physical characteristic of Austronesian traditional architecture (Chen, 1998). The most prominent of these physical characteristics are the pile foundation or the raised floor supported by timber piles or stilts; saddle-backed roof with the ridge-line extends beyond the gable walls, and application of elaborated carpentry and decorative features (Waterson, 1990).

3.2 Interaction with India & Hindu-Buddhist Architecture in Southeast Asia

The first indigenous Hindu-Buddhist kingdoms in Southeast Asia appeared between the 3rd BC and the 3rd AD centuries, which means from the beginning these newly emerging states already had connections with India, as archaeological evidence both in India and Southeast Asia proves that trading contact between the two region was established as early as the 2nd century BC (Andaya, 2008). Indian penchant for gold, aromatic woods and spices attracted them to Southeast Asia lands. The vitality of two-way trading activities resulted in a rich relationship between two regions, which in Southeast Asia gradually metamorphosed into cultural and religious interactions where traders and missionaries played an important role (Fisher, 2006). Although countless Indian merchants and missionaries visited Southeast Asia lands since early time they never settled permanently in large scale in the region (Ryan, 1963; Munoz,2006)

Based on the initial brief study of the mosque beforehand, the mosque is of traditional influences of Malaccan architecture. Malaccan architecture is unique as it incorporates many influences of Chinese, Indian, and Malay traditions together. The mosque can also be seen to take influence from Archipelago architecture, which is the architecture that can be found within the islands of Southeast Asia, notably the traditions and style of the Minangkabau people. Originally,

many centuries back, the mosque was built entirely of wood that can be assumed to be sourced locally. However, the current mosque we see today was rebuilt and renovated in 1990. Malaccan-based mosques usually feature tiered-pyramid roofs that are either two or three levels tall. This roof style is known as the "tumpang" roof and this style is thought to originate from Hindu-Buddhist sacred architecture. The floor plan of a typical Malaccan-based Mosque would often be in a simple, square shape and can also be traced back to Hindu-Buddhist influences. The square shape makes it easier for the mosque to expand on all sides, which has already been done by the Masjid Jamek Seremban. Other than that, the mosque features ornaments such as crowns on top of a roof, and roof tails on the ridge and corner of every roof. Lastly, the minaret of a typical Malaccan-based architecture resembles that of a Chinese tower, which features ornaments, pronounced ridges and projected eave corners, which are all present in the Masjid Jamek's minaret.

4. METHODOLOGY

During the course of this project, various methods of research and methodology were conducted to achieve significant results and information. These courses of methodology include, measurements, sketches, 2D and 3D drawings, interviews, observation, tracing, photography, and model making. All of the work assigned to gather the necessary details and data were organized in nine (9) weeks, with separate phases to ease the burden of work; division of groups, on-site work and report, software drawings and lastly, model making.

Initially pre-site visit, different tasks were identified to be divided into groups, which then lead to the assignment and division of groups. As such, four (4) groups were created to ensure that the work done during the site-visit would run smoothly; (1) Measuring team, (2) CAD team, (3) Report team, (4) Catalog/Photography team, (5) Sketch team.

Continuing from the division of groups, the actual site-visit was when actual work was conducted. Initially, to obtain the sense and scale of the mosque itself, each individual group had their own tour of the place, as there were no available tour guides present. Afterwards however, all of the groups started their assigned tasks, the measuring team specifically had their tools and equipment ready to start the process of measuring the mosque. Each group used different sets of equipment and instruments for their assigned tasks around the mosque. On the first day, the measuring team was concerned and placed priority in measuring the floor plan. The sketch team took various images of certain angles of the mosque to start sketching the elevations and other component details. Concurrently, the report team directed an interview with Tuan Haji Muhamad bin Ahmad, one of the current Imams, and also with other mosque members. At the same time, the photography/catalog team documented, filmed, and took pictures of everything about the mosque and the teams doing their work. The last group, the CAD team, used similar measuring equipment and instruments to measure certain building components so that the data collected could be transferred into 2D drawings.

On the second day of work, each team continued with whatever remaining work left. The measuring team progressed with measuring the roof and the minaret. All the other teams continued doing similar work, with a few cross-coordination from certain groups to help speed up work. The report team started work on researching the background of the project, and worked on the report as well. Most importantly, there were several sessions of group status meetings and discussions held to ensure the smooth sailing and progression of the whole project. Shortly afterwards, a Gantt chart was created to help illustrate and further guide the group on how and when each assignment is to be concluded.

The third phase is the continued progression of all the software drawings. Once all of the measurement data were collected, the information was transferred into 2D CAD drawings first with the guidance and critiques of the lecturer. Then, when the CAD drawings were completed and satisfied, they were transformed into individual 3D digital models, and eventually a 3D digital model of the mosque was produced. Meanwhile, there were several sketches drawn, and the report team continued working and extracting information online regarding the mosque itself.

The final phase, On the 7th, 8th, and 9th of April 2022, the project and site survey was carried out fluidly. Several scopes of this project were laid out, starting with the analysis and study of the historical significance of Masjid Jamek Seremban. Collecting data such as the main measurements, detail measurements, facade, and original form of the mosque was another point of scope as well. Most importantly, the students were required to, other than taking measurements, to research the historical background of the mosque and location to further educate and appreciate the heritage and culture that is being preserved, that can be applied in their future studies and career. Furthermore, the last main scope that was identified was to gather enough data to create a 3D virtual model and a 3D physical model based on the actual measurements of the mosque.

5. SUMMARY AND CONCLUSION

Masjid Jamek Seremban is a very well preserved mosque which can help the students understand the concept of traditional buildings in Malaysia properly. It is a great starting point due to its basic, simple design and architecture. Its form also played an important role in making the students understand the construction of a building properly, scale and proportion, and also the religious significance of a mosque. Extraordinarily, the mosque tries to incorporate modern and traditional designs in its interior such as some of the building components, which makes the building more intriguing and interesting. Additionally, it emphasizes the importance of applying skills learned in classes to be utilized in field group work, be it a minor objective or a major objective. Moreover, this particular mosque has never been properly studied, or worked on before at this scale by other educational institutions, so this building served as a challenge to all of the participants.

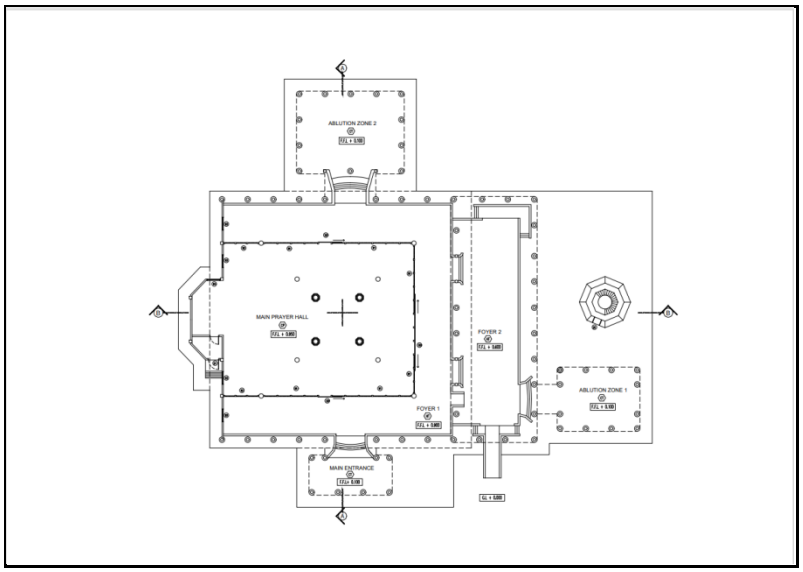

Figure 1: Masjid Jamek Seremban features a simple centralized spatial organization that is beneficial to the followers. It can be considered multifunctional due to it featuring multiple prayer

halls, an office, an ablution area and a toilet. The planning layout is accustomed to the climate of Negeri Sembilan, and expresses the obvious influences of typical Islamic Mosque layouts. This makes the mosque easily able to be renovated and expanded whenever it's called for.

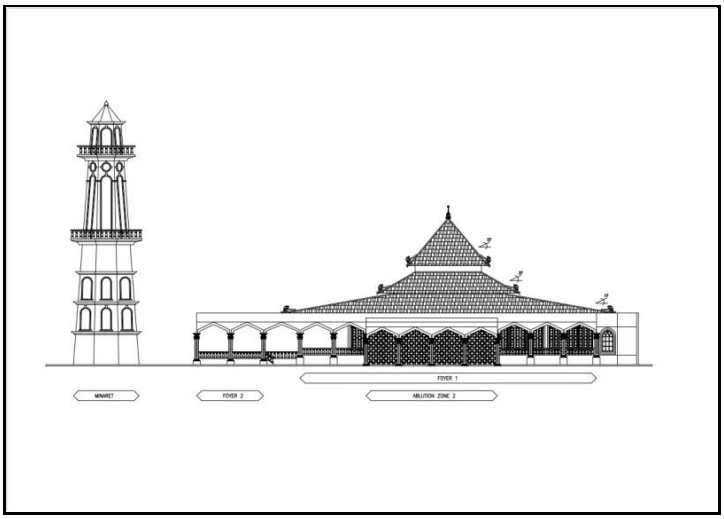

Figure 2: The roof of Masjid Jamek Seremban is unique as it concurs with the style of Malaccan Architecture. The most striking feature of the roof is its style, a multi-tiered pyramidal roof. Each tier of the roof has an opening made of stained glass. The stained glass offers a unique opportunity for ventilation while simultaneously providing natural sunlight.

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TRANSIT ORIENTED DEVELOPMENT AND LAND POLICIES: TOWARDS SUSTAINABLE TRANSPORT CITY

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ABSTRACT
Together with the development of brownfield areas in city centres and fringes, transit-oriented development has been considered to be the way to go when it comes to urban re-generation initiatives in many developed countries. As the provision of public transportation networks and facilities has always been seen as a public initiative, the private projects proponents have no choice but to engage the governments, be it at the federal, state or local levels, for the establishment of a clear land policy that could facilitate transit-oriented development in their cities. Urban Transport System and Land Use The interdependence of transport system and the built environment that includes housing in the cities and fringes is not new. In the contemporary relationship between transport system and the built environment, the main aim is aligned towards achieving a sustainable and liveable city. Of relevance is the promotion of public transport system over the private vehicles usage in the city. Black argued that there is a need to understand how a city works in terms of the interaction between land use, traffic and transport. Spatial pattern of traffic concerns with the distribution of traffic which is influenced by the disposition of land and the restraints to movement. Selection of transport mode and route depends on two main factors namely the travel time to be taken and the cost of the travel. Lastly, traffic on a transport network will influence the quality and comfort of journey that is to be taken. A sustainable transport system should enable efficient transit of goods; should create car-free urban areas and friendly to the pedestrians and cyclists.

Keywords: Transport Development, Urban Transport System, Sustainable Transport System, Land Policies

1. INTRODUCTION

With the expansion of urban areas all over the world, there exists a pressing need for us to find alternatives to the ensuing urban sprawls that have been impacting our modern lives. By 2050, it is projected that two-thirds of the world population will consist of urbanites (UN DESA, 2021a). Gone are the days when cities were allowed to be expanded gradually or actively without considering the negative impacts of this phenomenon on our planet's finite resources and the environment. Governments the world over, city planners and property developers have been trying to offer alternatives that could become panacea to this predicament. As urbanites need to be mobile between their home and place of work, transit oriented development has been proposed as an antidote to the excessive urban sprawl. Together with the development of brownfield areas in city centres and fringes, transit oriented development has been considered to be the way to go when it comes to urban re-generation initiatives in many developed countries. With transit oriented development, new housing and commercial properties are introduced near or around a public transit hub or station. As the provision of public transportation networks and facilities has always been seen as a public initiative, the private projects proponents have no choice but to engage the governments, be it at the federal, state or local levels, for the establishment of a clear land policy that could facilitate transit oriented development in their cities. This interdependence and

engagement, if implemented successfully can result in the creation of a sustainable transport city that relies on an efficient public transit network to move people about.

2. LITERATURE REVIEW

2.1 Overview

Historically, the global urban population exceeded the rural population for the first time in 2008 (UN DESA, 2021a). This urbanisation trend brings with it changes in human settlement pattern and pressures to the environment. The resultant urban sprawl, for example, can create demographic and structural constraints, increased infrastructure costs and the loss of rural lands (Abedinia & Khalili, 2019). The pressure to satisfy demand for affordable houses in urban areas is also tremendous. Due to these bleak prophecies, the United Nation has formulated the "2030 Agenda for Sustainable Development". Of particular interest is Goal 11 of the Agenda that aims to "make cities and human settlements inclusive, safe, resilient and sustainable". This Goal is to be achieved through, among others, ensuring access for all to adequate, safe and affordable housing and basic services and upgrading slums (UN DESA, 2021b). Additionally, the UN Habitat has projected that 3 billion people will need access to adequate housing by 2030. This figure equals to the creation of 96,000 new affordable houses per day to satisfy demand by then (UN Habitat, 2021).

2.2 Urban Transport System and Land Use

The interdependence of transport system and the built environment that includes housing in the cities and fringes is not new. Sir Ebenezer Howard, through his Garden City movement, proposed a collection of cities in the 19th century England that should be connected by rail transit networks. This model was mooted to resolve some social issues found in the industrial cities of England which among others included the cramped and poor conditions of workers housing (Beevers, 1988). Advanced as it might in its time, this idea is being revisited nowadays as a potent mechanism to address many urban ills such as uncontrolled urban sprawl, increased carbon footprint, air pollution and traffic accidents. In the contemporary relationship between transport system and the built environment, the main aim is aligned towards achieving a sustainable and liveable city. As one of the main component of urban structures, transport system is a low hanging fruit that should be transformed immediately towards achieving sustainability. Of relevance is the promotion of public transport system over the private vehicles usage in the city.

There are many proven benefits of public transportation system in our urban areas. The basic purpose of any public transportation system in cities is to connect urbanites in large number and safely to their homes, work places, commercial establishments, parks and educational facilities, among others. An efficient mass transportation system can reduce commuting times and reduce cost of living (Litman, 2022). Furthermore, it can promote cluster of firms within a supply chain to congregate along a public transport corridor or around a public transport hub. This will help increase productivity within a supply chain cluster, support innovation and enhance economic growth. Reduction in private vehicle usage with the implementation of a good public transport system will, over time, reduce the need to build more urban roads. More space can be accorded to creating new public parks. Some ageing urban elevated highways can also be demolished and the resultant empty space repurposed as new public space. The decline in private car usage will also relieve traffic congestion on existing roads and reduce carbon emission. Other chain reactions include improved access to skilled labour and the unlocking of new development sites for business establishments and housing.

Black (2018) argued that there is a need to understand how a city works in terms of the interaction between land use, traffic and transport. This is so because he identified land use, traffic and transport as a 'system' that needs to integrate the three components for them to function cohesively. Land use covers the types of structures built on a piece of land that may include houses, factories and schools. It also covers the scale of intensity of social and economic activities that take place on that piece of land. This may include population number, employment and factory output. Transport supply supports the physical links between land uses. The main components are transport modes (such as footpaths, roads and railways) and operational characteristics (such as travel times, frequency and ticket price). Finally, traffic is identified as the joint result of land use and transport supply. In this sense, pedestrian and vehicular traffic for example signifies the horizontal movement of people and goods along the transport corridor. To better understand the interactions between land use, transport supply and traffic, five concepts are fundamental namely accessibility, traffic generation, spatial pattern of traffic, selection of transport mode and route, and traffic on the transport network. Accessibility is the outcome of relationships between the geographical arrangement of land uses and the transport system that serves these land uses. Traffic generation is a measure of the amount of traffic that falls on a particular piece of land within a specific period of time. Spatial pattern of traffic concerns with the distribution of traffic which is influenced by the disposition of land and the restraints to movement. Selection of transport mode and route depends on two main factors namely the travel time to be taken and the cost of the travel. Lastly, traffic on a transport network will influence the quality and comfort of journey that is to be taken.

Urban transportation, either public or private, has been observed to have shaped the growth of our cities. The Industrial Revolution introduced many new inventions such as the steam railway engines and electric streetcars. These inventions enabled the relocation of well-off businessmen' homes away from the city centres to the suburbs. The inner-city manufacturing factories were also able to be relocated nearer to canals and ports. The cities would gradually expand following the transit corridors. This pattern of city growth could be seen in the historical expansions of many western cities such as London, Paris and New York. On the other hand, private vehicles ownership sparked the creation of suburbs at an unprecedented scale. There is no better place to observe this car-driven city expansion to the suburb than in North America and Australia. On the flip side, the growth of our cities that is motivated by land use patterns could create the need for the construction of new urban transportation networks. This is especially true in many developing Asian cities that have built their mass transit networks only after experiencing choking traffic congestions for decades. This reactive urban transport planning strategy could be observed happening in Kuala Lumpur, Bangkok and Jakarta. These cities have had their first MRT lines opened fairly recently.

2.3 Transit Oriented Development

The latest craze that has inspired the housing and commercial developers, at least in Malaysia, is transit oriented development (TOD). This term is however not new. It was formulated by Peter Calthorpe in his book entitled The Next American Metropolis: Ecology, Community, and the American Dream (1993). In its basic form, a transit oriented development should consist of mixed use developments at various densities within a certain radius of a transit stop. TOD Institute (2022) states a transit oriented development as "compact, walkable, pedestrian-oriented, mixed-use communities centred around high quality train systems". To this it adds "transit oriented development as regional planning, city revitalisation, suburban renewal, and walkable neighbourhoods combined". Linton and Bray (2019) identified seven key factors that could contribute towards a successful transit oriented development. Firstly, transit in the forms of heavy or light rails or bus should be at the heart of this development. Secondly, the development needs to have critical mass of people coming from high density housing and commercial properties.

Thirdly, the development should support walking and cycling. Fourthly, driving and ownership of private vehicles should be discouraged. Fifthly, services such as shops, healthcare and schools should be integrated with the development. Sixthly, the use of brownfield sites (as opposed to greenfield sites) should be the first choice locations. Finally, the public sector involvement should be cherished as it will be the key enabler to integrate land use planning and the transit oriented development. One good example of a successful transit oriented development is KL Sentral in Kuala Lumpur. As a pioneer in Malaysia, this development has become the precedent of a good and well-planned city within a city with ample supply of housing and commercial spaces, supported by myriads of public transport modes such the intercity railways, LRT, MRT, airport links and monorail. Many similar developments have since sprung up in the city such as the Bukit Bintang City Centre, the TRX development and the Dang Wangi TOD.

2.4 Sustainable Transport City

The current maxim for development is to achieve sustainability in every action that we take vis-à-vis the Earth's carrying capacity. The concept of sustainable development was described by the 1987 Bruntland Commission Report as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (UNESCO, 2022). As the mobility of urban dwellers is paramount to ensure their urban survival, we cannot help but to give emphasis on the needs for their mobility to be sustainable too. In fact, within the ambit of Goal 11 of the Sustainable Development Goals, we should make cities and human settlements inclusive, safe, resilient and sustainable. Specifically, Sub-Goal 11.2 states that:

'By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport,…'

Consequently, the onus is on all stakeholders to ensure our cities have sustainable transport systems. A sustainable transport system should enable efficient transit of goods; should create car-free urban areas and friendly to the pedestrians and cyclists (Ogryzek et al., 2020). Banister (2008) introduced several principles for achieving sustainable transport goal. The principles are reduced travel needs; transport policy shift; distance reduction; and technological innovation to increase efficiency. Consequently, Banister proposed an alternative approach to transport planning to support sustainable mobility. Among others, sustainable mobility should focus on social dimensions (vs physical dimensions); should be local in scale; and putting pedestrians and cyclists at the top and car users at the bottom of users' hierarchy.

The European Conference of Ministers of the OECD (2004), defines a sustainable transport system as a system that:

"a) is able to meet the basic need of access to the transport system by individuals and society consistent with the needs of human health and ecosystems, b) is affordable, operates efficiently, offers choice of transport modes and supports a growing economy, c) limits emissions and waste, minimizes consumption of non-renewable resources, limits consumption of renewable resources to the level of sustainability, minimizes the use of land and reduces noise."
(Cheba & Saniuk, 2016)

Owing to the aforementioned characteristics and definitions, we cannot help but notice that there is no one decisive definition that can be attributed to sustainable transport system, and consequently, sustainable transport city. Having said that however, there exist several frameworks that have been adopted by countries and agencies when they attempted to classify what constitutes a sustainable transport system and how would that contribute to a sustainable transport city.

The existence of a sustainable transport system in a city supports the sustainable goal of the city as a whole. In this context, a sustainable transport system cut both ways. On the one hand, a sustainable transport system will reduce carbon emissions and urban heat island occurrence which could thus improve the city's environmental sustainability. On the other hand, a sustainable transport system as defined earlier, could help the city to mobilise its people efficiently. Efficient and cheap access to place of employment will ensure the economic sustainability of urban dwellers and the city as whole. At the same time, efficient and cheap access to urban parks, open spaces, schools and cultural centres help to ensure social sustainability of citizens.

3. METHODOLOGY

This chapter used the journal archive search and internet search to identify the sources of frameworks and indicators that have been established for assessing the sustainability level of urban transport system. The phrase "sustainable transport indicators" was used in the search string. The search results were then summarily browsed and suitable sources were then identified and studied. The primary source from Arcadis (2017) and secondary sources from the studies by Cheba and Saniuk (2016) and Regmi (2020) were identified to be suitable for further analysis and discussion. The indicators were then tabulated and descriptively analysed.

4. FINDINGS AND DISCUSSION

Several agencies and researchers have come out with frameworks and indicators to assess the sustainability level of urban transport system, and hence sustainable transport city. The primary source from Arcadis (2017) and secondary sources from the studies by Cheba and Saniuk (2016) and Regmi (2020) were identified to have clear lists of indicators of a sustainable transport system. The findings from these sources from the journal archive search and internet search are summarised in several tables below.

Table 1: Sustainable transport indicators in the European Union

Headline indicator	Operational indicators	Explanatory indicators
Energy consumption of transport relative to GDP	Transport and mobility	
	Modal split of passenger transport Modal split of freight transport	Volume of freight relative to GDP Volume of passenger transport relative to GDP Energy consumption by transport mode
	Transport impact	
	Greenhouse gas emission by transport mode People killed in road accident	Emissions of nitrogen oxides from transport Emissions of particulate matter from transport Average CO_2 emissions per km from new passenger cars
Contextual indicator	Price indices for transport	

Source: Cheba & Saniuk, 2016

Table 2: The three pillars of sustainable mobility

People	Planet	Profit
Measures social and human Implications of mobility systems including quality of life	Captures environmental impacts; "green" factors like energy, pollution and emissions	Assesses the efficiency and reliability of a mobility system to facilitate economic growth
● The People sub-index rates safety (traffic fatalities), access to transport services, share of trips taken by public transport, rider connectivity, digitization of the transport system, upkeep of the transport system, uptake of active commuting, airport passengers, hours of metro accessibility and wheelchair access. These indicators can broadly be thought of as capturing "quality of life" for a city's commuters and visitors.	● The Planet sub-index ranks cities on greenhouse gas emissions, congestion and delays, efforts to lower transport emissions, bicycle infrastructure, air pollution, provision of green space and electric vehicle incentives. These indicators can be broadly thought of as "green factors".	● The Profit sub-index examines commuting travel time in a city, transport revenues as a share of expenses, public finance commitment, affordability of public transport, system utilization and efficiency of road networks. These indicators can broadly be thought of as capturing "economic health".

Source: Arcadis, 2017

Table 3: Indicators for sustainable urban transport index

Indicators	Natural units
The extent to which transport plans cover public transport, intermodal facilities and infrastructure for active modes	0-16 scale
Modal share of active and public transport in commuting	Per cent of trips
Convenient access to public transport service	Per cent of the population
Public transport quality and reliability	Per cent satisfied with service
Traffic fatalities per 100,000 inhabitants	Number of fatalities
Affordability – travel costs as part of income	Per cent of income
Operational costs of the public transport system	Cost recovery ratio
Investment in public transport systems	Per cent of total investment in transport
Air quality in city (PM 10)	µg/m3
Greenhouse gas emissions from transport	Tons/capita/year

Source: Regmi, 2020

Table 1 lists the sustainable transport indicators established by the European Union. The indicators are subdivided in a hierarchical relationship containing headline indicator, operational indicators and explanatory indicators. Table 2 highlights the three pillars of sustainable mobility as established by Arcadis in 2017. The three pillars are people, planet and profit with their corresponding measurement indicators listed accordingly. Table 3 from Regmi (2000) lists the indicators for sustainable urban transport index. Unlike in Table 1 and Table 2, the indicators identified by Regmi are not grouped but rather listed individually with their corresponding natural units becoming the measurement scales.

As indicated in Table 1 until Table 3 above, the indicators to measure sustainability level of urban transport are non-exhaustive. Table 1 identifies energy consumption; transport and mobility; transport impact; and price indices for transport as the indicators. Table 2 indicators capture "quality of life" for a city's commuters and visitors; "green factors"; and "economic health" as important aspects under the people, planet and profit groups of indicators respectively. Finally, Table 3 only lists indicators individually without hierarchy or groupings which among others include public transport quality and reliability; traffic fatalities per 100,000 inhabitants; affordability; and greenhouse gas emissions from transport. Based on the three sampled sets of indicators, we could deduce that they concern with the three main components of sustainability namely the environmental sustainability, the social sustainability and the economic sustainability.

5. CONCLUSION

Sustainable development concerns all aspects of life. In a city, urban transport system contributes to the land use pattern and affects the sustainability scale of the city. A sustainable transport city could be measured through many indicators established in many proposed frameworks. The common themes that bind these different indicators and frameworks together are related to the three main components of sustainability namely the environment, social aspect and economy.

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MANAGING HOUSING ISSUES FOR THE POOR TOWARDS BUILDING COMMUNITY RESILIENCY IN HAZARD-PRONE AREA

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ABSTRACT
The research discusses, the provision of housing for the most vulnerable, particularly low-income dwellers who are more vulnerable to hazards such as tsunamis, earthquakes and floods; and the poor dwellers of slums and squatter settlements at city edges in search of opportunities in the urban city. Some aspects regarding safety are covered in the three major instruments of human rights – the Universal Declaration of Human Rights, the International Covenant on Civil and Political Rights and the International Covenant on Economic, Social and Cultural Rights. The competing priorities of investment education, economic growth, food and clothes; have overruled the need to provide a decent home for the family. Some dwellers see their houses as a supporting factor towards their economic growth. Lack of land tenures and ownership has contributed to the mushrooming of temporary shelters and slums. Processes of urbanization forced people to occupy land which is unsafe for settlement from landslides and flooding or ofunstable ground; in order to be close to job opportunities and infrastructure. Safe lands are available but government have invested a huge amount of money into making them safer, thus requiring the occupants to repay in the form of taxes. The locals may have very little knowledge on construction of hazard-resistance buildings and the technology to implement it in every dwelling. A permanent and strong housing solution may well adapt with the extreme climate while continuing to support the economic activities of the dwellers. 3 Positive Impacts Emphases on participation, resistance to relocation, the encouragement of decentralisation , the promotion of a rights-based approach , and the recognition of shelter and housing as social and economic assets have driven the global standardisation in disaster preparedness in housing policy.

Keywords: Poor Dwellers , Participation , Resistance, Relocation , Global Standardisation

1. INTRODUCTION

Charles Abrams (1946), a prominent advocate for housing reform wrote "Housing in the twentieth century has been one continuing emergency" (Stohr, 2006). Indeed, cycle of war, natural disaster and poverty, all drastically emerging in the twentieth century, have had major impacts on housing. Strive for the poor and vulnerable to sustain their livelihoods in the realm of marginalisation have been increasingly tough as the nature continues to takes it tolls, hitting the poorest the hardest.

The chapter discusses, in general, on the provision of housing for the most vulnerable, particularly low-income dwellers who are more vulnerable to hazards such as tsunamis, earthquakes and floods; and the poor dwellers of slums and squatter settlements at city edges in search of opportunities in the urban city. In this discussion, it is also important to understand that an infectious disease turned pandemic is also considered as a type of hazard that can have severe impact towards community.

2. THE RIGHT TO SAFETY

All human being have a right towards a safe life. Some aspects regarding safety are covered in the three major instruments of human rights - the Universal Declaration of Human Rights (UDHR), the International Covenant on Civil and Political Rights (CCPR) and the International Covenant on Economic, Social and Cultural Rights (CESCR). (Twigg, 2003). They are:

1 right to security in general
2 right to economic, social and cultural development
3 right to an adequate standard of living (including right to housing)
4 freedom from hunger
5 right to health and safety at work
6 right to health

Housing, particularly, plays an important role in ensuring that the right to safety for all human being is not violated. To house is to shelter, which is necessary to provide security and personal safety, protect from the climate and enhance resistance to ill health and disease. It is also important for human dignity and to sustain family and community life as far as possible in difficult circumstances (Sphere Project, 2004) cited in (Alam, 2008, pg.11) A house encourages economic growth and home-based entrepreneurs, reducing poverty and lessen hunger. A house provides space for social and cultural networking within a community. Hence, housing constitutes all of the aspects of safety.

3. POOR HOUSING BY THE POOR

Poverty is the 'root' problem to housing. The lack of initial financial resources for quality materials, construction and maintenance, have forced poor dwellers to build their homes from anything that they can easily find, cheap or costless. The competing priorities of investment – education, economic growth, food and clothes; have overruled the need to provide a decent home for the family. (Aysan *et al.* 1995, pg.42)

Some dwellers see their houses as a supporting factor towards their economic growth. In the attempt to build up their assets through their economic activities, they have reduced their living cost by building temporary shelters. With hope that their accumulated assets would be sufficient enough to relocate themselves into better houses, the process actually takes longer as the poor people – with minimal literacy and skills; may only resort to low-income jobs. Most of their income, then, will be spent on maintaining their homes from leakages, deteriorations and etc. These temporary shelters, instead of being replaced by permanent housing, becomes permanent themselves which resulted in the creation of slums.

Frequent hazards have also caused dwellers to build cheap, temporary shelters with materials salvaged from the previous hazards, only to have them destroyed when the next hazard strikes. Without realizing, the repeated reconstruction actually costs more as more accumulated possessions will be lost and even worse, if it involves injury and death of family members due to the disaster.

Lack of land tenures and ownership has contributed to the mushrooming of temporary shelters and slums. There have been issues of rising insecurity from forced relocation by the government due to illegal settlements. Majority of low income people prefers to invest in assets

that are easily mobilized – such as television, refrigerators and stoves, rather than those with permanency, like building better house structures.

Processes of urbanization forced people to occupy land which is unsafe for settlement from landslides and flooding or of unstable ground; in order to be close to job opportunities and infrastructure. (Spence, 1991) Safe lands are available but government have invested a huge amount of money into making them safer, thus requiring the occupants to repay in the form of taxes. The poor people will sometimes settled at the edge of cities in order to benefit from the city's infrastructures, thus creating illegal squatter settlements, which is legally subjected to forced eviction by the government.

Aysan *et al.*(1995, pg. 42) listed lack of knowledge and building skills as one of the common reasons for vulnerability in low-income housing. The locals may have very little knowledge on construction of hazard-resistance buildings and the technology to implement it in every dwelling. Resources spent on costly technological solutions – machineries, high-tech equipments and hiring geologist or structural engineers to build on hazard-prone areas; may draw scarce resources away from equally effective and less costly solutions. (Dynes, 1991)

4. PROVISION OF HOUSINGS

4.1 Pre-Disaster

There have been rising awareness to mitigate disaster among the global community recently. Many states have started to initiate and invest in disaster mitigation strategies due to the immense amount of loss in possession and casualty resulting from disasters. The occasional post-disaster reconstruction requires more expenditure compared to a long-term pre-disaster mitigation planning. Furthermore, the process towards total recovery from disaster also implies social and political framework, thus delaying the process of recovery.

Climate change also contributes towards the provision of permanent housing. Extreme climatic conditions such as excessive heat, occasional rain and storms can no longer be tolerated by people living in temporary shelters. Internal temperature of their shelters becomes too hot in the day and too cold in the night, making it no longer suitable for human to inhabit. Storms and heavy rains which brings flood most of the time can cause severe damage to their shelters. The effort of routinely rebuilding their shelters led to unnecessary spending. Relocation is always seen as a solution, but these floods, for instance, for some community, are their source of income. Seasonal agricultural activities relies on the occasional flooding, thus relocation can mean declination in economic growth. A permanent and strong housing solution may well adapt with the extreme climate while continuing to support the economic activities of the dwellers.

4.2 Post-Disaster

Many developers assumed that rebuilding the 'old village' will have a positive acceptance because of people's cultural background. This sometimes can be true in terms of space planning and the use of local materials. But, in long-term, the growing aspirations of the locals towards modernity in their housing can cause barriers to community development, especially for the newer generations. Insistence on traditional forms may be counter-productive, as people may prefer to follow aspiration not tradition. (Aysan *et al.* 1995, pg 21) Why pay extra money for concrete? Because it looks good, like the good parts of the city – a place with status' (Hamdi, 2004, pg.27)

The funds towards post-disaster responses have increased dramatically due to recent rising of disaster occurrence. Many states were forced to spend a huge amount of money in

providing continuous supply of food, clothes and shelters for the victims, until they can sustain themselves without aid. The recovery process will prolong as issues regarding land tenure, security, psychological trauma and others need to be considered accordingly. By incorporating disaster mitigation strategies into the initial design of a housing layout, the investment can have long-term effect, hassle-free.

4.3 Positive Impacts

Emphases on participation, resistance to relocation, the encouragement of decentralisation, the promotion of a rights-based approach, and the recognition of shelter and housing as social and economic assets have driven the global standardisation in disaster preparedness in housing policy. United Nations Office for the Coordination of Humanitarian Affairs (OCHA, 2006) pointed the key influences on the shifts of housing policy the, as follows:

1. Local capacity and vulnerability are far better understood. Criteria for interventions, priorities and assessment for the vulnerable have been clearly outlined.
2. There is a much broader and more holistic view of what constitutes the sector, such as economic, social benefits and culture acceptability.
3. There is a linkage between land tenure and success in reconstruction.
4. There is linkage between family shelter/housing and community settlement
5. There has been some shift in emphasis to beneficiaries having more responsibility, both in the project design process, and financially.
6. The relationship between relief, recovery, and reconstruction is recognized. Shelter policy influences the speed and shape of the parallel reconstruction of permanent settlements and housing.
7. Reconstruction is identified as an opportunity for future risk reduction

Serageldin (1992, pg.8) defined architecture of empowerment as a built environment which responds to the needs of the poor and destitute, while respecting their humanity and putting them in charge of their own destinies. Involving the community in the reconstruction process may encourage self-reliance, self-confidence, training skills and improve organization within the community. (Aysan *et al.* 1995, pg 74) Self-help buildings can empower the community by allowing them to make decisions of their habitat, giving a sense of ownership towards their self-built, permanent homes and to sustain themselves in the future, with minimal external aid.

Building permanent housing can provide job opportunities for the locals – labour forces, manufacturing local roof tiles, transporting building materials and etc. During the construction, they can earn incomes to improve their own houses and also to build up their assets. Upon completion, they can utilise their acquired construction skills to find jobs in the nearby cities. It is a win-win situation where they get to build their homes and obtained free skills for their future benefits. These newly trained local builders can make construction as their income while passing on the knowledge to the younger generations for replication, minimizing the dependence on aids in the case of future disaster.

Ela Bhatt, on her discussion of women's roles in the Third World, defined home as a productive asset; functioning at various times as a warehouse, a storehouse, and source of inputs such as water and electricity. Access to shelter enables women to work year round, protected from monsoons, floods and other interruptions. The house provides greater security; allows accumulation of materials, products and inventories; and facilities linkages to services necessary for profitable activities (Serageldin, 1997, pg.9) Permanent housing of hazard-resistant characteristic can provide sufficient protection from loss of possessions and assets due to disaster, if the design initially incorporated a 'safe room' or storage within the house for safe-keeping.

UNDRO (1982, pg.34) listed the advantages of accelerating reconstruction of permanent housing, as follows:

1 Concentration of limited resources, where it works best and effectively
2 Reduces the time in which people are without permanent accommodation
3 Self-help methods keeps housing at a price low, "grass-roots" level decision-making
4 Uses and builds upon the existing housing process and the skills within the community
5 Accelerate full recovery and makes optimal use of local resources, human and material

4.4 Negative Impacts

Local aspirations may increase the vulnerability of housing, especially where resources and expertise are insufficient. The lack of knowledge on the local climate will cause discomfort for the occupants, especially in a badly designed concrete building. Poor maintenance of permanent housings can cause rapid deterioration of structure i.e. corrosion of metal works, concrete structural failures and etc., making it unsafe for occupying.

Female-headed households are generally more vulnerable to poverty to begin with, when hit by disaster, suffers more due to the head's lack of education and limited access to resources (Mehta, 2007, pg.21) Some organization have very strict regulation regarding who can benefit from their housing projects. Rule such as each family should send a member to help with the construction process will burden those who cannot do so, such as single mothers and the disabled people. Each individual affected by the disaster should have equal rights to a new and safer home, regardless of their ability and limitations. It is important that criteria for eligibility for shelter are transparent and fair and that people in similar conditions receive similar aid. (Beck, 2005a, pg.4)

Building permanent housing may sometimes pose harm towards the environment if it is not properly planned in the prospect of the future. Excessive excavation of site for building foundation can cause landslides and flash floods when the designer neglected the topography of the site in the initial design of the housing layout. Agencies with experienced working on disaster preparedness can make a huge difference in planning for reconstruction.(Alam, 2008, pg.7)

Within the limited plot of land of their permanent housings, the dwellers have very few options of expanding their homes. The permanency of the building also makes it hard to alter any part of the structure without directly affecting the stability of the house. Growth in economic activities or family members, which requires more space, can easily be disrupted by this. When in temporary housings, dwellers are more flexible in the expansion of their dwellings and the land surrounding their homes are not limited, thus allowing economic activities such as agriculture to take place.

4.5 Problems of Provision

The coordination in response between government and NGOs is crucial in determining the standard approach to shelter and housing for reconstruction in disaster areas. (Ramalingam, 2008) Government, having the utmost authority, often dictates the type of shelters to provide for the victims, mostly concrete, hazard-proof houses. The NGOs, on the other hand, might support traditional housing to minimize alteration towards the cultural suitability. These two main bodies have great influence on the community, where the younger generations might support modern development and the older, conservative group will opt for the idea to preserve tradition. This will lead to conflict and tension within the community, thus delaying the process for reconstruction.

Population movement in the form of migration in and out of cities is often unpredictable. (Beck, 2005a, pg.4) Victims of the disaster may prefer to stay close to their previous homes or live with their family members. Some might move to the city when their capital ability allows them to do so. The problem arises when; the provision of permanent shelters is not adequate to support the growing number of family members. Vice versa, when job opportunities and resources in the village become scarce and the nearby cities offer more prospects, people will start to move to the city and abandon their homes. As a result, new slum settlements will be created in the city and the investment into permanent housing will be wasteful.

Some victims, however, have the idea that the government will provide their needs without having to work for it since they have loss most of their possessions and were the most vulnerable in the situation. Due to that, some agencies working on the field for reconstruction, employed external labours and imported building materials for their programmes. Having done that, strict regulation may be imposed towards the beneficiaries because huge amounts of money have been invested by the agencies towards the reconstruction process. Ownership will also become an issue as the agencies will reluctantly deliver the houses but maintain a level of authority over them.

Failure to recognise the length of time it would take to build permanent housing and delivery of shelter will result in delays to rehouse disaster victims. (Beck, 2005b, pg.6) Raised hopes and expectations towards their new homes can never be satisfied, at least not on time (Hamdi, 2004, pg.24) The affected population will then suffer as they need to sustain their livelihoods within the limited provision of temporary or transitional shelters, normally with inadequate infrastructure such as water and sanitation, poor drainage, no electricity and etc. This will exacerbate the outbreak of water-borne diseases and other health related risks.

A single asset does not make a livelihood. (Cosgrave, 2008, pg.20). When donor's only concern is to rehouse victims after the disaster, the affected population often were forced to sell their productive and household assets to cope, as post-disaster support is frequently overlooked. (Alam, 2008, pg.8) Technical assistance such as loans, infrastructures, guides for housing maintenance and such were sometimes excluded in the reconstruction phase, thus slowing the process for total recovery from the disaster and to rebuild their livelihoods. Recovery and reconstruction must look beyond returning to the status quo and rather seek to address the root causes of vulnerability – aiming, for example, to improve infrastructure and livelihood opportunities (Houghton, 2005, pg.1)

4.6 Transitional Shelter

An important strategy for speeding reconstruction has been to design and build transitional shelter using materials that can be repurposed for the construction of permanent housing (Oxfam, 2006). Corsellis *et al.* (2003) defined transitional shelter as shelter which provides a habitable covered living space, a secure, and healthy living environment with privacy and dignity to those within it, over the interim period between being forced to leave their home and achieving a durable shelter solution; or shelter within a damaged home prior to the reconstruction of the home in a manner suitable for permanent occupation

Oxfam (2006) also pointed the goals for these transitional shelters, in their project 'Transitional Community' in Sri Lanka after the 2004 tsunami, as follows:

1. To provide shelter on temporary sites rather than waiting for land-issues to be resolved,
2. To help defray families' construction costs for building permanent housing by giving them materials that they can later sell or repurpose.

The idea of locating these shelters on a community's common ground may have positive impact as it will force a speedy reconstruction, in order for the community to reclaim their shared space. However, ignorance of the dwellers may cause conflict within the community and these transitional shelters will soon become permanent.

6. CONCLUSION

Disaster can act as a strong catalyst of change. Where old, unsafe shelters were destroyed or badly damaged in the disaster; and sufficient funds are flowing in for reconstruction, dwellers should take this opportunity to improve the condition of their new permanent homes. Care should be taken in order not to reconstruct the same 'old village'. The locals should have a thorough understanding of their previous houses to be able to progress from that. However, a single disaster response cannot undo decades of underdevelopment (Cosgrave, 2008, pg.9) Constraints such as ethnic and cultural division, poor governance and corruption can further undermine the attempts towards a more sustainable reconstruction.

Building a house means more than setting up walls and roofs; it means setting up understanding and involvement with the users and the environment surrounding the building" (Aysan *et al.* 1995, pg.82) Many considerations such as economical implication, climate and environment; and social well-being and networking should be made in the initial planning of the programme. The involvement of the community in determining their needs should also be made compulsory, as they will be the end-users. World Development Report, World Bank (2004) quoted, 'the main difference between success and failure is the degree to which poor people themselves are involved in determining the quality and quantity of the services they receive (Stohr, 2006)

Shelter and housing should be considered as processes to support, as opposed to products to be delivered (Davis, 1992, pg.12) Donors have to align their aims and priorities alongside the needs of the affected population when providing aid for the disaster victims. Differences in agenda and interest should be resolve beforehand to avoid conflict during the reconstruction process.

The idea of 'safe housing' means more than human being physically safe from disaster. It also means being safe economically, culturally, mentally and socially with the prospect into a more sustainable, independent future. The journey from subsistence to permanence in building construction cannot be made in one leap, but gradually, so as to match economic growth and the gradual increase in technical ability and without disrupting cultural continuity. (Boyle, 1991)

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IMPLEMENTATION OF CONSTRUCTION WASTE POLICY IN MALAYSIA

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ABSTRACT
Evidence shows that approximately 40 percent of the waste generated globally originates from the construction and demolition of buildings and this forms a major portion of the solid waste discarded in landfills around the world. The purpose of this paper is to identify current barriers and to upgrade the implementation of construction waste management and policy. The aim of this chapter is to highlight authorities and people involved in the construction sector the perception of various environmental problems and examine the relative importance of each problem in construction waste management and environmental strategy for developing appropriate policies in Malaysia. In order to achieve the objectives, a systematic review is to be conducted which will cover textbooks, institutional and statutory publication periodical and trade/academic journals, seminars and conference paper to obtain general information of the facets of construction waste, on the environment effect, understanding the main problem in managing waste, the gap in policies implementation for construction that within the international and local government standard regulations. The information from the interview shows the significant level of contribution and the level of practice among the waste minimization factors in the construction industry of Malaysia. In recent years, waste reuse and recycling have been promoted in order to reduce wastes and protect the environment. In summary, there are a number of policies and voluntary initiatives supporting sustainable resource and waste management in the Malaysian construction sector, however the reality remains challenging.

Keywords: Construction Waste management, Systematic Review, Environmental Management

1. INTRODUCTION

Construction projects are important in providing growth to the economy, increasing the standard of living and providing job opportunities. In Malaysia for two decades, the extensive building and infrastructure development projects have led to an increase in construction waste generation (Begum, R. C. 2007) and create greater problems such as illegal dumping should receive greater attention. Construction by nature is not an environmentally-friendly industry. Air, water, noise and land pollution can all be linked to the construction industry and construction waste has a major impact on the environment. Thus, waste minimization is an important area of concern in the construction industry implementation for construction waste. According to the magazine Recycle today. (2004) stated that, in the United States construction industry alone, the EPA (USA's Environment Protection Agency) estimates that 136 million tonnes of construction and demolition waste are produced yearly.

In Malaysia the construction industry in our country is fast becoming a big waste generator. The Malaysian extensive building and infrastructure development projects have led to a huge increase of construction and demolition waste recently (Mohd Nizam, Y. 2010). Evidence shows that approximately 40 percent of the waste generated globally originates from the construction and demolition of buildings and this forms a major portion of the solid waste

discarded in landfills around the world, for instance, in the USA it is approximately 29 percent (Bossink, B.A.G., Brouwers, H,J.H., 1996)

Further, research indicates that 9 percent of the total purchased materials end up as waste and 1 to10 percent of every single material contributes to the solid waste stream of the site (Bossink, B.A.G., Brouwers, H,J.H., 1996). Many researchers have shown that there is a positive correlation between waste prevention and environmental sustainability (Lingard, H., Gilbert, G., and Graham, P .2001). Many countries, especially the developed countries have started to aggressively recycle construction materials due to its many benefits. These conditions include proper site location and equipment for waste sorting out, waste recycling operations, trained supervisors and employees, knowledge of secondary materials market and knowledge of environment and safety regulations.

Very few contractors have spent efforts in considering the environment and developing the concept of recycling building material (Kartam, N. N.-M.-G.-H. 2004). Because contractors rank timing as their top priority, their effort is always focused on completing the project in the shortest time, rather than the environment (Poon, C. A. (2001).

The purpose of this paper is to identify current barriers and to upgrade the implementation of construction waste management and policy. The study is to identify the problem and needs for the implementation of construction waste management policy able to provide successful guidelines in a better environment.

2. LITERATURE REVIEW

2.1 Aims and Objectives

The aim of this chapter is to highlight authorities and people involved in the construction sector the perception of various environmental problems and examine the relative importance of each problem in construction waste management and environmental strategy for developing appropriate policies in Malaysia. In order to achieve the research aim, the following research objectives are established:

1. To analyze the construction waste that affect the environment
2. To investigate the main problem in managing construction waste
3. To identify the gap in terms of policies implementation

2.2 Construction Waste Effect on Environment

The literature review involves reading and appraising other people who have written about the subject area (Naoum, S. G. 2007). In order to achieve the objectives, a systematic review is to be conducted which will cover textbooks, institutional and statutory publication periodical and trade/academic journals, seminars and conference paper to obtain general information of the facets of construction waste, on the environment effect, understanding the main problem in managing waste, the gap in policies implementation for construction that within the international and local government standard regulations.

Construction waste is becoming a serious environmental problem in many cities around the world (ChenZ, L. 2002). In Malaysia, the construction industry generates a lot of construction waste which may cause significant damage to our environment. Construction by its nature is not environmentally friendly as the various activities involved, such as excavation, building and civil

works, site clearance, demolition activities, road works and building renovation, generates a tremendous amount of construction waste (VWY, T. 2008).

In Malaysia, many environmental issues and problems have been identified and require urgent attention. The list includes air pollution, water pollution, soil erosion, loss of natural habitats for both endemic and endangered fauna and flora, solid waste disposal and waste management (Awang, M. Y. 1998). Waste problems seem to be serious environmental problems at the Olimpos National Park in Turkey (Erdogan, N. 2005) and the waste generated by the building and demolition of construction projects forms a large proportion of environmental waste in Hong Kong (Poon, C. A. 2001)

Reference [Uher, T., 1999] suggested that construction activities have a significant impact on the environment across a broad spectrum of off-site, on-site and operational activities. Off-site activities include manufacturing of materials and components, transportation of those, land acquisition and project design. On-site construction activities relate to the construction of physical facilities, where all these result in air and water pollution, creating traffic problems and generation of construction wastage.

3. CONSTRUCTION WASTE MANAGEMENT IN FOREIGN COUNTRY

This background research of construction waste in foreign countries will determine the measures, managements and policies applicable in the current situation in the construction industry. The practices highlight the healthy environment towards managing the construction waste and effects in our environment.

The need for better understanding of the complexity of concerns are based not only on risk perceptions but also on lack of trust and credibility in waste managers, decision-makers, the decision processes and control mechanisms for waste facility and operation. For example, attitudes, awareness and practices in London regarding the waste minimisation provides an account of research undertaken concerning the first of the aims, focusing, in particular, on management attitudes, awareness and practices in waste/energy minimisation (Judith Petts 1994).

3.1 Waste Minimization Strategies

Managing and monitoring the different waste streams on a construction site requires a detailed waste minimization strategy. This needs careful planning throughout the design, build and occupancy phases, to ensure its success, effectiveness and compliance with building regulations (Gray, J. 2010). There are three basic strategies for dealing with waste, those are reducing, reuse and recycle. Reference (United Nations Environmental Programme (UNEP). 2009) mentioned waste prevention is the ideal, and this can be addressed:

I. By identifying possible waste streams early on in the build process
II. Designing for their minimisation
III. Using standard sizes for building components such as windows can prevent future waste
IV. Design for deconstruction using recyclable components
V. Better communication between building professionals to ensure exact calculations of required materials
VI. Just-in-time delivery strategies to avoid improper storage or weather damage.

3.2 Implementation of New Method in Managing Waste at Site

At site, many states or localities require evidence that grinding up all wood waste and drywall and applying it to the site just before seeding or sodding the lot does not harm soil or water quality (Eric, Y. P. 1995). But in addition, this method has to be counter checked with state and local solid waste agencies to determine the acceptability of this method. If all wood waste and drywall could be handled in this way, containment, transport, and landfilling costs would be reduced of jobsite waste.

3.3 The Present Policy Practice for Managing Construction Waste in Foreign Country

Implementation of Policies in United Kingdom

According to the Department for Environment, Food and Rural Affairs, the waste going to landfill from the construction industry in 2004 was about 100 million tonnes (Defra. (2012). This is more than 3 times the amount of domestic waste collected at 28 million tonnes. It has gone up from about 70 million tonnes in 2000.

There are increasing regulations about waste disposal from construction and many products, even common products like gypsum plasterboard and mineral wool insulation are now labeled as hazardous and require special disposal (Environmental Impact. (2007). In addition, there are many projects to find new uses for waste construction materials (through Government bodies such as WRAP). However, with waste disposal, the less processed a material and the less hazardous means the easier re-use, recycling or healthy disposal will be for example through composting will.

Implementation of Policies in United State

Reference (Environmental Protection Agency, 2007), implemented a plan to manage waste. Those plans are:

I. General: Implement waste management plan. Provide handling, containers, storage, signage, transportation and other.
II. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring and reporting status of waste management work plan.
III. Training: Train workers, subcontractors, and suppliers on proper waste management procedures.
IV. Site Access: Conduct waste management operations to ensure minimum interference with roads, streets, walkways and other adjacent occupied and used facilities.
V. Hazardous Wastes: Hazardous wastes shall be separated, stored, and disposed of according to local regulations and should not be included in Construction Waste Management Plan's calculations of waste.

Implementation of Policies in Australia

European waste management is driven by the European Commission's Waste Framework Directive (Tony Breton, 2009). Corporate and professional services tenants in this market segment are willing to pay a premium for green offices (*Property Australia.*, 2007). Tenant demand for green offices is underpinned by major companies' rising conviction of the need to reduce greenhouse gas emissions and to demonstrate their environmental responsibility to customers and shareholders. They also recognise the growing evidence that green buildings indeed provide a

healthier environment that increases employee productivity.

For a building to be recognized as 'green', the developer needs to maintain and monitor sustainable practices, including waste minimization and recycling. For example, under the Green Building Council of Australia (GBCA) Green Star rating system, projects that recycle C&D waste and use recycled building materials can earn points towards Green Star certification.

Green Star, which certifies the environmental performance of buildings, is a comprehensive, national, voluntary environmental rating scheme that evaluates the environmental design and achievements of buildings (*GBCA.*, 2007). The GBCA performance indicators are based on the principles of two widely recognized international tools: the British BREEAM (Building Research Establishment Environmental Assessment Method), and the North American LEED (Leadership in Energy and Environmental Design). These two international tools were also referenced in the development of the GBCA's Green Star tool.

4. METHODOLOGY

Data was collected through interviews with JKR Putrajaya, Contractors registered with the Construction Industry Development Board (CIDB) of Malaysia in the Klang Valley, specifically in Kajang, and Putrajaya Holding in Putrajaya and CIDB personnel. The information from the interview shows the significant level of contribution and the level of practice among the waste minimization factors in the construction industry of Malaysia.

From the target sample of eight contractors, five were successfully interviewed for the purpose of this research. The questions asked to the interviewees were broadly grouped in the following categories; awareness of environmental impacts, on site sustainable management practices, policies implementation and the recommendations for improvement. The data was summarized for each questionnaire.

Reference (Uher, T., 1999) suggested that construction activities have a significant impact on the environment across a broad spectrum of off-site, on-site and operational activities. Off-site activities include manufacturing of materials and components, transportation of those, land acquisition and project design. On-site construction activities relate to the construction of physical facilities, where all these result in air and water pollution, creating traffic problems and generation of construction wastage.

Since the last two decades, Malaysia has had extensive building and infrastructure development projects, which led to an increase in construction waste material generation [Begum, R.A., C. Siwar, J.J. Pereira and A.H. Jaafar, 2006]. However, construction wastes which represent a greater proportion of total solid waste generation in the country create greater problems such as illegal dumping and should receive greater attention. (Begum, R.A., C. Siwar, J.J. Pereira and A.H. Jaafar, 2006), (Barnard, R. and G. Olivetti, 1990), (Begum, R.A., C. Siwar, J.J. Pereira and A.H. Jaafar, 2007), stated that a number of environmental effects are potentially caused by waste management and all of them should be properly controlled.

In other view, waste management does affect the environment through land use and pollution with hazardous substances that escape into air, water and soils. In recent years, waste reuse and recycling have been promoted in order to reduce wastes and protect the environment (Caplan, A.J., T.C. Grijalva and P.M. Jakus, 2002), (Shen, L.Y. and V.W.Y. Tam, 2002), (Faniran, O.O. and G. Caban, 1998), (Petts, J., 1995). The effectiveness of reuse and recycle application has

been suggested as a limitation largely because the conditions for applying these approaches were not provided (Chun, L.P., E.S. Domenic and J.K. Charles, 1997). These conditions include proper site location and equipment for waste sorting out, good experience in waste recycling operations, trained supervisors and employees, knowledge of secondary materials markets and knowledge of environmental and safety regulations.

The present chapter highlighted contractors` perception on the various environmental problems and examines the relative importance of each environmental problem as part of an overall construction waste management and environmental strategy for developing appropriate policies in Malaysia.

In summary, there are a number of policies and voluntary initiatives supporting sustainable resource and waste management in the Malaysian construction sector, however the reality remains challenging. The continuous growth of the sector provides an opportunity for a wider uptake of sustainable waste practices, contributing to the country's aspirations for sustainable development.

5. RESEARCH ANALYSIS

Data was collected through interviews with JKR Putrajaya, Contractors registered with the Construction Industry Development Board (CIDB) of Malaysia in the Klang Valley, specifically in Kajang, and Putrajaya Holding in Putrajaya and CIDB personnel. The information from the interview shows the significant level of contribution and the level of practice among the waste minimization factors in the construction industry of Malaysia.

From the target sample of eight contractors, five were successfully interviewed for the purpose of this research. The questions asked to the interviewees were broadly grouped in the following categories; awareness of environmental impacts, on site sustainable management practices, policies implementation and the recommendations for improvement. The data was summarized for each questionnaire.

Construction Waste Management Interview Questionnaires with CIDB Management Personnel:

How can the design stage be effective to reduce waste?

Design stage was given a top priority to contribute to the reduction of construction waste. Mostly agree that conceptual design contributes a lot in the construction waste management and minimization.

How procurement practices improve waste minimization?

The procurement of subcontractors and materials is critical to the success of the business waste minimization and management plan. Proper plan needs to be implemented, accurate estimates of material and ensuring the project cost has been analyzed properly.

How to improve planning and communicating in delivering waste management practices?

Holding a waste workshop to share information, insights and resolve the issues in waste management practice. An instruction and directive from management to simply reduce waste may be ignored and even presented by the front line to achieve waste minimization.

How to cut costs and reduce waste in construction and implement a good environment

practice?

Green technology has created an impact in good construction practices. It has been actively reducing waste from construction projects and contractors can also improve competitors by becoming a green builder. It can be concluded that the construction industry can save money by implementing good environment practices such as waste minimization on the site.

How to raise awareness among contractors regarding the benefits of construction waste management?

Develop training tools, modules, packages focusing on 3R practices on C&D waste management. Support and conduct research on the importance and good practices of C&D waste management. Provision of waste reduction training to on-site staff is also considered important in raising environmental awareness and helping site staff implement a better working procedure.

How do contractors benefit from waste management training?

Waste Management training should also help the construction industry to get maximum value out of its waste and make better use of resources and towards more sustainable waste management. These plans are cited as being extremely beneficial in formalizing a comprehensive recycling and waste management strategy for each project. A good way to help businesses be careful about how they use, store and dispose of materials which at present usually only get consideration after all other factors have been decided.

Interview Questionnaires on the Environmental Management System in Construction Waste with Government and Local Authority:

How to implement an environment waste management system?

Implementing an environmental management system can be tricky for an organization. EMS plays a critical role in ensuring that organizations undertake a responsibility to safeguard the environment.

How to get current information on construction waste?

Basically, data collection must be determined based on the objective of the data. Most of the time the survey will be handled by a group of researchers from a local university or organization. Most data need to be updated based on the latest or current issues on waste.

How does a series of workshops help to improve the environment?

Most of the time workshops and seminars will be conducted with credit and points to be collected by the contractor. Having a series of workshops will slowly educate them towards the awareness of reducing waste.

How to produce a proper plan for policies and procedures and effectively implement it?

Preparing a written document and detailing the policies, procedures include information about purpose and the objectives intended to accomplish. Truly effective policies and procedures address genuine needs within a business, making employees willing and even eager to implement them because they make operations smoother and give the business added credibility.

What benefits can be awarded on the achievement towards the environment?

Development of a case study to promote the organization's environmental award practices. The environment will gain benefit as it affects the construction site and surrounding.

I also give the benefit of top environmental performers and award plaques to customers, suppliers, employees and stakeholders.

How does a formal waste management plan work?

Mostly the awareness on waste management plans was not fully enforced. The proper training and enforcement on the importance of the plan should always be the top practice to ensure the effectiveness. The designer and contractor can contribute towards a better understanding of the need for positive action and direction in the restrain of material waste by following the proper plan.

6. RESULT AND FINDING SUMMARY

In the actual construction industry, there is a great need to improve and attention leading towards a better understanding about the intention and changed behavior of the Malaysian citizens. Beneficiaries of the research will be the Malaysian public, the municipal councils, Ministry of Health Malaysia, Ministry of Natural Resources and Environment and Ministry of Housing and Local Government.

Objective	**Summary**
1.To analyze the construction waste that affect the environment	It can be concluded that the construction industry can affect the environment due to lack of enforcement, awareness and incentive for implementation in the environmental aspect. A good environment practice can be done by minimizing waste on and off site during the construction project. The benefit of protecting the environment must be included in the tender for better enforcement in the project.
2.To investigate the main problem in managing construction waste	Waste on site is not always avoidable by those who engage in site operations. It was caused by the nature of the site, the design priorities, the forms of contract used, the various terms and conditions of the contract documents, the design and packaging priorities of the manufacturers and suppliers and the methods of materials handling. Responsibility for waste concerns all members of the building team, while any solution to the problem must involve site practice.
3.To identify the gap in terms of policies implementation	Mostly the awareness on waste management plans was not successfully enforced. Contractors and practitioners need proper guidance, memo, training and enforcement. Not much is expected from SWMP as the program and training need to be emphasized in the first place. Understanding the importance of implementing the policy may benefit the construction sector and Malaysian economy.

Table 1: Summary of Finding

7. CONCLUSION

In summary, there are a number of policies and voluntary initiatives supporting sustainable resource and waste management in the Malaysian construction sector, however the reality remains challenging. The continuous growth of the sector provides an opportunity for sustainable waste practices, contributing to the country 's aspirations for sustainable development.

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ARTIFICIAL INTELLIGENCE TECHNOLOGY (AIT) USAGE IN CONSTRUCTION

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ABSTRACT
In today's world, multiple industries such as healthcare, e-commerce, financial services, etc., are leveraging Artificial Intelligence the fullest of its potential. The technology has helped businesses grow in leaps and bounds with improved quality, security, and efficiency. However, it is observed that engineering and construction are lagging behind in implementing artificial intelligence and machine learning solutions. This book chapter aimed to determine the adoption of AI in construction industry. A questionnaire was utilized for the identification of perspective from construction players such as architects, engineers and quantity surveyors. Data collected from the legal research method were analysed and then be summarized, tabulated and classified in order to facilitate and understand. It was revealed that from planning to designing to construction, AI has been spreading its benefits in all the sub-segments of construction. Harnessing the potential of AI in construction will boost the profits, and reduce the injuries and risks involved. It is recommended for the new generation of construction players be initiative starting a different step to bring a new culture in construction industry.

Keywords: Thinking machine, Artificial Intelligence, New Technology, Benefits of AIT, Construction Industry.

1. INTRODUCTION

Since the trend of Industry 4.0, artificial intelligence (AI) has already played an important role in each scope to every country. AI` is a term for describing when a machine mimics human cognitive functions, like ability of problem-solving without requiring detailed, human-developed software, pattern recognition or learning. Machine learning is a field of artificial intelligence that uses statistical techniques to give computer systems the ability to "learn" from data to perform tasks, such as identifying images, recognizing speech, identifying relevant information in texts, 3 synthesizing information, drawing conclusions, and forecasting, without being explicitly programmed (Mohd Fauzi et. Al, 2016).

2. BENEFITS OF AI IN CONSTRUCTION

2.1. Planning And Design

AI can have predictive analytics. As its name suggests, current and historical data is collected and this type of analytics can predict future events which are possible to happen. Such as identifying the impact of weather trends on project scheduling or managing budget overages through analysis of the team's experience level and contract type. AI is welcomed to be the 'Predictor' nowadays, it has the potential to analyse the possible situation and list down to enable to let us to avoid the unwanted situation.

Building Information Modelling is increasingly becoming a vital process in the design stage. Creating a BIM model enables those involved in a project to make optimize their decision-making before going anywhere near a construction site. In this digital age, applying artificial intelligence in BIM process is slowly increasing in order to improve the models (Maskurity et. Al, 2019). AI is already helping the construction industry work more efficiently and will soon become the norm, as in other industries. To make BIM software worked with AI that trains a machine in learning from data and identify patterns. It can then make independent decisions on how to automate and improve on the model building process. This is also known as AI-assisted BIM.

2.2 Data Sources

Every day a large amount of data is being created, AI systems are exposed to an endless amount of data to learn from and improve. This data will become of pool of information to let AI able to analyse the benefits from the insights generated from data with the help of AI and machine learning systems. Hence, using AI to make use of the information makes the process a lot more effective. Furthermore, AI allows for faster exploration of all the possible permutations of a construction solution. It helps to quickly generate design alternatives and learning what works and what doesn't from each iteration. Using AI can take decisions faster than human and carry our actions even faster. While taking a decision, human will analyse many factors to make final decision on the design but now AI will automatically calculate the elements based on data collected from site and give respond to make recommendation of the best design to be applied on site (McKinsey, 2017)

2.3 Costing

Estimate methods have several types. And the cost they estimate is determined by the project size, design difficulty, design similarity of building, the construction way method, material choosing for the building, machineries and labour using during work, water and electricity supply and other factors that will determine the cost (Sumana Rao, 2019). Mostly, the variation, rework or alteration will cause the over budget for the clients. And the factors causing cost overrun have a lot such as defect on materials, extension of time and others. Hence, this will make the cost not accurate at last. To tackle the problem of the cost overrunning, applying the technology of AI. Artificial Neural Network is used which can help to make a proper estimation based on the data collected and site conditions to calculate.

2.4 Construction Method

AI will analyse the data collected from the site and provide recommendation the most suitable method to the building (Lucie Gaget, 2018). Construction methods have a lot, and the site conditions will always change. Humidity, soil condition and location are always different, hence choosing the right construction method is hard. Using AI can get a suggestion produced for the selection on method applying on the project. Or suggesting on new method such as 3D printing method. To declare that there is no stated yet the 3D printing belongs to AI but it is verified that AI can be apply in 3D printing software. AI and machine learning can also be used in the 3D printer after their printing process. It is allowing to detect problems directly and improve the quality control of the 3D printed parts. AI could clearly help to improve the printing process and avoid errors.

2.5 Time Management and Productivity

By collecting data such as previous similar project, method choosing to build the project, weather forecast, labour productivity, material supplying and delivering and other factors that will be the data of time estimation (A.T. Kearney, 2017). Using the technique of AI will drastically save the time. Such as on time saving to design, produce timeline on work to contractors to avoid from clash work, giving reality insight on design to clients for fast variation or alteration on design. AI-based applications let to collaborate with computers to create complex and complicated designs quickly.

Using the AI and machine learning software to assist them on distribution of labour and machinery across jobs. AI constantly evaluating job progress and the location of workers and equipment enables project managers to tell instantly which job sites have enough workers and equipment to complete the project on schedule, ensuring the project will not be delayed as well as detecting which parts might be falling behind where additional labour could be deployed. Robots that powered by AI and machine learning can represent labour on site. This can firstly save the cost of labouring and also minimize the accident of labour on site. AI machine learning also will give information on the task to avoid the robots doing the wrong tasks. This will highly increase the speed of work the project and increase the productivity of the project.

2.6 Site Surveillance, Safety and Risk Management

To monitoring the progress by using the drones deploying drones and drone mapping software drastically cuts down the time to gather accurate surveys maps and aerial images of a jobsite. This can be used to track progress without having to be on the jobsite. AI technology in the construction industry and scanning software, they can track the body movement of labour to analyse their form in order to reduce the amount of injuries on-site. The combination of AI in the surveillance will have the face recognition, this technique is to ensure the workers on site is completely safe and on working.

AI can also produce a risk management report, but it cannot be final report as well as need to keep monitoring the condition of site. Stand another site of thinking, humans know that risk is hazardous for them, labours on site has a risk on their safety, this is one of the biggest advantages of AI (Kendall Jones, 2018). Humans can overcome many risky limitations of human by developing an AI Robot which in turn can do the risky things for them. Sending them to the unhealthy environment better than sending a human to that kind of environment to avoid let a chance of illness get into the human. A better example, NASA explore Mars by sending robots is because of human at that environment has poor oxygen to supply, robots do not breath not like humans.

3. METHODOLOGY

Data collections by using primary data such as questionnaire and secondary data that including all information gathered from all studied articles, literature books, publication, journals and reports relating to the topic of study. The next is to synthesis the data from all collections in order to make the conclusions on the results obtained.

4. FINDING

All data were collected from the architects, engineers and quantity surveyors. Total number 1350 sets of questionnaires are being distributed to the construction players and retuned back with a total of 153 responds. Regarding to the aim of research, the understanding level of respondents to the benefits of AIT in construction and the perspective of respondents. There are involving 97 males respondents and 56 females respondents. Most of the respondents are having more than 5 years working experience. With a parallel number of job profession of the respondents, and most of them are in a private sector of company. Majority number of companies are not applying AIT, and they are not plan to adopt the AIT. Hence, most of the respondents have no experienced on AIT in construction and they are only having only little knowledge on AIT (25% - 50%).

From section B showed that statement 1 to 8, most of the respondents are indicating 'Yes'. As well as commenting on the statement about the reason of supporting or not supporting the statement give. In section C, perspective of the respondents is important in this part. Most respondents indicated the opportunity and risk are the strategic of AI if their organization plans to implement AIT in the next following construction project. The highest possibility of challenges that will be faced by AIT is lack of technology knowledge. In the first open ended question, it is about the opinion of respondents if the AIT is important in their future, high percentage of respondents is indicating 'Yes'. As well as forecasting that the duration of AIT will be implemented completely in the construction, about 49% of respondents mentioned it will be taking more than 10 years. Nevertheless, on second open ended question, it is about the expectation of respondents, majority of respondents is also indicating 'Yes' with high expectation to the AIT in the construction future.

5. CONCLUSION

This chapter is to know the benefits of AIT in construction to let construction players know more the strategy of the AIT to improve the culture of construction. The author concludes that there is a certain amount of organizations which are still not clearly knowing about the benefits of AIT in construction. Hence, this topic will be ignored if the culture of construction is still remaining at the same step. To lead to a new culture of construction, doing more on a research to similar topic can fasten the time to let the culture of construction will not stick on old construction method, and let it turns over a new leaf, make impossible to be possible.

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REAL ESTATE INVESTMENT TRUSTS' (REITs) -INVESTORS PREFERENCES ON ASSETS PERFORMANCE AND ALLOCATION IN MAXIMISING RETURN

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ABSTRACT
Real Estate Investment Trusts (REITs) is a trust unit which created fund flow from investors and unit holders to real estate. In recent years, REITs had received interest by many which the REITs investment has become significant to investors' choice in their investment portfolio due to its stability and sustainable performance. A study on the investor behavioral preferences is beneficial as the study on the scope of investor perspective is limited especially in Malaysia market. This chapter aim to assess investor preferences in decision making towards REITs investment assets portfolio strategies. This research employed quantitative analyses by using Statistical Packages for Social Scientist (SPSS) which later analyzed using descriptive statistics. This study will enable investor to understand better towards REITs investment market and characteristics that influenced most of investor and REITS stakeholders to invest in REITs and derived maximum profit from the investment.

Keywords: REITs, investor, preferences, assets performance, assets allocation, Malaysia.

1. INTRODUCTION

REITs as now well established as a property investment vehicle around the world including US, France, Singapore, Australia, Japan, Malaysia and other countries. The investment in REITs has become significant recently due to sustainable performance of investment growth shown by these types of investments. REITs are cable in offering capital market gain from real estate investment activities, such as real estate-based capital market instrument, real estate rights, real estate tenancy businesses and real estate projects (Adnan et al., 2021). In REITs investment, the management is allowed to collect resources from many as possible investor before going into public and realizing valuable and high-value real estate investment (Hansen, 2017). Other than that, REITs is said capable in allowing both small- and large-scale investor to acquire ownership of the commercial properties. The examples of properties are shopping mall, offices, industrial properties, warehouse and hotel. As return, REITs will pay out at least 90 percent of taxable income in the form of dividend to the shareholders (Samsudin, 2018). In any investment including REITs, investor will act as a decision maker which will plan and decide for action that will be taking. Decision-making is a process of choosing a particular alternative from several theories. It then allows proper evaluation of all the alternatives. Investor has no control over the states of nature that will prevail in future but the future states will certainly affect the outcome of any strategy that the investor may adopt (Wamae, 2013). Therefore, effective decision making in REITs demanded for better insight and understanding of human nature in evaluation investment performance with the financial skills and the ability to gain the best out of the investment. In order to achieve that, the objective of this chapter is outlined as follows.

1. To study the concept of REITs as an investment vehicle for investors.
2. To describe assets performance and allocation in diversification strategy to maximize investment return.
3. To evaluate investors preferences in decision-making in REITs investment portfolio strategies.

2. REITS IN GENERAL

REITs is an investment vehicle that offer alternative way to buy and own real estate with moderate risk. REITs is said to be a multi-billion property investment which offered from many well-established countries. Investors generally anticipate total return from combinations of dividend and capital gains. Likewise, capital appreciation is also important for both short and long-term growth prospects. Furthermore, REITs allow investors to invest in and own a diverse range of high-quality and valuable commercial real estate portfolios that generate income in the form of dividends, diversification, transparency, global exposure, and professional expertise management (Adnan et al., 2021). REITs are a type of hybrid investment that combines the liquidity and security of the stock market with the stability of real estate. Rental income generated by high-quality tenants and long-term leases provides income streams for REIT investments.

2.1 Development of REITs in Malaysia

Generally, REITs is produced by Real Estate company that own, operate or finance income generating real estate. REITs allow the real estate operator to pool capital from public investors while these investors profit from the dividend allocation from real estate investment activity without having to buy, manage and finance properties of their own. Malaysia is among the earliest country that publicly offer REITs listed in property trust. The regulatory framework for Malaysia Listed Property Trust approved by Bank Negara as earliest as 1986 and the development of Security Commission guidelines was done in 1991 with further revising in 1995. Since then, Malaysia has become a well-established market with about fourteen REITs being listed in between year 2006 to 2010 (Ong et al., 2012). Malaysia established the world's first Islamic Real Estate Investment Trust in accordance with Shariah principles The implementation of Islamic REITs was aided by guidelines issued by Malaysia Securities Commission (SC). These guidelines established a new global standard for the development of Islamic REITs, enhancing Malaysia's important role in promoting the growth and development of the Islamic market in the International Financial Community Islamic REITS which have gained popularity as an ethical investment vehicle for Muslim investor around the world. Among the first Islamic asset are Al-Aqar Healthcare (ALQAR), Al Hadharah Boustead REITs and I- REITs (Adnan et al., 2021; Samsudin, 2018). In the western countries such as United states and Australia REITs has proven as one of successful investment vehicle which become preferable by investor but unlikely in Malaysia. REITs appear to be less popular than they should be and similarly less demand (Newell & Osmadi, 2009). Consequently, Malaysian participation rates Investors' interest in REITs is substantially lower than it is in other countries. Furthermore, Malaysian REITs have performed poorly since their inception in the 1980s until 2004.

2.2 Advantages of REITs Investment

REITs are a low-risk investment vehicle that provides shareholders with consistent annual income. Both small and large investors can benefit from rental income from commercial properties without becoming involved in REIT management. REITs are managed by an experienced and

knowledgeable team. A skilled management team Furthermore, REITs have lower volatility than real estate stock prices (Rohaya Abdul Jalil et al., 2017; Samsudin, 2018). This indicates that, as compared to real estate, the stock price of REITs is more steady and less risky. Furthermore, REITs have a diversified investment portfolio that boosts profits while lowering risk. Due to the low liquidity of real estate, investors shy away from making real estate investments. Due to the REITs' strong liquidity and the fact that its shares are traded on a major stock exchange, investors choose to invest in REITs (Chien et al., 2020). The purchasing and selling process is made simple and quick by this characteristic.

3. REITs FINANCIAL PERFORMANCE

REITs allow investor purchase interest in a portfolio of properties in the capital market and share in the company. REITs promising a stable return for long term investment goal as well as higher dividend distribution. However, there is a favourable correlation between REIT performance and size or in other word it is called market capitalization (Hashim et al., 2021). As a result, the properties that make up the REITs' portfolio are crucial to ensuring better revenue (Anderson & Springer, 2003).

Due to the different nature of the invested property in the REITs portfolio, different types of property contribute different performance to REITs. The difference in property portfolios is determined by the type of property in which REITs invest (Newell & Osmadi, 2009). In the meantime, larger REITs were expected to have higher profit margins, a higher rental revenue ratio, lower implied capitalization rates, and a lower cost of capital (Rohaya Abdul Jalil et al., 2017). On the study by Buttimer et al., (2012) revealed that the overbuilding of office space in the United States in the 1980s impacted office REITs, resulting in poor rental revenue and dividend yield performance. Furthermore, because the size of a REIT is significantly related to the level of institutional investor participation in REITs, larger REITs have a greater ability to attract institutional investors, where it plays a significant role in influencing investor preferences to invest in REITs (Brown, G.R. and Matysiak, 2000). Aside from interest expenses, the size of a REIT has a significant impact on all expenditure cost categories. General and administrative expenses, as well as management fees, exhibited the greatest economies of scale, while operating expenses had only a minor impact.

As in the case of Malaysian REITs, it is necessary to determine the appropriate size for them in order to avoid administrative and diseconomies of scale. There appears to be a lot of room for growth for Malaysian REITs. For instance, the standardisation of return calculations is an important feature in performance measurement (Ting, 2002). Therefore, it should be giving priority attention. Investors in Malaysia have been following the performance of REIT investments through dividend yield or dividend distribution. This is primarily because tax requirements for REITs mandate a greater dividend yield than the market's average for equities (Chan et al., 2003; Ghosh & Sirmans, 2006).

In general, the regulatory environment of REITs is unique that it requires at least ninety percent of taxable earnings to be paid in terms of the dividend declared (Samsudin, 2018). Thus, no more than five percent of the remaining earnings can be used for REIT expansion, which resulting in limitation of REIT investment (Rohaya Abdul Jalil et al., 2017). Dividend pay-out ratios are lower in REITs with higher cash flow volatility. This appears to be consistent with the explanation about dividends and stock prices (Li, 2012). Equity REITs which including REITs with high earnings volatility, REITs with poor performance, and REITs with higher growth typically pay lower dividends. As the government is influenced by dividend policy as supported

by Brad et al., (2015) the government should plays important role in increasing investor participation in REITs.

3.1 Assets allocation

REITs have outperformed the market while exhibiting low long-term correlations with other major asset classes. Many investors believe a reasonable portfolio allocation to REITs is between five percent to fifteen percent and the idea comes from the optimal diversification strategy to reduce risk of investment and maximizing return. Diversification by property type and location revealed that the location of properties and the types of properties owned have a direct relationship to the value of REITs and have an impact on the investment strategy (Habbab et al., 2022). Furthermore, the specialized strategy provided a better understanding of the specialized market and allowed both the investor and manager to get to know REITs better while avoiding unnecessary costs due to large number of properties in its management. Modern Portfolio Theory (MPT) is the method used to solve the assets allocation problem in capital market investment including REITs. This theory stated property portfolio diversification strategies emphasize the benefits of having a diverse property type. The performance of REITs is evaluated based on property types and concentration (Rohaya Abdul Jalil et al., 2017). For instance, hotel, office and retails building REITs shows different performance to the investment return. List of REITs in Malaysia and its property types shown in Table 1.

Table 1: List of REITs with property types

List of REITs	Types of property portfolio
1. KLCC REIT	Office
2. IGB REIT	Retail
3. Sunway REIT	Retail
4. Pavilion REIT	Retail
5. Capitalmalls Trust	Retail
6. Axis REIT	Diversified
7. YTL Hospitality REIT	Hotel
8. AL-Aqar Healthcare REIT	Healthcare
9. Amfirst REIT	Office
10. hectares REIT	Retail
11. UOA REIT	Office
12. Public Trust REIT	Diversified
13. Quill Capita Trust	Office
14. Tower REIT	Office
15. Atrium REIT	Industrial
16. Mandate of PNB Land Property	Office

Source adopted **:** (Adnan et al., 2021)

4. METHODOLOGY

To achieve the research objectives of this chapter, a quantitative approach was adopted for this chapter, which statistical analysis were conducted by using primary data collection. The data collection was done in random sampling method by using online questionnaire survey instrument using google form to several group of investors who attended investment events and seminar through online platform. This purpose is to record on the respondents' response towards the questions.

4.1 Sampling Method

The data collection was done in year 2021 while Malaysia was struggling to eradicate Covid pandemic in the country. This study's population consists of Malaysian individual investors who trade on Bursa Malaysia. The sampling frame includes all individuals with a CDS account, which totals approximately 2.49 million people (The Star, 2017). This study's unit of analysis is individual investors between the ages of 21 and 60 who have which attended several online investment events and seminar and have previously invested in the REIT market, as well as the behavior of working adults. Using the table by (Floyd J. et al., 2009). A margin of error of 5%, and a 95% confidence level, the required sample size for this study is 384 respondents. While random sampling is acknowledged to be superior to no random or non-probability sampling (John W. Creswell, 2009). Many studies on individual investors in Malaysia use non-probability sampling methods due to population size and member dispersion such as Jamal et al., (2014) and Lai et al., (2013). Furthermore, the Personal Data Protection Act of 2010 imposed additional restrictions by prohibiting intermediaries, such as stockbrokerage firms, stock market organization from disclosing the investor's contact information.

5. DATA ANALYSIS

In this section, author should address the following information which is data analysis section. Out of 400 total of investor prospect, we received 384 respondent which is the exact amount as the minimum required sample size.

5.1 Profile of respondents

Most respondents were male which represent about 58.1% from the total respondent which consistent with previous research on investors' behavior preference in decision making (Jamal et al., 2014; Tariqul Islam et al., 2016). Many of the respondents were young in the majority with the age from 29-39 years old. These means that most of the respondents are from the early 20s to 30s. In term of the education background of the respondent, we can say that almost 90% of the respondent obtained post-secondary education after finishing Sijil Pelajaran Malaysia (SPM). The education background shows the attainment relationship between proper education and knowledge in REITs share market literacy (van Rooij et al., 2011). In the sense of obtaining information on employment status, this has been done to estimate the capital resources used by the respondents in acquiring REITs investment. From the result it shows that, 84.9% of the respondents are employed which majority are from the private sectors. Experience in REITs investment shows that 39.8% of respondents have experienced investing in REITs in between 1 to 4 years while the longest experienced which more than 5 years obtained about 47.1%.

Table 2: Profile of Respondents

Demographic Characteristics		Frequency (N=384)	Percent (%)
Gender	male	223	58.1
	female	161	41.9
Age	21-29	178	46.4
	30-39	144	37.5
	40-49	21	5.5
	50-59	41	10.7
Education	SPM	61	15.9
	Diploma	120	31.3
	Bachelor's degree	190	49.5
	Master's degree	9	2.3
	PHD	4	1.0
Employment	Government	73	19.0
	Private	253	65.9
	Self-employed	46	12.0
	Pensioner	7	1.8
	Unemployed	5	1.3
Experience in REITs Investment	1-4years	153	39.8
	5 years and above	181	47.1
	Below 1 year	50	13.0

5.2 Decision Making Process in REITs

As other types of investment, investor who involves in REITs portfolio should do several studies in order to make accurate decision to decide on the suitable assets to achieve investment objectives of one investor. Generally, speaking decision theory is concerned with the analysis of judgements. According to Howard, (1988) investment analysis is a schematic procedure in transforming investment decision problem into a sequence transparent steps. In the result obtained from the questionnaire response shows that the response was scattered where it shows 29.43% of the respondents choose to adopt Joseph L. Pagliari, (1995) investment process decision theory which involves investor's objectives and constraints; real estate market conditions and expectations; target portfolio determination; portfolio strategy determination; portfolio monitoring; and portfolio performance measurement. The second highest response goes to Jaffe, (2001) with 27.34%, followed by (Pyhrr et al., 1989) with 18.75% while Baum, (2002) and Brown, G.R. and Matysiak, (2000) obtained 13.28% and 11.20% respectively.

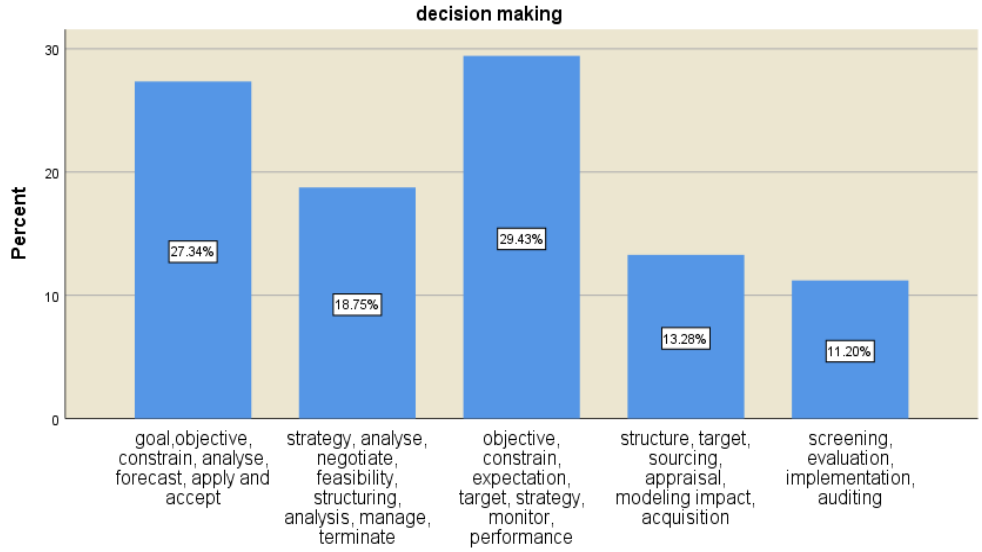

Figure 1: Preferable Decision-Making Process for Investor to Decide the Best Assets Investment

5.3 Factors that influenced investors' investment preferences on REITs

There are many factors that might influenced investors decision making in REITs investment that might affect the return of the investment. Amongst the prevailing factors are return of the investment, dividend yield, net income, management of the company and size or market capitalization of the REITs (Adnan et al., 2021; Binti Mohamad & Bin Zolkifli, 2014). From survey result shows that the highest factor that become the most preferences for investor to invest into REITs assets are the confident of REITs operator management with 28.13%. This is supported by (Adnan et al., 2021; Cannon & Vogt, 1995). Followed by high dividend earning with 27.60%. This is because REITs has a potential for steady income and dividend that attract investors (Peck-Ling & Shuet-Ee, 2016). Then easy entry to the market received about 18.23% while both portfolio diversification and liquidity received similar weightage with 13.02%.

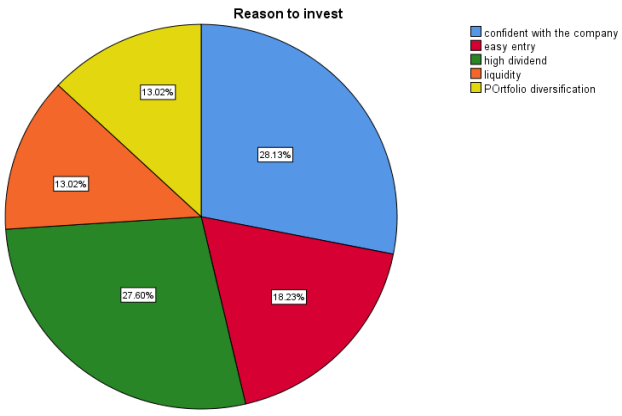

Figure 2: Factor influenced investor investment preferences on REITs

6. DISCUSSION AND CONCLUSION

In the situation where REITs has been accepted as an investment vehicle to investors, with the massive size of the global REITs market including Malaysia where the REITs market capitalization is improving, research into investors' preferences and decision making is vital in deciding the best profitable assets to maximizing their profit return. From the literature review and the result of the investor respondents survey, it is evidence that, property investment decision making process in REITs is complex and need further research to identify possible variables that might influence directly or indirectly to the investor preferences in decision making.

There are many factors that could influenced the references of the investors in their REITs investment portfolio strategies. Amongst that are safety and reputable status of the operator investment company as well as the REITs generator. Good status will attract confidence in investor to invest thus increase the possibility for the company to pull more capital. Other than that, elements such as liquidity and high dividend earning could be another interesting advantage for investors to look for. High dividend of REITs may provide investor safety and assurance that the REIT are more stable and carry better expected future earnings (Kalay, 1985). REITs that have higher yield of dividend this situations shows strong financial position of the firm to distribute payout. It also indicates the company have better reputation as higher dividend translate that the company are in better performance than their competitors. Another factor that influences investors in REITs is the investor confidence towards the company, this prism of confidence can be determined in the REITs reputation. Larger REITs have more diversified properties and stream of cash flow. The REITs will generate more cashflow than smaller REITs. REITs that have longer years of operation have higher confidence form to sustain operations and dividend.

Furthermore, as REITs assets are blooming in the Malaysia share market sector, further research should focus to explore on REITs investment decision making in operator institution as well as investor or shareholders point of view. The revised framework for making decisions might then be put to the test through empirical research, such as interviews with REIT managers, to see how well it captures the actual process used in practice.

Finally, as this research was done through online survey platform and the data collection instrument using google form, this could be one of the limitations to this research. Further study should include meeting investors or REITs manager face to face to enhance the accuracy and validity of the data.

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A REVIEW ON THE TECHNICAL KNOWLEDGE OF DEFECT LIABILITY PERIOD BY THE NEW HOUSE BUYER

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ABSTRACT
The understanding of the occurrences of defect can be seen through building inspection and need further technical advice by the registered Building Surveyor. Defect in building construction is a shortfall in performance and appearance occurring at any time in the life of the product, the element or building in which it occurs. A large number of new house buyers are unaware oftheir rights that any defect that occur to the property can be claimed to the vendor within the time given. In the same Clause also stated that ifthe defect, or the faults have not been made good by the Developer within thirty days since the complaint was filed but no appropriate action is taken to rectify the defect, the Purchaser will be entitled to carry out the rectification works on their own and to bill the vendor for the amount used. In this case, inspection behaviour is the core to competently undertaking' surveys which explained the competency in understanding of defects analysis and the likelihood of defects occurred in a building. It is an option to the house buyer to identify the defect by themselves or by hiring the registered Building Surveyor to examine the existing condition of the house for reporting the DLP status.

Keywords: Defect Liability Period, inspection, house buyer

1. INTRODUCTION

Buying a house is everyone's dream. Either it is a sub-sale property or newly built, it gives greater satisfaction to the homeowner in many ways. The property should be well designed and meet required standard as per specification that has been officially written. According to Radzuan et al. (2011) the provision of housing for every country is vital to achieve social and economic stability to support national development. The development of housing industry in Malaysia has grown exponentially after the independence in year 1957. Every building including institutional, commercial as well as housing need to be inspected in order to find any defect or damage occur before the owner/buyer begins to use or occupy the building (Kariya et al.,2016). Defect simply means something which is not accordance with the contract. Most of the standard forms of building or engineering contract i.e. PAM, PWD and FIDIC contain the provision related to the defective works.

For newly built homes, buyers are given time known as Defect Liability Period (DLP) for them to inspect and make a claim if there is any defect that occurred to the house. According to Property Guru (2018), many Malaysian new homebuyers are not aware of about the existence of the warranty. Radzuan et al. (2011) revealed that, there is a significant shortcoming is this system that is the existing practice does not allow house buyers to do the inspection. As a result, the buyers are forced to accept and live in the defective house and the best course of action is simply to repair the defects that have formed (Noraini, 2014). If this situation constantly happens, it would be a loss for the buyer resulting in unguaranteed protection of house buyers.

2. AN OVERVIEW OF DEFECT LIABILITY PERIOD FOR NEW HOMES

In Malaysia, when the house is completed and the Architect has made the verification, the property developer will obtain vacant possession. Developer will hand over the key to the house buyer and thus start the countdown of defect liability period. The house buyer will be invited for the house inspection to discover and report any building defects occurred to their house (Radzuan et al, 2011). Pursuant to this event, there are house buyers that have less information and knowledge related to defect inspection which therefore neglecting such damage on building structure and elements to poor quality of workmanship. The exposure on building defects among all house buyers is largely depending on their real experience in which sometimes it has wrongly measured. Therefore, an understanding about building defects is the prominent factor to enable the house buyer to check and report it effectively.

2.1. Definition of Defects

The understanding of the occurrences of defect can be seen through building inspection and need further technical advice by the registered Building Surveyor. Anthony et al (2009) said that Atkinson (1987) has given a clear definition of the terms failure and defect "A failure is a departure from good practice, which may or may not be corrected before the building is handed over. A defect, on the other hand, is a shortfall in performance which manifests itself once the building is operational."

Defect in building construction is a shortfall in performance and appearance occurring at any time in the life of the product, the element or building in which it occurs (Che & Akhavan, 2015). The works is considered as defect when the standard and quality of workmanship and materials as specified in the contract is deficient (Shwan, 2011). In further clarification of the defects terminology it can be revealed through understanding towards the types of defects in building.

2.2 Types of defects

National House Buyers Association Malaysia (2001) and Master Builder Association Malaysia (2007) simplify the definition of defect by classifying it into two types, namely Patent Defect refers to physical defects and Latent Defect refers to technical defects. Zolkafli et al., (2014) stated that some defects are caused by the designers (latent defect), while some caused by the constructor (patent defects). The explanation of the defect is shown in Table 1.

Table 1: Types of Defects

Types of defects	
Patent Defects	**Latent Defects**
Patent defects are the defects which can be discover during examination or deficiency in a structure that is obvious to reasonable inspection (Malaysia, 2006).	Latent defects only become apparent at some later date or upon an investigation of some consequential effects caused by the defect. (Shwan, 2011). Latent defect frequently can be realized after the Defect Liability Period has already expired and it is a problem that can arise at any time, which is something that cannot be predicted accurately in the early stage of occupancy (Noraini, 2014).

2.3. How the Process of Defect Liability Period Works?

Any new completed houses are protected under the provision of Defect Liability Period (DLP) as stated in Clause 29 in Schedule H of Housing Development (Housing Development Act 1966 of Malaysia). Any defect, or other faults in the said Parcel or in the Building or in the common property which becomes apparent within twenty-four (24) months after the date of Purchaser takes vacant possession of the said parcel or the building shall be repaired and made good by the Developer at its own cost and expense within (30) days of the Developer having received written notice thereof from the Purchaser. A large number of new house buyers are unaware of their rights that any defect that occur to the property can be claimed to the vendor within the time given (Radzuan et al, 2011).

In the same Clause also stated that if the defect, or the faults have not been made good by the Developer within thirty (30) days since the complaint was filed but no appropriate action is taken to rectify the defect, the Purchaser shall be entitled to carry out the rectification works on their own and to bill the vendor for the amount used. The Purchaser to inform his intention to make good defects within 14 days after the expiry of the said period of 30 days. The Developer's solicitors shall release such cost to the purchaser from the stakeholder sum held by him. The client will get professional advice from Building Surveyor and recommendations to be stated in Building Condition Survey Report (BCSR) (Radzuan et al, 2011).

Identification of defects would be the key indicator of processing the DLP. According to Cho (2006) building works which fell short of complying with the requirements of contract, specifications or contract drawings, together with conditions of its quality and any implied terms, durability, workmanship, design or performance, aesthetic can be defined as defective building works. Therefore, the house buyer needs to notify the defect occurrences covering the entire aspect of building, its structures including services installation whether the condition works well or else. The house owner should aware on the DLP time frame so that they are entitled to issue such claims for the respected defects. If the time exceeded, the cost will be bared by the house owner otherwise the defects occurrences have been developed before the DLP ended.

3. METHODOLOGY

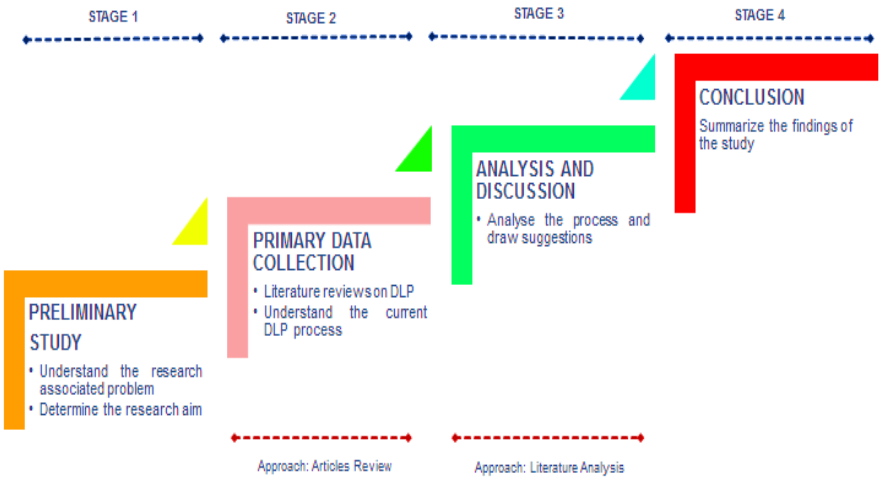

Figure 1: Methodology Flow

The preparation of the chapter was derived from 4 basic stages as stated in Figure 1. Starting with Stage 1 on the identification of topic via preliminary study, followed by Stage 2 on the primary data collection through articles review from various sources including journals, government publications, books and websites. In Stage 3, it involved of analysis and discussion on related topic and lastly in Stage 4, concluded with suggestion on how the new house buyer enable to be knowledgeable in implementing the DLP.

4. ANALYSIS AND DISCUSSION

Knowing the process on how DLP is work is the most important way to allow the new house buyer to understand their rights during DLP. Identification and assessing the defects can be technically hard for those who have no technical building background. Mustafa et al (2010) had revealed that primarily, building inspections are undertaken for many purposes but commonly it is relation to valuation, buying, selling or letting the residential property. However the nature of carrying such inspection will differ to the purpose of inspection and document's reported. In this case, inspection behaviour is the core to competently undertaking' surveys which explained the competency in understanding of defects analysis and the likelihood of defects occurred in a building.

It is an option to the house buyer to identify the defect by themselves or by hiring the registered Building Surveyor to examine the existing condition of the house for reporting the DLP status. All of the defects can be reported within the period that has been officially declared for DLP. Based on a study conducted by Md Dalib, (2011), there are some component defects that frequently received complaints from the Customer Support & Service (CSS) within 14 days after the date of Vacant Possession which are floor, wall, door, window, ceiling, roof and fixtures for toilet and shower. There are several barriers for the residential house buyers to know about the defect liability period. This matter has been highlighted by various authors and described as below:

i) Unaware of the Exist of the Warranty

Some issues have raised during filling of claims including mistake interpretation of Sales and Purchase Agreement (SPA), renovations, sale of property, significance of defects and timeline of repairs. The main issue for the Malaysia new homebuyer is that many of them are not aware of the DLP which is the protection provided to the buyer with the legal courtesy of the Housing Development Act (HDA) of 1966 (Property Guru, 2018).

ii) Lack of Technical Knowledge about Building Defect

Kariya et al. (2016) stated that house buyers were generally not having proper knowledge in term of quality inspection, the more concerning thing is the circumstances are not just limited to defect liability period (DLP) but beyond that period which they were forced to rectify the defect themselves.

iii) Lack of Assistant from the Developer for Inspection

Most of the vendor's representatives try their best to avoid from receiving many complaints pertaining to the defects of the building (Radzuan et al., 2011). It gets worse when the owner lacks technical background to confirm on specification and building condition of the property.

iv) Lack of Practical Guidance from Industry

According to the survey conducted by Zolkafli et al. (2016), the respondents in the survey agreed that establishing associations were essential to rise up awareness of the society on the issue concerned and the respondent from the category of developer criticized the Real Estate and Housing Developers Association Malaysia (REHDA) should play more significant role to raise the issue.

5. SUGGESTION FOR THE NEW HOUSE BUYER IN DEALING WITH THE DEFECT LIABILITY PERIOD (DLP)

There are several suggestions made to encounter three (3) different phase for the new house buyer to deal with the DLP. There suggestions are explained below:

i) Pre Defect Liability Period (Before DLP)

The Ministry of Housing and Local Government (KPKT, 2015) explained several important aspects for the home buyer before purchasing a house. They have to make sure that the Property Developer have a valid Advertising Permit and Developer's License (APDL) and still in force. It is essential for the house buyer to look in detail the Sales and Purchase Agreement (SPA) because this is the most important document that state all the term and conditions that the property purchase (KPKT, 2015)

- Schedule G – SPA for landed property (Bungalow, Twin House, Terrace House)
- Schedule H – SPA for strata property (Condominium, flat, apartment and townhouse)

ii) During Defect Liability Period

When the defect liability period has start, there were two alternatives concluded for the house buyer to deal with DLP:

1) Alternative 1: The buyers may inspect the defects that occur to the house by themselves.
2) Alternative 2: The buyers may hire an expert to do the inspection which the task is to deliver a report of the major component of the house, its condition and whether it requires to be rectified (Wei, 2015).

iii) Post Defect Liability Period (After DLP)

Generally, after the Defect Liability Period end, the buyers shall repair the defect at its own cost and expenses. However, if there are any defects manifest itself after DLP has expired and the buyers suspect the defect was due to developer's negligence, the buyers can bring the issue to The Tribunal for Homebuyer Claims (THC). THC will implement final inspection based on the submitted condition survey report to validate the current status of building defects. The Tribunal for Home Buyers Claim will assess the report and to use for site inspection before the reconfirmation on the status of reported building defects (Radzuan et al., 2011).

6. CONCLUSION

In conclusion, the technical knowledge among the new house buyer on Defect Liability Period (DLP) is still low. The detail knowledge on the DLP practice is crucial to safeguarding the rights of the house buyers, mainly to avoid unexpected issues regarding the defect that occurred to their residence. The stipulated finding justifies that buyers' knowledge about the DLP is still in basic phase and requires more in-depth exposure. The assistance from the developer for defect inspection is highly required to guide and indirectly educate the house buyer in reporting the defects correctly. On the other hand, the house buyer itself should be responsible for having strong awareness about how DLP is being implemented and regulated. The house buyers are advised to follow all the steps listed in the Sales and Purchase Agreement (SPA), so that the claim's process can be done smoothly. Nevertheless, the technical knowledge regarding DLP

among the new house buyer is deeply in need to strengthen their understanding and power in purchasing any property.

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PRICE FLUCTUATION 1990 - 2020: EFFECTS ON CONTRACTOR'S PERFORMANCE AND UNDERLYING VIA CONTRACT

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ABSTRACT
The fluctuation of construction material prices was one of the factors that have been heavily influenced by the uptrend and downtrend of economic output. The construction industry acts as the backbone of one country's economic growth; therefore, it influences every macro and micro economic sector on all levels of the economy, and this includes the price fluctuation of any exported or imported construction products. Fluctuation of prices in material products may or may not be the contributing factor to this matter but in reality, the productivity of contractors or any construction players were overwhelmed by this one aspect namely, the fluctuation of prices. Price fluctuation will be involved with the nature of the industry, the nature of work, and nature of the environment. The research will discuss the relationship between price fluctuation and contractor productivity in order to measure the performance of the construction industry. Relationship Between Fluctuation of Price and Contractor Productivities Contractors are the major actors in any construction project as they are the ones who take up all the responsibility to undertake the whole construction activities and related tasks. This can be reflected in the productivity of the contractor and solve the problem of shortage of the reinforcement bar. Fluctuation of price has affected the contractor's productivity in many ways.

Keywords: Price Fluctuation, Productivity, Contractors, Construction

1. INTRODUCTION

The world has drastically changed over the course of three decades. Major events such as the World Economic Crisis 1998 have been happening across the globe affecting the direction of how one country develops. Malaysia is one of the struggling countries which were critically affected by these exhausting events. The economic growth of Malaysia was stagnant, showing some bullish and bearish markets for the last 30 years. The trendline of this economic development has been affecting the evolution of the macro and micro economic sectors in Malaysia (Ilyani et al, 2016) as well as the output of Malaysia's Gross Domestic Product (GDP). Over the years, the construction sector has exerted a phenomenal impact towards the economic development in Malaysia (Wesham et al, 2021). While this was a positive outcome, some negative impacts were witnessed as a result of these achievements. The fluctuation of construction material prices was one of the factors that have been heavily influenced by the uptrend and downtrend of economic output.

The construction industry acts as the backbone of one country's economic growth; therefore, it influences every macro and micro economic sector on all levels of the economy, and this includes the price fluctuation of any exported or imported construction products. Supply and demand is other contributing factor towards the high and low of any material prices. On the surface, this may not appear critical however, the fluctuation of prices in construction products

has been critically affecting the construction industry members, especially contractors. According to data provided by the Construction Industry Development Board (CIDB), almost 50% of registered contractors have remained dormant in business pre covid 19 outbreak and one of the major factors contributing to this shocking statistic was bankruptcy or contract termination. Fluctuation of prices in material products may or may not be the contributing factor to this matter but in reality, the productivity of contractors or any construction players were overwhelmed by this one aspect namely, the fluctuation of prices.

2. LITERATURE REVIEW

2.1. Price Fluctuation and Construction Productivity

Construction industries such as housing, infrastructure facilities use a large quantity of materials. There is a large demand in building materials due to population growth and there is a gap between demand and supply management (Yazdani Mehr, S., & Omran, A., 2013)**.** In this chapter, we are discussing two major criteria that reflect the contractor's performance which is price fluctuation and productivity from the contractor's point of view. This will involve how the contractors manage their purchasing of the building materials in the construction projects. In order to get the projects, the contractors have to bid competitively for most of their work and at the same time deal with risks and uncertainties connected with bid submission. These contractors have been involved in diversified activities that are directly affected by the prevailing market situation and price fluctuation (Mishra, A. K., & Regmi, U., 2017).

Price fluctuation can be defined as the rise or fall of the price of goods, materials, and services on the markets. This price fluctuation can occur in any market, i.e., at international markets, local markets, and/or at the labor market. A contractor who tenders at a fixed price runs the risk that he may later have to pay more for materials and labor than the prices and wages current at the time of his tender (Mishra, A. K., & Regmi, U., 2017). According to (Riggs, 2006), there are many causes of the recent material price fluctuations in the construction industry which involve both domestic and international market forces. It is also considered in the aspects of the construction industry that make it particularly vulnerable to average cost fluctuation and Bank Economic Report. There are several reasons for price fluctuation and the major one being identified as:

Table 1: Reason for Price Fluctuation

	Reasons For Price Fluctuation
1	Supply and demand imbalances
2	Exchange rate changes - If there is a depreciation in the exchange rate, then exports will become cheaper abroad, but imports will appear to be more expensive. Firms will be paying more for their overseas raw materials leading to increased prices of the domestic economy.
3	Imported inflation: In a global economy, firms import a significant proportion of their raw materials or semi-finished products. If the cost of these imports increases for reasons out of domestic control, then once again firms will be forced to increase prices to pay the higher raw material costs.
4	High Energy and Transportation Costs.
5	External shocks - This could be either for natural reasons or because a particular group or country will gain more economic power. An example of the first was the Kobe earthquake in Japan, which disrupted the world production of semiconductors for a while. An example of the second was the case of OPEC which forced up the price of oil four-fold in the early 1970s.

6	Exhaustion of natural resources: As resources run out, their price will inevitably gradually rise. This will increase firms' costs and may push up prices until they find an alternative source of raw materials.
7	Taxes: Increase in indirect taxes (taxes on expenditure) increases the cost of living and pushes up the prices of products.

Sources: Anjay Kumar Mishra, Ujjal Regmi (2017)

Productivity refers to measuring how well the contractor ability to transform its resources into goods and services and generate income. Also, productivity is a measure of the rate at which outputs (of goods and services) are produced from a given amount of inputs. Input involves not only quantity but also quality which embraces raw materials, capital, land, machinery, and wages together with management, organization, skills. effort, ingenuity, creativity, and attitudes. Output is not only limited to physical outputs, it includes invisible services". Examples of improved services are better delivery, better quality, better output and better benefits to customers. It also embraces social concerns, such as job creation and security, poverty alleviation, resource conservation, and environmental protection (Chia F.C, 2011). This productivity will relate with the efficient use of various factors of production. It is basically concerned with how efficiently a specific output of goods or services are produced and the value created by the production process (Runeson, 2000).

In construction, there are a large number of determinants of construction productivity and are very complex; These factors vary from country to country, from project to project, and even on the same project anything influencing them can subsequently affect productivity. It will be involved with the nature of the industry, the nature of work, and nature of the environment (Chia F.C, 2011). The following sections will discuss the relationship between price fluctuation and contractor productivity in order to measure the performance of the construction industry.

2.2. Relationship Between Fluctuation of Price and Contractor Productivities

Contractors are the major actors in any construction project as they are the ones who take up all the responsibility to undertake the whole construction activities and related tasks. Enhancement in productivity and quality is vital for contractor performance as a global player in the construction industry. This contractor's productivity is also considered in how the contractor managed the project cost when involved with price fluctuation.

The relationship between Price Fluctuation and Contractor Productivity:

i) Economic Development

Similar to many other industries, the construction industry is subjected to the boom and bust cycles of the economy. The Malaysian construction sector has experienced four cycles since 1960. The external shocks of the energy crisis of the 1970s, the 1980-1982 global recession, and the 1997-1998 Asian financial crisis have plunged Malaysia's construction sector into a more severe contraction spike than the one before. The annual growth of the construction sector contracted by 10.3%, 14.0%, 24%, and 1.5% in 1975, 1986, 1998, and 2005 respectively (Chia F.C, 2011). Through these records, we can see that the relationship between price fluctuation and constructor productivity will reflect if the uncertain price of building material will reflect on the performance of contractors at the site.

ii) Construction Supply Chains

A key term in SCM is the 'push–pull boundary'. This is the point in the supply chain where products are pushed, generally from stock to an organization that is orientated to demand.

Often the entity on the push–pull boundary in the construction industry is the main contractor (Richard F & Craig S., 2014). The relationship between price fluctuations and contractors involved with three distinctive characteristics:

a) Convergence at the construction site of materials
b) One-off projects facilitated by repeated processes of project organizations
c) A make-to-order supply chain.

iii) Price Control Act

The Price Control Act (1946) authorized the Price Controller to fix maximum prices for the sale of price-controlled goods which include cement and steel bars. The Price Controller may by written license authorize any person to sell price-controlled goods or any particular class of price-controlled goods in any premises or at any place specified in the license. Therefore, the supplier not authorized to increase the price must follow how much price has been released by the Government in order to control the price in the market. This can be reflected in the productivity of the contractor and solve the problem of shortage of the reinforcement bar (Bong H.Y, et al, 2018).

2.3 Construction Material Price Fluctuation Trend Analysis From the 1990s To 2020s

Malaysia shows a significant growth in economics over the last three decades. Several highly impactful construction projects were initiated via the Malaysian 6th Plan (1990-1995) (Prime Minister Office Of Malaysia, 2022), up to the latest 11th Malaysia Plan. Malaysia's Construction Growth recorded an average of 7.2% from 1991 until 2000, instead of an average of 4.7% between 1991-2010, and 4.43% from 2011 until 2022 (Department of Statistics Malaysia, 2022). Over the past three decades, various events have occurred that have had a significant impact on the increase in the price of building materials, this includes construction booming during 1994- 1998 and several others in regard to domestic and international events. Table 2 shows the major events and their effect on Malaysia's construction material price fluctuation.

Table 2: Majors Events and Their Effects on Malaysia Construction Material Price Fluctuation

Years	Events	Effects
1994 -1998	Malaysia Construction Booming (F1 Circuit, KLIA, KLCC, KL Tower Commonwealth Game)	Increase of Cement, Steel & Reinforcement Bars.
2003-2005	Iraq War/ Invasion	Petroleum-Based Construction Products
2015	Malaysia GST Implementation.	Almost All Major Construction Materials Affected.
2018	China – U.S Trade War.	Steel, Reinforcement Bars, Aluminum, Coopers, Petroleum-Based Construction Products
2020-2022	The COVID-19 Pandemic Geopolitical Tension Russia - Ukraine	Increase of Concrete Price by 30%, Steel, Reinforcement Bars, Aluminum, Coopers, Petroleum-Based Construction Products

Based on table 2, there are several major events domestically and internationally that give direct implications on the price fluctuations of construction materials. From 1994 until 1998, the

development of Malaysia was brisk with various mega projects including Sepang F1 Circuit, Kuala Lumpur International Airport, Kuala Lumpur Tower, and Petronas Twin Tower KLCC. This has caused a high demand, especially for cement and reinforcement bars and at the same time drove up the price of those construction materials. Later, between 2003 to 2005, the Iraq invasion completely affected the cost of Petroleum-Based Construction Products such as paint, and bituminous. Moreover, in 2018 the China U.S Trade War disrupted the global supply chain, since China is the biggest steel producer, this event successively expanded the steel price and the like. The recent Covid-19 pandemic spread and geopolitical tension between Russia and Ukraine also provide an increase of 30% in concrete prices and also steel, reinforcement bars, aluminum, coopers, petroleum-based construction products

2.4 Effect of Fluctuation Price To Contractor Productivity.

Fluctuation of price has affected the contractor's productivity in many ways. It can affect time, cost and quality of the project.

i) Delay in Project Delivery

Due to an increase in material price, contractors were unable to deliver the project on time, as in certain situations, contractors' attempts to get compensation were denied. As a result, the project cannot be delivered on time (Anjay and Ujjal, 2021). Delays in payment to contractors also can hinder the capability of contractors to deliver the project on time, as it affects the progress of the project due to postponement in material and equipment conveyance on-site and delays in paying workers' salaries. Financial capabilities are important in order to maintain the smoothness of the project flow (Johnson, et. al, 2018). The Malaysian construction industry is facing several issues related to time overruns, which lead to a decrease of productivity in the project. Due to poor economic conditions, it can affect contractor and client productivity, which results in a delay in the project (Gholamreza, et. al, 2021).

ii) Project Cost

Price fluctuation causes cost overruns in most cases, where it is hard to forecast the cost accurately because of high inflation of price in developing countries or the speculation of suppliers. Through this, it can hinder the performance of contractors (Ali, et. al, 2010). (Chia F.C, 2011) mentioned that one of the factors that contribute to the effectiveness and productivity is whether the cost of compliance can be reduced, which means that it takes into consideration how to deliver a project and achieve its objective, despites the fluctuation or bad market conditions. The increase of the material prices causes the contractor to absorb the price increment. This is a burden to the contractor, which can affect the contractor's performance (Bong, et. al, 2018). The Malaysian construction industry is facing several issues related to cost overrun, which leads to a decrease of productivity in the project (Gholamreza, et. al, 2021).

iii) Poor Quality Projects

Another effect of the fluctuation is that contractors deliver poor quality projects. As mentioned above, in certain circumstances when the attempt to get the compensation is denied, the contractor is the one who needs to absorb the extra cost. Without getting any additional money, contractors need to complete the project within the agreed price which decreases the quality of the project (Anjay and Ujjal, 2021). It is a good balance between cost and quality that can achieve a better value for money. If one of the elements

is missing, it causes an imbalance to the project, which leads to a poor quality of the project (Low and Lau, 2019).

2.5 Fluctuation Provision Under the Malaysian Standard Form of Contract

The price fluctuation, also known as Variation of Price (VOP), provision was first introduced by the Malaysian government through a treasury circular letter in 1991, and subsequently, two (2) times amendments have been made in 2008 also through a treasury circular letter, due to significant increases in the price of building materials and fuel, to ensure government projects not affected and can be completed on schedule (Government of Malaysia, Ministry of Finance, 2008). Subsequently, the Public Work Department (PWD), has made an initiative to revise both of their standard forms of contract, viz Standard Form of Contract PWD 203A (Rev 2007) and PWD 203 (Rev. 2007). The provisions of Price Fluctuation have been integrated via this revised publication both under Clause 30, and it remains until the latest publication version (Rev.1/2010). Ironically, in 2015 this provision was abolished in parallel with the introduction of Government Service Tax (GST) by the government. The contractor should anticipate the risk (price fluctuation) during the tendering process (pricing).

However, none of the provisions have been allowed to other Malaysia Standard Forms of Contract available in Malaysia such as PAM Contract 2018 (With/Without Quantities), CIDB Standard Form of Contract for Building Works (2000), The Standard Form of Building Contract 2019 (AIAC).

3. METHODOLOGY

This chapter is prepared entirely based on a literature review, from various sources including journals, government publications and statistical data, books, and websites. In line with the title of this chapter, all literature sources gathered are set to be within the years of 1990 to 2022.

4. FINDINGS AND DISCUSSION

During an economic downturn, cost-cutting is a strategy taken by majority of companies. The following are some of the measures that the companies interviewed have taken during the economic downturn which has been organized to cost reduction focused on staff overhead, cost reduction focused on other overhead, cost reduction focused on finance cost, and cost reduction focused on improved efficiency (Chia F.C, 2011). Another step that can be taken in order to avoid the low productivity of contractors is that the policy and decision makers should increase their effort to encourage construction companies to follow modern methods, such as lean construction methods, which can promote productivity, efficiency, and sustainability of a construction project. This is because the Government of Malaysia besides the CIDB in Malaysia has a fundamental role in introducing and training new methods and technologies that use the substantial improvement of operational strategies, enhanced quality, continuous product improvement, and more value-added operations (Gholamreza, et. al, 2021). Contractors, consultants, owners, and regulatory bodies should work together to improve the compensation system in which a wider range of inputs will be allowed for compensation. The method of price fluctuation compensation estimation/calculation should be clear and consistent across all contractors, consultants, regulatory bodies, and clients. Besides that, the client should be committed to making payment on time, as contractors are suffering due to price fluctuation and high interest rate if payment were delayed (Anjay and Ujjal, 2021).

In Short, provisions of Variation of Price (VOP), provide a win-win solution for the client (both public and private) and the contractor. The contractor does not need to jeopardize their risk toward price fluctuations during the preparation of their offer to the client, thus giving a better effect to the contractor's cash flow management, and subsequently enabling them to deliver the construction project within the specified time period. The risk of fluctuations in the price of building materials can be considered large, given that the industry involves a wide chain (supply chain) and it is difficult to determine the range of risks.

5. CONCLUSION

Price fluctuation trend has led to more complex changes in the development of the construction industry. The greater growth was shown in the early 1990s and unfortunately oversaw many challenges along the journey. Among all the reasons for price fluctuation will always depict the supply and demand imbalances following the global economic downturn that happened throughout the region. For instance, it has discouraged the relationship between the contractors' performance to combat the struggles in the construction business. The impact of the fluctuation phase may positively enhance the progress of economic growth after facing a major wave of Covid. Unlike the critical situation during war seasons, the effect on material prices derived the entire cost of the construction economy. It takes years in the recovery period and yet encounters more other consequences of project delay, cost overrun, and poor-quality projects.

On the other hand, new methods and technologies to improve the operational strategies have been drawn by the Government and also CIDB Malaysia to inculcate more value-added operations which also address the method of price fluctuation compensation estimation and provisions of VOP for the client and the contractor. Thus, the practicality to regulate and sustain the performance among the contractors is largely depending on the global economic performance so that the construction cycles may survive in the future.

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RIGHTS AND DEFENCES UNDER CONSTRUCTION LAW: OVERVIEW

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ABSTRACT
Construction law involves any legal issue related to the construction of a building or other structure. It is a known facts that the key to understanding construction law is that it has two main categories: non-contentious and contentious. The chapter highlights several legal issues in the area of construction management. It also discusses some important current developments in construction law including the enactment and importance of the The Construction Industry Payment and Adjudication Act 2012 (CIPAA)which came to force in April 2014. This Act applies to every construction contract since April 2014.

Keywords: Construction, Law

1. INTRODUCTION

Construction law involves any legal issue related to the construction of a building or other structure. It is a known facts that the key to understanding construction law is that it has two main categories: non-contentious and contentious. Legal issues related to construction activities can arise under federal, state, or local laws. The ensuing paragraphs highlight some important legal issues involving construction law such as the general principles of construction law including completion, defects, retention, certification, licensing and contract provisions, Legal issues and business issues that impact project management, etc. Another important issue discussed below relates to the laws pertaining to developers rights to collect booking fees. References are made of several court cases where the various courts decided in favour of protecting the purchasers rights and reducing the impact of Covid-19.

2. LEGAL ISSUES IN CONSTRUCTION MANAGEMENT

There are striking legal issues involving construction law as follows:

a. General principles of construction law including completion, defects, retention, certification, licensing and contract provisions.
b. Practical focus upon legal concepts applicable to the construction industry.
c. Relevant provisions of standard form building contracts.
d. Contractual relationships in the engineering and construction industry and the actions that result in disputes.
e. Major emphasis is on the principal contractual relationships (owner-contractor, owner-architect/engineer, contractor subcontractor, and architect/engineer-consultant).
f. Contractual relationships, contract performance, liability and negligence, surety bonds, insurance, mechanics' liens, bidding and procurement rules and change orders.
g. Legal issues and business issues that impact project management.

h. Emphasis on techniques for preventing disputes and techniques for resolving them (negotiating, mediation, arbitration, and litigation the steps required for rapid,cost-effective resolution.
i. Claims avoidance & analysis procedure

3. CURRENT DEVELOPMENTS OF CONSTRUCTION LAW

The Construction Industry Payment and Adjudication Act 2012 (CIPAA) was enacted in 2012 and came into force with effect from 15 April 2014. The CIPAA provides a "speedy dispute resolution through adjudication". It applies to every written construction contract entered into on or after 15 April 2014 for construction works carried out wholly or partly in Malaysia. It also applies to construction contracts entered into by the Malaysian government. Adjudication under the CIPAA results in an adjudication decision which is only temporarily binding. The CIPAA provides that the adjudication decision would cease to be binding on the parties upon:

- It being set aside by the High Court under limited grounds prescribed under the CIPAA;
- The subject matter of the adjudication decision being settled by a written agreement between the parties; or
- the dispute being finally decided by arbitration or the court.

It is also the current trend appears to be for the successful party in a CIPAA adjudication to look to the winding-up court to "enforce" the adjudication decision. Thus, it is common for the successful party to issue a statutory notice under the Companies Act 2016 (CA 2016), to demand the adjudicated sum. If the "debt" is not paid within the statutorily prescribed period, the successful party will then invoke the deeming provision under the CA 2016 that the unsuccessful party is "unable to pay its debts" and present a winding-up petition against the unsuccessful party.

The Court of Appeal in Sime Darby Energy Solution Sdn Bhd (formerly known as Sime Darby Offshore Engineering Sdn Bhd) v RZH Setia Jaya Sdn Bhd [2022] 1 MLJ 458 set aside a Fortuna Injunction (ie, an injunction to essentially restrain the presentation of a winding-up petition to wind up a company) granted by the High Court – thus allowing the presentation of a winding-up petition based on an adjudication decision. The Court of Appeal found the following.

- A balance must be struck between the successful party in "proceeding in collecting his cashflow expeditiously" and the unsuccessful party in pursuing arbitration or a court action for a final determination of the dispute.

- Although a final decision in arbitration or a court action may ultimately overturn the adjudication decision, this does not render the adjudication decision "disputable". The reversal of the adjudication decision is an "uncertain event".
- The failure of the unsuccessful party to settle the debt claimed by the successful party vide a statutory demand gives the impression that the unsuccessful party is "unable to pay its debts" and ought to be wound up. This would be the case even if the company was shown to be solvent as "a simple refusal to pay" is ordinarily insufficient to stop the presentation of a winding-up petition.
- Additionally, regard must be had to the objectives and legislative intent of the CIPAA (ie, "speedy and efficient dispute resolution in the construction industry").

In principle, obtaining an adjudication decision in its favour, the successful party would take steps to register and enforce this at the High Court. However, this does not appear to be a mandatory step before a winding-up petition can be presented, as decided by the Court of Appeal in Likas Bay Precinct Sdn Bhd v Bina Puri Sdn Bhd [2019] 3 MLJ 244. It is interesting that despite this and the fact that adjudication decisions are only temporarily binding in nature, the courts have declined to intervene by way of a Fortuna Injunction. This is so even if the companies appear to be solvent. It follows that t more and more parties will be looking to the winding-up court to secure payment based on adjudications under the CIPAA.

4. EXTENSIONS OF TIME GRANTED BY THE CONTROLLER OF HOUSING ULTRA VIRES

Under the Housing Development (Control and Licensing) Act 1966 (HDA), the Minister of Urban Wellbeing, Housing and Local Government (Minister) has the power to make regulations. One of these regulations is the Housing Development (Control and Licensing) Regulations 1989 (HDR). In particular, Schedule H of the HDR provides for a statutorily prescribed contract of sale (more commonly referred to as the "sale and purchase agreement" (SPA)) between a purchaser and a developer for housing projects in Malaysia.

The standard terms of contract are the agreed delivery of vacant possession within 36 months for housing accommodation in a subdivided building (I.e., condominiums and apartments). If the developer fails to deliver within time, it will be liable to the purchasers for liquidated and ascertained damages (LAD) calculated based on the period of delay. Under the HDR, the Minister authorises the Controller of Housing (Controller) to "waive or modify" the provisions of the SPA.

The developer previously, is of the view that the project may not be completed within 36 months, it may make an application to the Controller under the HDR to "waive or modify" the provisions of the SPA by extending time to deliver vacant possession. In the Federal Court in the landmark decision of Ang Ming Lee and Others v Menteri Kesejahteraan Bandar, Perumahan dan Kerajaan Tempatan and Another and other appeals [2020] 1 MLJ 281 ("Ang Ming Lee"). Here, the developer made an application for an extension of time for the delivery of vacant possession of condominium units after the SPAs were executed. The application was first made to the Controller and, upon it being rejected, an appeal was made to the Minister. The developer ultimately obtained an extension of time not from the Minister, but from the Controller. The purchasers brought an action against the Minister, the Controller and the developer for the extension of time.

The Federal Court found the following.

- The HDA is a piece of social legislation "designed to protect home buyers" and "the interest of the purchasers shall be the paramount consideration against the developer". The Minister has been entrusted to safeguard such interest.
- It is the Minister, and not the Controller, that is "entrusted or empowered by Parliament to regulate the terms and conditions" of the SPA. There is no express provision allowing the Minister to delegate this responsibility to the Controller.
- Accordingly, the Controller has no power to "waive or modify" the provisions in the SPA. The Minister's delegation of such power to the Controller under the HDR is therefore ultra vires the HDA (ie, beyond the Minister's powers under the HDA).

In contrast, the recent case of Bludream City Development Sdn Bhd v Kong Thye and Others and other appeals [2022] 2 MLJ 241 ("Bludream City Development"). Here, the Court of Appeal attempted to distinguish Ang Ming Lee based on the following facts.

The purchasers of units of service apartments similarly brought an action against the Minister, the Controller and the developer for the extension of time granted by the Minister. The purchasers argued that the extension was invalid and that they were entitled to claim for LAD. Like Ang Ming Lee, an application for extension of time was first made by the developer to the Controller and, upon it being rejected, an appeal was made to the Minister. In Bludream City Development, it was the Minister and not the Controller who ultimately granted the extension of time.

The Court of Appeal found the following.

- The Federal Court in Ang Ming Lee did not consider whether the Minister has the power to "waive or modify" the SPA. The issue was only whether the Controller could do so, and the answer was a resounding no.
- Whilst the Minister cannot delegate his power to "waive or modify" the SPA to the Controller, the Minister nevertheless has the power to do so himself in accordance with the objective and purpose of the HDA.
- Here, the Minister was right to have done so. There was a genuine need for extension of time not due to any fault on the developer's part. It was also not a case of the developer attempting to take advantage of its own delay and short-changing the purchasers.

Another interesting case to consider is Alpine Return Sdn Bhd v Matthew Ng Hock Sing and Others [2022] 1 CLJ 120 ("Alpine Return"), the Court found the following:

- Since the extension of time was sought for and obtained before the execution of the SPAs, the purchasers are stopped from not honouring the terms of the SPAs. As the SPAs are ultimately still contractual documents, the parties are bound by their bargain (ie, a period of 60 months instead of 36 months for the delivery of vacant possession).
- The purchasers would be unjustly enriched if they were allowed to claim for LAD based on a shorter completion period that they had never agreed to. The purchasers cannot take advantage of the ruling in Ang Ming Lee to "unjustly enrich themselves".
- In fact, vacant possession had been delivered within 60 months and the purchasers had received this "without any protest and objection".

5. DELIVERY OF VACANT POSSESSION CALCULATED FROM A "BOOKING FEE"

The Federal Court set the record straight in PJD Regency Sdn Bhd v Tribunal Tuntutan Pembeli Rumah and Another and other appeals [2021] 2 MLJ 60. The interpretation of the phrase "from the date of this Agreement" in the statutory prescribed SPA was decided to mean from the date the "booking fee" was paid, and not from the date the SPA was executed.

The seven appeals before the Federal Court arose from three sets of different cases. The seven appeals essentially raised the same point of law, namely whether in a Purchaser's claim for liquidated agreed damages ("LAD") for late delivery of vacant

possession against a housing developer ("the Developer"), the LAD ought to be reckoned from the date of payment of deposit, booking or initial fee or written intention to purchase or from the date of the sale and purchase agreement ("SPA"). Several individual appeals also raised specific issues and specific leave questions. In Appeals 29 and 30 ("the PJD Regency Cases"), the unique issue was whether the calculation of the LAD for late delivery of the common facilities ought to commence from the date the Certificate of Completion and Compliance ("CCC") was issued or from the date the Certificate of Practical Completion ("CPC") was issued. The developers contended that it should be calculated from the date the certificate of practical completion ('CPC') was issued.

The Housing Tribunal decided in favour of the Purchasers. Both the High Court and the Court of Appeal also decided for the Purchasers. The Developer appealed to the Federal Court. In Appeals 40, 41 and 42 ("the GHJ Avenue Cases"), the High Court relying on the Supreme Court authorities of Hoo See Sen & Anor v. Public Bank Bhd & Anor [1988] 1 MLRA 46 (SC) ("Hoo See Sen") and Faber Union Sdn Bhd v. Chew Nyat Shong & Anor [1995] 1 MLRA 623 (SC) ("Faber Union") held that the date of commencement of the LAD was from the date of the booking fee. The Court of Appeal however, attempted to distinguish the authorities relied upon in the High Court and held inter alia that the material date for the reckoning of LAD was the date of the agreement or SPA. The Purchasers appealed to the Federal Court. In Appeals 4 and 31 ("Sri Damansara cases"), the specific issue concerned unjust enrichment. The Developer appealed against the High Court and Court of Appeal's decisions and argued that since the purchasers had been given a 10% rebate on the purchase price of their properties, the LAD should be calculated on the rebated price and not on the actual purchase price stated in the S&Ps since that would otherwise amount to unjust enrichment. The Federal Court essentially found the following:

The courts would not countenance the bypassing of statutory safeguards meant to protect the purchasers. When the Developers acted in contravention of the law, they had to accept the resulting consequences. The courts would not condone the commercial practice of accepting booking fees, until and unless the law said otherwise. The appeals by the Developers were devoid of merit and ought to be dismissed with costs. There were merits in the Purchasers' appeals and they ought to be allowed with costs (paras 130-132).

Observation 1: The Developers who collected booking fees did so in express contravention of reg 11(2) of the HDR 1989. Without prejudging the matter, it was possible for any reasonable person to conclude that the Developers had committed an offence under reg 13(1) of the HDR 1989. Further, solicitors or anyone else who had collected the fees as stakeholders or had advised or encouraged the developers to do so had similarly committed an offence under reg 13(3) (para 51).

Observation 2: The House of Lords and the Privy Council constituted distinct judicial tribunals. The decisions of both judicial institutions were of equal persuasive weight in Malaysia - post the cut-off date in s 3 of the Civil Law Act 1950, and notwithstanding the principle established in Khalid Panjang & Ors v. Public Prosecutor (No 2) on the otherwise binding effect of certain Privy Council's decisions in Malaysia. (para 73)

The creation of the “booking fee” is a devious attempt by developers to thwart the protection afforded to purchasers under the HDA. The developers have put purchasers at a disadvantage by potentially abusing the opportunity to put a later date on the SPA in an attempt to delay the time for delivery of vacant possession.The HDA is a social legislation, in that it was enacted to regulate the relationship between the weaker party (ie, purchasers) and the stronger party (ie, developers) due to the inequality in bargaining power. The

purpose of the HDA is to safeguard the interests of purchasers by balancing the scales of justice.

Although illegal, the collection of a "booking fee" does not render the SPA void for illegality. Otherwise, there would be severe consequences to innocent home buyers who were under the impression that the "booking fee" was required to secure their purchase. Instead, the developers ought to have this illegality construed against them. Since the developers attempt to secure "an early bargain" by collecting "booking fees", then the protection of the HDA should operate to bind the developers to such "booking fees".

Additionally, the payment of the "booking fee" signifies the striking of a bargain and is "sufficient to constitute an intention to enter into a contract". Thus, the Federal Court has now concluded that where a "booking fee" is collected, the time for delivering vacant possession is calculated from the date that the "booking fee" was collected and not from the date of the SPA.

6. REDUCING THE IMPACT OF COVID-19

Section 7 provides a form of temporary relief to a party when his "inability… to perform any contractual obligation" is caused by the prescribed measures made or taken under the Prevention and Control of Infectious Diseases Act 1988 to combat COVID-19. Section 7 operates by precluding the other party from exercising his rights under the contract provided that the contract in question falls within the list of contracts specified in the Schedule. The list of contracts includes construction contracts, specifically the following:

- Construction work contract or construction consultancy contract and any other contract related to the supply of construction material, equipment or workers in connection with a construction contract.
- Performance bond or equivalent that is granted pursuant to a construction contract or supply contract.

Despite the COVID-19 Act came into force on 23 October 2020, the temporary measure afforded by Section 7 applies retrospectively. Section 7 is deemed to have come into operation since 18 March 2020 and will remain in operation until 22 October 2022 by subsequent extension orders under the COVID-19 Act. As regards interpreting Section 7, the High Court in the case of Ravichanthiran Ganesan v Lee Kok Sun and Others [2021] 1 LNS 1581 found the following:

The High Court was requested to stay the execution of a Sessions Court judgment pending its appeal. The Plaintiff commenced a civil action against three defendants for sums arising from his rendering of legal services, including unpaid legal fees. In turn, the Defendants brought a monetary counterclaim. The Sessions Court found in favour of the Defendants and dismissed the Plaintiff's claim, leading to the Plaintiff's appeal to the High Court alongside the instant application for a stay of execution of the subordinate court's decision.

7. SECTION 7 OF THE COVID-19 ACT

As background, the Covid-19 Act came into force on 23 October 2020. It was enacted to support the recovery of the Malaysian economy and to mitigate the financial impact of the Malaysian government's efforts to contain the pandemic on businesses. The Covid-19 Act does so by providing, through several Parts, multiple protections against civil claims to parties that have been affected by recent administrative responses to the pandemic as set out in the Prevention and Control of Infectious Diseases Act 1988 (PCIDA).

Part II of the Covid-19 Act, which was the focus in Ravichanthiran, provides relief from civil actions to parties that have been unable to perform their contracts due to the PCIDA. This relief may only be raised in relation to agreements falling within the categories set out in the Schedule to Part II of the Covid-19 Act, which includes construction work or consultancy contracts, performance bonds or equivalent contracts granted pursuant to construction or supply contracts, professional services contracts and leases or tenancies of non-residential immovable properties.The "inability" of a party ought to be a "factual inability", where "the facts make it inevitable that the party cannot perform". It cannot be a mere refusal by the party to perform his contractual obligations; the threshold is higher than a "mere breach". The COVID-19 Act is not to be resorted to merely to avoid liability just because it arose during the COVID-19 pandemic. That is not the purpose of the Act. Recently, in SN Akmida Holdings Sdn Bhd v Kerajaan Malaysia [2022] 2 CLJ 302 ("SN Akmida Holdings"), the High Court found the following:

Section 7 does not apply to construction contracts entered into by the Malaysian government as a "Government construction works contract" has clearly been excluded in Item 1 of the Schedule to Section 7. A comparison can be drawn to other statutes in Malaysia, including the CIPAA which expressly provides for the inclusion of construction contracts entered into by the Malaysian government. The exclusion of a "Government construction works contract" would not defeat the purpose of the Act as these contracts "are well within the control of the Government through the issuance of, among others, administrative circulars". In the present case, the Superintending Office (ie, the contract administrator) had granted extensions of time due to the delay in completion of the works caused by the Movement Control Orders implemented by the Malaysian government pursuant to the Prevention and Control of Infectious Diseases Act 1988.

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Alpine Return Sdn Bhd v Matthew Ng Hock Sing and Others [2022] 1 CLJ 120

Ang Ming Lee and Others v Menteri Kesejahteraan Bandar, Perumahan dan Kerajaan Tempatan and Another and other appeals [2020] 1 MLJ 281

Construction Industry Payment and Adjudication Act 2012 (CIPAA)

Sime Darby Energy Solution Sdn Bhd (formerly known as Sime Darby Offshore Engineering Sdn Bhd) v RZH Setia Jaya Sdn Bhd [2022] 1 MLJ 458

Likas Bay Precinct Sdn Bhd v Bina Puri Sdn Bhd [2019] 3 MLJ 244.

HIGHLIGHTS ON RECENT COURT CASES ON CONSTRUCTION LAW IN MALAYSIA

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ABSTRACT
This chapter attempts to highlight the most recent courts cases in Malaysia pertaining to the construction Law. These cases are vital to provide comprehensive consequences on the disputes arisen in the construction management. The chapter finds that these cases are significant since several important issues are being emphasised by the court. Those courts findings are also valuable to the developing the curriculum of the subject to the construction management.

Keywords: Construction Law, Construction Management

1. INTRODUCTION

This chapter attempts to highlight the most recent courts cases in Malaysia pertaining to the construction Law. These cases are vital to provide comprehensive consequences on the disputes arisen in the construction management. The chapter discusses selected cases that cover some important disputes in the field. These include for example, Sri Damansara Sdn Bhd v Voon Kuan Chien & Anor. This is a case that concerns home buyers rights with regards to the period of calculation for damages pertaining to late delivery of vacant possession. This is an issue that affects many buyers and their rights as new owners of properties. The chapter also analyses cases related to the power of the Minister to extend the period of delivery of VP by developers as well. Importnt lessons from these cases are deduced for the benefit of the reader.

2. WHEN DOES LAD START TO RUN?

(Sri Damansara Sdn Bhd v Voon Kuan Chien & Anor [2020] 4 MLJ 265; [2020] 5 CLJ 619, COA with the grounds of judgment dated 5 March 2020)

Judges: Hasnah Mohammed Hashim JCA, Kamaludin Md Said JCA, and Lee Swee Seng JCA (delivering the judgment of the court)

The case is important since it concerns home buyers as to whether the calculation of liquidated and ascertained damages (LAD) on late delivery of vacant possession should be calculated from the date of payment of booking fee or the date of the sale and purchase agreement (SPA).

The appellant/Developer in the instant case had entered into a Sale and Purchase Agreement ("SPA") with the 1st respondent/Purchaser for the sale of a condominium unit ("the unit"). The Developer took a RM10,000 booking fee from the Purchaser on 6 January 2012 as part of the 10% deposit of the purchase price. The SPA however was dated 28 June 2012 at which time the Developer issued the Purchaser a credit note for the balance of 10% deposit payable (RM63,108) The credit note appeared to give the Purchaser a "discounted purchase price". However, the excess between the actual loan amount and the

"discounted purchase price" (less the credit note) was in fact transferred to the Purchaser's account with the Developer to offset against the sinking fund, disbursement for electricity and water deposits and all other monies due under the SPA upon vacant possession. The Purchaser later filed a claim for late delivery damages with the 2nd respondent/Tribunal for Homebuyer Claims ("the Tribunal").

The Purchaser calculated damages from the date of the SPA which he claimed was 6 January 2012 - the date of payment of the booking fee. The Developer argued that there was nothing ambiguous with respect to the clear and plain meaning of the expression "date of the SPA" and in the instant case, vacant possession of the unit had been given within the prescribed time from the date of the SPA, which was 28 June 2012. Thus the Developer was not liable to pay any late delivery damages. Further, the Developer claimed that since the credit note discount had been given, the real or actual purchase price of the unit was lower than that stated in the SPA and damages if awarded, ought to be reckoned based on the discounted purchase price. The Tribunal agreed with the Purchaser on both the proper date of the SPA which was taken as the date of the payment of the booking fee and that the purchase price was as stated in the SPA. Thus, the Tribunal ordered the Developer to pay the Purchaser a sum of RM40,860.36 as late delivery damages. The Developer applied for judicial review to quash the decision of the Tribunal but the High Court dismissed the Developer's application.

It was held that:

1) It was a principle of judicial review that merits might be delved into if the challenge was on grounds of illegality and irrationality. A tribunal did not have the licence to commit an error of law where a question of the right and proper interpretation of a contractual clause in an agreement was concerned. A Tribunal was also not to disregard relevant considerations or fail to take into account relevant considerations. (para 17)

(2) To allow a collection of a deposit of less than 10% of the purchase price before the signing of the SPA, pejoratively called a booking fee, would be repugnant to the whole purpose of the Housing Development (Control and Licensing) Act 1966 ("HDA") and the Housing Development (Control and Licensing) Regulations 1989 ("Regulations"). To allow the collection of a booking fee under the scheme of payment under the Third Schedule to the Sch H of the SPA would be to permit what was expressly prohibited by reg 11(2) of the Regulations with the effect that the protection afforded to a purchaser under the Scheme of Instalment Payment of Purchase Price could be circumvented in the SPA being signed way after the payment of the booking fee. The collection of the booking fee required the Purchaser's agreement to a host of conditions in a Letter of Acknowledgement which sought to discriminate against the Purchaser if he did not agree to use the solicitors recommended by the Developer for the SPA and loan documentation. It was tantamount to a backdoor way to introduce additional terms to the prescribed form of SPA under Sch H to the Regulations. (paras 28, 30 & 31)

(3) A developer who chose to collect less than 10% of the purchase price must be prepared to sign the SPA for there was no prohibition in granting a more favourable term to the purchaser. To sanction a payment without the signing of the SPA would go against both the letter of the prohibition in reg 11(2) and the spirit and the statutory scheme of the Schedule H of the SPA. It was irrelevant that the Purchaser consented to it because the HDA and the Regulations were there to protect the Purchaser and the prohibition would have no bite if a booking fee or a deposit less than 10% of the purchase price was collected without the signing of the SPA. It was also irrelevant that the Purchaser

could only pay the 10% of the purchase price much later and for the SPA to be dated when the 10% was paid. Such a mischief in the circumvention of the prohibition on collection of a booking fee was precisely what the HDA and the Regulations were designed to arrest. (paras 32, 33, 35 & 36)

(4) The courts would have no problem calculating the late delivery claim from the expiry of the period of completion from the date the booking fee was paid, and not from the date of the SPA. To take the SPA date would be to allow the perpetuation of a practice that the Regulations prohibited. In the instant case, the device of a credit note which could have been given at the point the booking fee was paid, was nothing more than a device to attract sales at the expense of the Purchaser who would ordinarily been able to have his SPA dated contemporaneous with the payment of the RM10,000. (paras 36 & 39)

(5) If developers were allowed to collect booking fees or any sum called by any name without the need to sign a SPA, then there would be no protection afforded to the purchaser in the event the SPA was not signed. Unscrupulous purchasers might want to forfeit the whole of the booking fee or deposit paid whereas under the Sch H of the SPA, if a purchaser's loan was not approved, he would be allowed to terminate the SPA and under cl 5(3) only 1% of the purchase price would be forfeited to the purchaser and the balance refunded to the purchaser. Being a social piece of legislation the Court should interpret the standard form Sch H of the SPA in a manner in which the purchaser would not be taken advantage of or exploited in any way or made to bear an unconscionable term. To sanction a dating of the SPA only when the full 10% of the purchase price had been paid rather than the moment a booking fee or a lesser deposit was made would be to expose the purchasers to further vulnerabilities that would make them susceptible to unscrupulous practices by developers. (paras 59, 60 & 63)

(6) There was no error in the Tribunal's finding and calculation of the liquidated claim for late delivery with reference to the date the booking fee was paid. This was especially so when at the point the SPA was signed, the Developer had given, pursuant to its representation to the Purchaser, a credit note which deemed the balance of the 10% deposit as having been paid. (para 66)

(7) The device of stating a higher purchase price in the SPA when a developer knew that it would be giving a credit note to a purchaser at the opportune time determined by the developer had the debilitating effect of the banks giving a higher margin of loan to the purchaser who might otherwise not qualify for the loan to purchase the property. (para 68)

(8) There was nothing unreasonable, illegal or improper for the Tribunal to have agreed with the Purchaser that the calculation of the late delivery claim be based on the purchase price as stated in the Schedule of the SPA. The whole landscape of the Sch H of the SPA and the HDA as well as the Regulations did not countenance a different category or classification of "purchase price" whether it be a "discounted purchase price" or a "reduced purchase price" or "actual purchase price". (paras 71-72)

(9) The Purchaser could not be said to benefit when the SPA date was not taken to mean the date the booking fee was paid but a much later date when the SPA was signed with the result that the Purchaser would not be entitled to his late delivery claim. The Purchaser could not benefit when the "purchase price" was not as stated but a "reduced", "discounted" or "rebated" amount using the fictional device of a credit note. There did not appear to be any cogent reason to deviate from the meaning of "purchase

price" for the purpose of calculating the late delivery claim under cl 25(2) of the SPA as it was on "10% of the purchase price". (paras 82-84)

(10) The Developer could not accept the good in the property having been sold and not the bad in not accepting that the purchase price was as stated in the Schedule of the SPA. The Developer ought to be stopped from contending otherwise. There was nothing wrong with the reasoning of the High Court in affirming the Tribunal's award in calculating the late delivery claim based on the "purchase price" as stated and disclosed in the SPA. (paras 85 & 89)The High Court held inter alia that in calculating the period of delay for the purpose of a late delivery claim, the SPA date had to be the date the booking fee was paid. Also, the Tribunal was right in taking the purchase price as stated in the SPA. The Developer appealed to the Court of Appeal.

3. CONTROLLER OF HOUSING HAS NO POWERS TO GRANT ANY EXTENSION TO A DEVELOPER TO COMPLETE THE DEVELOPMENT.

(Alvin Leong Wai Kuan & Ors v Menteri Kesejahteraan Bandar, Perumahan Dan Kerajaan Tempatan & Ors And Other Applications [2020] 10 MLJ 689; [2020] 6 CLJ 55, HC with the grounds of judgement dated 20 March 2020)

Judge: Wong Kian Kheong J

He Alvin Leong and other purchasers (“Purchasers”) entered into Schedule H, statutory sale and purchase agreements (“SPAs”), for several service apartments (“Parcels”) with the Developer. The SPAs provide that VP of the Parcels shall be delivered to the Purchasers within 42 calendar months from the date of the SPAs.[3]

Subsequently, the Developer sought for a further extension from the Controller to extend the time for delivery of VP to 59 months. The Controller partially allowed the Developer’s request to a period of 54 months. Dissatisfied with the Controller’s decision, the Developer appealed to the Minister[4] whom allowed the Developer’s appeal (i.e. extending the time for delivery of VP to 59 months).

Dissatisfied with the decision of the Minister, the Purchasers filed judicial review applications seeking to, among others, quash the decision of the Minister.

4. HIGH COURT’S DECISION

The High Court[5] allowed the Purchasers’ judicial review applications and quashed the decision of the Minister. In so doing, the learned High Court Judge held, among others:

- That his Lordship was bound by the decision of Ang Ming Lee (i.e. that Regulation 11(3) of the HDR which delegates the Minister’s power to grant extensions of time to the Controller) was invalid and ultra vires the HDA. Accordingly, the Controller could not invoke Regulation 11(3) of the HDR to waive or modify the 36 month statutorily prescribed time for delivery of VP;

- Nothing in the HDR empowered the Minister to extend the time for delivery of VP. As such, there was no lawful basis for the Minister to make the decision (i.e. to extend the time for delivery of VP to 59 months);

- Even assuming the Minister had the power to grant the extension, the Purchasers should have been accorded a right to be heard before the Minister made his decision.

5. COURT OF APPEAL'S DECISION

The Court of Appeal held that whilst the Controller does not have the power to grant an extension of time, the same cannot be said about the Minister. Section 24 of the HDA is wide enough to clothe the Minister with this power.

In fact, the Court of Appeal through Justice Lee Swee Seng in the previous case of Loh Tina[6] alludes to the proposition that the power to grant an extension of time may fall within the ambit of the Minister's power.

In-depth discussion of the Court of Appeal's Grounds of Judgment on the Alvin Leong saga.

The High Court made four points:

First, Regulation 12 of Housing Development (Control and Licensing) Regulations 1989 provides that the Minister's decision "shall be final and shall not be questioned in any court". This part of the regulation is invalid as it ousted the Court's judicial power.

Second, even though these applications were filed before Ang Ming Lee, the judgement in Ang Ming Lee has retrospective effect and applies to the current applications. It is also in the interest of homebuyers for the judgement in Ang Ming Lee to be given retrospective effect.

Third, the Controller and the Minister cannot extend the time beyond the 36 months prescribed in Schedule H of the Housing Development (Control and Licensing) Act 1966.

Fourth, the homebuyers are entitled to claim for liquidated and ascertained damages based on the 36 months.

This case cements the rights of homebuyers to claim liquidated and ascertained damages for delivery beyond the statutory limit 24 or 36 months and potentially open the floodgates for more homebuyers to challenge to the Controller and Minister's decisions to extend the time beyond the statutory limit.

6. WHETHER AN ADJUDICATION DECISION CAN BE A DISPUTED DEBT

Maju Holdings Sdn Bhd v Spring Energy Sdn Bhd [2020] MLJU 1196, HC with the grounds of judgment dated 21 August 2020)

Judge: Ong Chee Kwan JC

The legal issues before the High Court were as follows:

First issue;

Whether a judgment issued by the High Court pursuant to section 28(2) of CIPAA 2012 is a "disputed debt" where there is concurrent arbitration or court proceedings

Second Issue;

If the debt under the Statutory Notice is undisputed, whether the company can raise cross claim or counterclaim of an amount equivalent to or more than the debt in answer to the demand to justify the grant of an injunction to restrain the presentation of the winding up petition?

Third Issue

Whether the Plaintiff has established on a bona fide cross claim or counterclaim on substantial grounds.

Prior to this decision, the High Court in ASM Development (KL) Sdn Bhd v Econpile (M) Sdn Bhd [2020] MLJU 282 (ASM) held that an enforced adjudication decision can still be treated as a disputed debt. This is because an adjudication decision is only of temporary finality. The present case departed from ASM.

In this case, the Defendant commenced adjudication proceedings against the Plaintiff and was successful. Thereafter, the Defendant successfully applied to enforce the adjudication decision. The Defendant then issued a statutory notice of demand. The Plaintiff applied to restrain the Defendant from presenting a winding up petition.

First, the High Court allowed the Plaintiff's application on the basis that the court was satisfied that the cross-claims by the Defendant is more than the statutory demand amount. Second, the High Court also held that an enforced adjudication decision is an undisputed debt. This decision is directly in conflict with ASM.

<u>Nature of Adjudication Order</u>

(Multazam Development Sdn Bhd v Felda Global Ventures Plantations (M) Sdn Bhd [2020] 11 MLJU 606, HC with the grounds of judgment dated 15 May 2020)

In 2018 Multazam Development Sdn Bhd (the plaintiff) commenced adjudication proceedings against Felda Global Ventures Plantations (M) Sdn Bhd (the defendant) for an outstanding sum of RM5,648,688.08 when the defendant terminated the contract between the parties. When the proceeding was in progress and an adjudicator had been appointed, the plaintiff sent a notice to withdraw the adjudication proceedings. At that time, the plaintiff's adjudication claim and the defendant's adjudication response had been submitted to the adjudicator. Consequently, since there was no mutual agreement between the parties on the bearing or sharing of costs incurred due to the withdrawal, the adjudicator made an order stating as follows:

The plaintiff had to bear the withdrawal costs of RM23,100, comprising the adjudicator's fee and the Asian International Arbitration Centre's (AIAC's) administrative fees, including 6% sales and services tax.

The AIAC had to fully refund the defendant for its share of the advance security deposit. The plaintiff had to pay the defendant the legal costs amounting to RM78,324.15 by 20 May 2019. Lim Chong Fong J

After hearing the application, the High Court remitted the issue on legal cost back to the adjudicator for reconsideration. Upon reconsideration, the adjudicator reaffirmed his previous order. The Plaintiff made another application to the High Court to set aside the revised order leading to the present case.

First, the High Court held that there is no provision in the CIPAA which permits an appeal or even the setting aside of a cost order made by an adjudicator.Second, the High Court highlighted that the Plaintiff's complaint was in substance an appeal against the adjudication order.Third, the High Court could not entertain the Plaintiff's complaint as the High Court has not been statutorily clothed with the jurisdiction power to do so. The court, among other things,

- held that the adjudicator's order was not an adjudication order which could be set aside pursuant to the CIPAA;
- remitted the issue on legal costs to be borne by the plaintiff to the adjudicator, who was ordered to discuss the matter with the director of the AIAC and to consider the plaintiff's submissions on the legal costs in determining their amount;(2) and
- prevented the defendant from presenting any petition to the court pursuant to Sections 465 and 466 of the Companies Act, pending the issuance of a revised order by the adjudicator.

7. ALTERNATIVE SPEEDY RESOLUTION FOR CONTRACTORS

(Spring Energy Sdn Bhd v Maju Holdings Sdn Bhd [2020] MLJU 902, SESSC with the grounds of judgment dated 1 July 2020)

Judges: Zulqarnain Bin Hassan

Since coming into effect in April 2014, CIPAA has been a salvation for the construction industry to resolve payment-related disputes. However, the adjudication lifeline came to a halt from March 2020 to November 2020. During that period, there was no director of the Asian International Arbitration Centre (AIAC) to appoint adjudicators. This decision is useful in setting out an alternative to CIPAA as it has the effect of resolving payment disputes in the construction industry speedily.

In this case, Spring Energy (Plaintiff) commenced an action against Maju Holdings (Defendant) for sums due and owing pursuant to Payment Certificates No. 22 and No. 23. The Plaintiff successfully obtained a summary judgment. The Sessions Court held that, among others, the Plaintiff had proved a clear-cut case against the Defendant as the payment certificates issued contained the elements of clarity, finality and incontrovertibility. The issuance of payment certificates amounted to an admission by the Defendant and that the Plaintiff was entitled to the payments.

8. CONCLUSION

It is to be noted that all the elaborated above cases are significant since the judges have underlined the main principles as to several essence of issues that involve in the construction management. The principles set by all the cases must be adhered to especially to provide a comprehensive understanding n the construction management.

REFERENCES

Spring Energy Sdn Bhd v Maju Holdings Sdn Bhd [2020] MLJU 902, SESSC with the grounds of judgment dated 1 July 2020

Multazam Development Sdn Bhd v Felda Global Ventures Plantations (M) Sdn Bhd [2020] 11 MLJU 606

Maju Holdings Sdn Bhd v Spring Energy Sdn Bhd [2020] MLJU 1196, HC with the grounds of judgment dated 21 August 2020

Alvin Leong Wai Kuan & Ors v Menteri Kesejahteraan Bandar, Perumahan Dan Kerajaan Tempatan & Ors And Other Applications [2020] 10 MLJ 689; [2020] 6 CLJ 55, HC with the grounds of judgment dated 20 March 2020

Sri Damansara Sdn Bhd v Voon Kuan Chien & Anor [2020] 4 MLJ 265; [2020] 5 CLJ 619, COA with the grounds of judgment dated 5 March 2020

CONSTRUCTION MANAGEMENT PROGRAMME AT IUKL: A PRELIMINARY REVIEW

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ABSTRACT
This chapter reviews the construction management programmes offered by departments or faculties at infrastructure University Kuala Lumpur (IUKL). The main aim of this chapter is to analyse the significance of the construction management programmes syllabus that is currently being offered at IUKL. The findings of this review are still at the preliminary stage to just highlighting the critical changes that are immediately needed. The findings indicate that the most popular subjects are those related to construction technology, construction management, measurement and law & contract. Also, it was found that programmes concentrate more on technicalities like the essence of engineering discipline approach. It is concluded that a clearer conception of the discipline is necessary both by educators and the industry for higher quality and students as well as contractors are more effective in discharging the quality in this industry.

Keywords: Construction Management Program

1. INTRODUCTION: CONSTRUCTION MANAGEMENT SYLLABUS AT IUKL

This chapter reviews the construction management programmes offered by departments or faculties at infrastructure University Kuala Lumpur (IUKL). The main aim of this chapter is to analyse the significance of the construction management programmes syllabus that is currently being offered at IUKL. It is not too extreme to suggest that the programme of construction management currently being offered at IUKL that is known as a Bachelor of Technology in construction management renders a blatant confusion. Historically speaking, this might have been as a result of the fact that this course was formerly offered by the faculty of engineering, IUKL. The designs and modules were developed by engineering faculty experts that were material at that point of time. Perhaps by the restructuring of the faculties and departments in IUKL that took place earlier, the programme was later transferred to the faculty of Architecture and Built Environment which currently offers the bachelor of Technology in Construction Management. It is with due respect; the programme needs a robust review taking into consideration the industrial demand and the ability and skills that should be possesses by the contractors in managing the process. Below is the syllabus of the said programme that currently offered by IUKL and the synopsis of the said programme that currently being offered at IUKL:-

2. PROGRAMME OBJECTIVES (PO)

a) To Produce Graduates With Sufficient Knowledge And Competency In Construction Related Industries.
b) To Produce Graduates With Professional Attributes Readily To Work In The Construction Profession.
c) To Produce Graduates With Professional Skills In Dealing With The Technological And Managerial Processes In Construction.

3. Programme Learning Objective (PLO)

a) Ability to prepare, apply, interpret and evaluate science and technology concept in a construction environment in accordance with applicable approved standards.
b) Ability to apply technical and practical competency in construction activities to suggest possible solutions for organizations' decision-making purposes.
c) Ability to apply a range of essential methods and procedures in solving a broad range of construction issues such as social, economic and environmental responsibilities for sustainable development.
d) Ability to collaboratively working with different people in learning and working communities and other groups or networks.
e) Ability to communicate knowledge, skills, ideas, critique or conclusion and report technical findings in both written and oral forms using appropriate methods.
f) Ability to critically identify, formulate, use and evaluate complex construction problems using appropriate technology in the construction environment.
g) Ability to interpret and evaluate constructions information using applications of numerical skills.
h) Ability to adapt responsibility in planning, resource management, and supervision with significant autonomy, leadership, and interpersonal skills in the context of a complex application and unpredictable situations.
i) Ability to demonstrate lifelong learning skills and personal development continuously.
j) Ability to exhibit entrepreneurial competency by actively engaged in entrepreneurial activities.
k) Ability to apply values, ethics, morality and professionalism in their career pursuit.

4. Refinement of the programme

The proposition of this chapter is that the content of education in construction management degree programs has changed over time. It has been said and litigated that the content has moved away from construction technology and has moved more towards generic areas of management since 2013 (H. Antoniades, P. Forsythe, 2013). Areas that must be enhanced include as below:

a. Extensive and more effective experiential learning to be provided.
b. The likes of assigned subject credit points and contact hours perhaps from other disciplines such as communication and culture differences
c. The impact of such changes to the industrial quality including the differentiation of university graduates in the past and present.
d. The industry perspective in terms of how the Artificial intelligent (AI) and Internet of Thing (IOT) changes have affected their expectations relating to employment of university qualified graduates.

e. The state of affairs, the existing perceptions and the future expectations (Arditi, 1989) related to construction management in general and its place in the educational system in global circumstances.

BACHELOR OF TECHNOLOGY (HONS) IN CONSTRUCTION MANAGEMENT

Overview:

Bachelor of Technology (Hons) in Construction Management programme equips students with relevant skills required to take on the onsite responsibilities in one construction project. This programme also prepares the students with the hard and soft management skill to make them ready to become a good construction manager in the future.

Minimum Entry Requirement:

i. Pass STPM with 2 relevant Principles including Mathematics ; **OR**
ii. Pass in recognized Diploma program, Foundation / Matriculation with a minimum CGPA of 2.00 **OR**
iii. Pass in UEC with a minimum of 5Bs including Mathematics; **OR**
iv. Pass A-Level with a minimum 2 relevant Principle Passes including Mathematics; **OR**
v. Average of 60% or higher in 5 subjects including Mathematics for SAM/ HSC/AUSMAT; **OR**
vi. Average of 55% or higher in 6 subjects including Mathematics for CPU/CIMP; **OR**
vii. Other equivalent qualifications recognized by Senate of IUKL as equivalent to STPM.

Abbreviations:

UEC: United Examination Certificate,
HND: Higher National Diploma,
SAM: South Australian Matriculation,
HSC: Higher School Certificate,
AUSMAT: Australian Matriculation
CPU: Canadian Pre-University,
CIMP: Canadian International Matriculation Programme,
IB: International Baccalaureate Diploma,
STPM: Sijil Tinggi Persekolahan Malaysia,
SPM: Sijil Peperiksaan Malaysia

Duration: 3 years **Total Credit Hours:** 120

PROGRAMME MODULE

Year 1	Year 2	Year 3
Basic Technical Mathematics Surveying and Fieldwork Basic Office Application Materials I University Subject (U1) Construction Technology I Introduction to Structures Construction Graphics & Drawing Building Services I University Subject (U1) Materials II Environmental Engineering Environmental Management Building Services II University Subject (U2)	Quantitative Methods and Statistics Construction Technology II Measurement and Documentation I Construction Cost Estimates University Subject (U4) English For Project Management Construction Technology III Construction Law Measurement and Documentation II Construction Safety & Health Construction Economic & Finance Contract & Procurement Management Green Technology & Sustainable Development	Thesis I Construction Technology IV Construction Management I Elective I (Risk Management/ Value Engineering) Thesis II Construction Management II Integrated Project Construction Technology V Elective II (Risk Management/ Value Engineering) University Subject (U3) Industrial Training

REMINDER

Student is required to inform the subject lecturer the reason for not attending the class within 5 working days after the date of absenteeism. A copy of the supporting document must be given to the subject lecturer, failing which, the student is considered absent without reason for the class.

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5. GRADUATE EMPLOYABILITY IN THE FIELD OF CONSTRUCTION MANAGEMENT

The construction industry plays an important role in designing a future for a country succeed in a globally competitive market. A well-educated and well-trained graduate in the field of the construction industry are vital to suit the industrial needs. The input of syllabus of the said programme at IUKL must be analysed from several important angles such as:

- Ability to understand whether there is a gap in the curriculum and to assess the difficulties they faced when they were searching for a job and also when joined as a fresh employee.
- suggestions from graduates regarding topics to be integrated into the curriculum in order to produce good quality whether for future engineers or contractors.
- The need for a new curriculum, industry- university partnerships

6. ASSESSMENT OF THE PROGRAMME

The programme of BTCM offered by faculty of Architecture and Built Environment, IUKL is assessed the final exams and continuous projects. Surprisingly, the assessment conducted by lecturers of BTCM programmed are acknowledged and complimented by the external panels of auditors.1 2020. The comprehensive linkages between CLOs and PLOs and the interlink with the proper levels of standard of questions seem relevant to match with the overall PLOs. However, a bulk of engineering input and perspective as stipulated in the syllabus are not really tested and what more yet to be tested its relevance to the industrial needs. Below is a sample of the final assessment.

1) Risk management had been establishing as part of project management. (25 marks)
2) Highlight FIVE key activities in risk management process life cycle in sequence and the purpose for each of the activities to be conducted (10 marks)
3) Brainstorming is the most popular method in risk identification. Propose THREE version of brainstorming in risk identification and highlight the advantages and disadvantages for each of the proposed version brainstorming (10 marks)
4) State TEN information needed in project risk register (5 marks)
5) Risk identification is the first activity that should be conducted in risk management life cycle. Thus, there are several methods in conducting risk identification. (20 marks)
6) Explain the concept of Qualitative Risk Analysis and Quantitative Risk Analysis. (5 marks)
7) State the purposed of using the following item in conducting risk analysis:
- Risk matrix
- Risk indicator
- Risk register template. (5 marks)

8) Highlight general procedure in conducting Qualitative risk analysis (10 marks)
9) Risk analysis is one of the critical activities in risk management life cycle. (25 marks)
10) You have been appointed as the risk manager for one large railway projects with 3 years of construction period. Thus, you have to assess the registered risk based on their likelihood and impact. Assess the following risk by using Qualitative risk analysis approach. Please provide the gross rating risk of the following listed risks based on the provided risk indicator. You may use the provided risk matrix to determine the risk rating. At the end of the analysis, please group the risk based on the rating. (15 marks).

[1] Audit conducted by MQA on 26th November 2019.

11) In your opinion, recommend THREE methods to implement effective risk management in large construction project. Justify your recommendation (10 marks)
12) Risk report is a life document due to monitoring and updates that need to be done throughout the project. (30 marks)
13) Explain the objectives of monitoring and update in risk management life cycle. (10 marks)
14) Risk report is a medium for risk communication in construction project. Justify THREE reasons how risk report can be medium of risk communication (10 marks)
15) Suggest THREE approaches of communication to overcome communication barrier in conducting risk management in construction projects.(10 marks)

7. CONCLUSION

The construction management education is evolving in meeting the 21st century education challenges for one main reason to produce highly capable and competitive graduates. It is not unacceptable to suggest that the fact that the inadequate planning in designing programmes offered also contribute to the lack of skilful graduates. Whether by continuing to adapt the traditional approach in designing the curriculum still forming the factors to this unwanted result or it is a combination that this approach of traditional perspectives seem seems short in providing and delivering a comprehensive program. It is highly recommended that the programme of bachelor of Technology in Construction management should be further enhanced to also include the communication aspects as major generic skills that should be nurtured in the students.

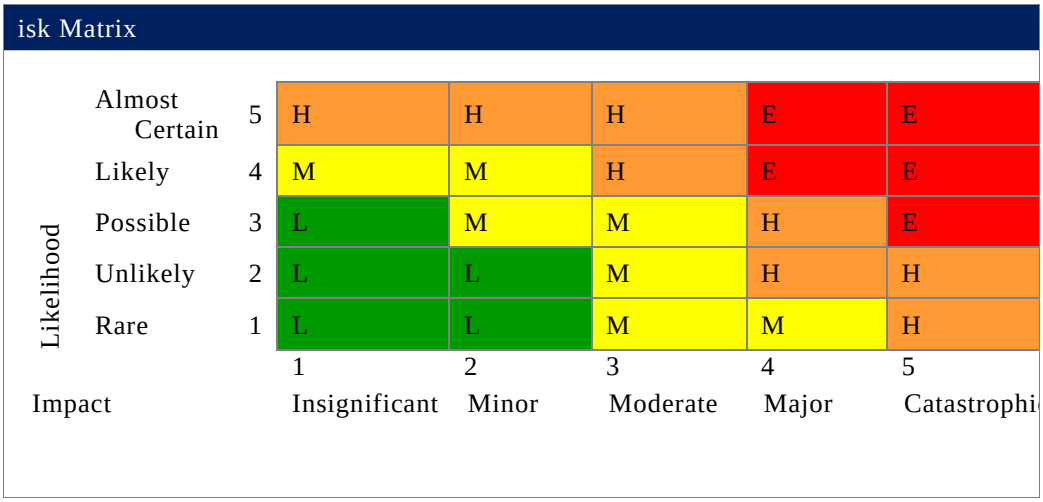
No	Risk ID	Risk Title	Expected possibility to happen	Exposure
1	001	Railway operations commencement delay.	Could happen once through out the construction period.	Once materialised, could lead to more than RM 2million project cost incurred.
2	002	Land cost overrun	Possible maximum 20% out of 30 numbers of land acquired would have cost overrun.	Possible cost incurred exposure would be more than RM 1 million
3	003	New requirements by local authority	Could happen once in a year	Cost incured would be maximum RM0.5 million for rectification works.
4	004	Public Safety	Could happen in quarterly basis	Could lead to fatality or permanent disable which can cost more than RM1 million for compensation.

5	005	Environmental	Could happen in quarterly basis	Could lead to maximum RM1 million for compensation and fine
6	006	Government Support Financing ("GSF")	Could happen once through out the entire project.	The shortfall could lead to additional cost more than RM1 million
7	007	Additional works and requirements requested by third party	Could happen more than 6 time in a year due to many interfacing alignment with other properties. However, it would not be monthly basis occurrence.	Could lead to more than RM1 million of additional cost for the additional works
8	008	Increase in construction material prices	Could happen once in a year due to the global market and demand	Cost incurred due to the delay could be more maximum RM 1 million
9	009	Breach in Terms and Conditions of Construction Contracts	Could happen once for each appointed contractor. 10 main contractors have been appointed for each 10 packages of the project.	Could lead to cost incurred maximum RM 1 million due to the delay.
10	010	Adverse negative sentiment	Could happen all the time through out construction period.	Due to the delay, could lead to maximum RM 500,000 cost incurred.

RISK INDICATOR

Likelihood	
Almost certain	Could happen once in a month
Likely	Could happen in quarterly basis or more frequent.
Possible	Could happen once in a year, or maximum 3 times in the whole period of construction
Unlikely	Could happen twice in the whole period of construction
Rare	Could happen once in the whole period of construction
Impact	
Catastrophic	Could lead to more than 1 numbers of fatality, permanent disable, permanent property damage, total lost, and financial exposure might be more than RM1 million.
Major	Could lead to 1 number of fatality, permanent disable, permanent property damage, total lost, and financial exposure might be equal or less than RM1 million.

Moderate	More than 1 major injuries such as broken legs and hand, huge properties damages, and financial exposure might be equal or less than RM0.5 million
Minor	At least 1 major injuries such as broken legs and hand, minor properties damages, and financial exposure might be equal or less than RM 200,000.00
Insignificant	At least 1 minor injuries such as minor cut, and financial might be equal or less than RM100,000.00



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