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Landscape Seminar

Theme:

FOSTERING ECOSPHERE IN THE BUILT ENVIRONMENT

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Kulliyyah of Architecture and Environmental Design. IIUM**

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UMRAN2014 ORGANIZING COMMITTEE	i-ii
TABLE OF CONTENT	iii-v
PREFACE	vi-vii
ACKNOWLEDGEMENT	viii

THEME: FOSTERING ECOSPHERE IN THE BUILT ENVIRONMENT

Session A: Exceeding The Norm Of Sustainability In Built Environment

1. Human Dimension On Fish And Amphibian As Indicators For A Healthy Environment In Urban Lakes Of Kuala Lumpur <i>Lukman Ramli, Liyana Bakeri and Zainul Mukrim Baharuddin</i>	1
2. Assessing The Implication Of Ecology On Scenic Beauty Preferences Of Fraser Hill <i>Nur Emira Ahmad Kamaruddin, Nur Fatin Rashidah Abdul Ropal and Jamilah Othman</i>	16
3. The Impact Of Landscape Setting And Architectural Element On The Outdoor And Indoor Microclimate: A Case Study Of Masjid Al-Mukarramah, Bandar Sri Damansara <i>Nur Yasmin Mohd Adnan, Nur Fadhilah Rozali, Aniza Abu Bakar, Nurhayati Abdul Malek, Rosniza Othman and Aliyah Nur Zafirah Sanusi</i>	32
4. The Impact Of The Outdoor Design And Architectural Dimension Of Masjid SHAS Towards Microclimate <i>Aslina Abdul, Nur Ikma Mohamad Nasir, Aniza Abu Bakar, Nurhayati Abdul Malek, Rosniza Othman and Aliyah Nur Zafirah Sanusi</i>	49
5. Aspect Of Tree For Controlling Outdoor Microclimate: A Case Study In IIUM <i>Mohamad Nur Ridhwan Mohd Nordin, Mohd Nasrul Nafizie Mad Nafiah, Aniza Abu Bakar and Amira Nadhirah Mohamad</i>	58
6. Study On Wild Birds And Elderly People In Relation To Sustainable Construction <i>Noor Sharlisa Dawi, Nur Syahirah Masdar and Ismawi Hj. Zen</i>	72
7. Tourists' Perceptions Towards Nature Trail Facilities Management: A Case Study Of Bukit Nanas Forest, Kuala Lumpur <i>Siti Nazirah Kamaruddin and Mohd Zin Mohamed</i>	89
8. The Effect Of Landscape Design On The Values Of Housing Areas In Klang Valley <i>Fitrynadia Mohd Shahli, Mohd Ramzi Mohd Hussain, Izawati Tukiman and Nurbazliah Zaidin</i>	106

Session B: Vitalized Built Environment As Catalyst For Heartier Community

9. Examining The Social And Communal Values Of Urban Square Towards Families And Youth <i>Muhammad Ruzaini Roslan, Noor Aqmal Hakim Noor Azman and Khalilah Zakariya</i>	121
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10. Provision Of Spaces And Space Quality In Housing Area Towards Quality Of Life: Case Study Of Taman Melati Mastika, Gombak <i>Muhammad Faiz Abdul Malek, Wan Mohamad Saifuddin Wan Hashim, Aniza Abu Bakar, Nurhayati Abdul Malek, Rosniza Othman, Aliyah Nur Zafirah Sanusi and Mohamad Abdul Mohit</i>	135
11. Emerging Relationship Of Spatial Design And The Activity Form Of Urban Park <i>Nur Ezzati Adnan, Nor Hidayah Ramlan and Izawati Tukiman</i>	151
12. Evaluating Guidelines On Open Space And Its Impact Towards Users Satisfaction In PPR Housing Area <i>Nur Athirah Kassim, Nurlaili Firdaus Che Othman and Mahadi Katang</i>	166
13. The Quality Of Housing Environment And Green Open Space Towards Quality Of Life <i>Ainatul Izzah Ishan, Nurul 'Ain Mohd Norddin and Nurhayati Abdul Malek</i>	183
14. Physical Factors And Social Attributes For The Liveliness Of Urban Plaza At Bintang Walk, Kuala Lumpur <i>Nabila Farhah Mohd Noor, Aimi Zarak Ali and Mazlina Mansor</i>	199
15. A Review On Contribution Of Landscape Settings In Hot-Humid Region Towards Modification Of Outdoor Microclimate <i>Amira Nadhirah Mohamad, Aniza Abu Bakar and Aliyah Nur Zafirah Sanusi</i>	215
16. Urban Green Spaces In Determining The Housing Price: A Theoretical Framework <i>Mohd Nasrul Hanis Manzahari, M.Zainora Asmawi and Noorzailawati Mohd Noor</i>	233
Session C: Green Technology Innovation As An Indicator For Emerging Challenges	
17. A Study On Homestay Concepts Of Tourism Program Development In Malaysia <i>Muhammad Saufi Daud, Muhammad Saddam Husin Daud, Muhammad Faridzman Samani and Rashidi Othman</i>	245
18. Visitor Perceptions Of Water Fountains Towards Space (Indoor , Outdoor) <i>Kamil Fahmi Ali, Siti Nor Ain Nasihah Mustfar and Jasasikin Ab.Sani</i>	259
19. A Study On Urban Morphology Using GIS , Remote Sensing Technique <i>Marina Mohd Nor and Norzailawati Mohd Noor</i>	273
20. Perception Of Campus Community Towards The Application And Practicality Of Campus Farming In International Islamic University Malaysia, Gombak <i>Norul Hafizah Yusoff, Nurfaezah Ghani and Putri Haryati Ibrahim</i>	288
21. A Study On The Importance Of Material Selection For Hardscape Surface Structure <i>Mu'az Mohamed Zainal Abidin, Aiman Yusri and Mohd Ramzi Mohd Hussain</i>	303

22. The Potential Of Water Filtration System For IIUM Gombak <i>Norsyafiqah Abd Kadir, Nurkhaleda Mohd Nasir and Izawati Tukiman</i>	312
23. A Study On The Potential Of Campus Outdoor Classroom In KICT, IIUM, Gombak <i>Nur Syakirah Mohmad Sayuti, Nurul Hani Muhamad Noh and Maheran Yaman</i>	326
24. The Potential Of Outdoor Space Utilization For Learning Interaction <i>Nazliah Hani Mohd Nasir, Farha Salim and Maheran Yaman</i>	343
Session D: Culture And Art Towards Enhancing The Quality Of Life	
25. Landscape Furniture Of Royal Palaces And Malay Traditional Houses <i>Muhammad Ariff Faisal Azhar, Aizuddin Ikil Shah Ahmad Shafiee and Nor Zalina Harun</i>	359
26. A Study On Job Satisfaction And Turnover Intention Among Quantity Surveyors <i>Nik Nur Azirah Mohamed Nor and Tan Chin Keng</i>	375
27. Cultural Landscapes In Built Environment: A New Perspective <i>Nurbazliah Zaidin, Mohd Ramzi Bin Mohd Hussain, Izawati Tukiman and Fitriynadia Mohd Shahli</i>	389
28. Mangrove Forest: Degradation And Rehabilitation <i>Mazni Adibah Abd Rahman and M.Zainora Asmawi</i>	398
29. Assessing The Values And Potentials Of Public Art In Campus Public Space <i>Ainul Samihah Albohari, Annur Jalilah Ramlan and Khalilah Zakariya</i>	411
30. Islamic Landscape: The Interpretation And Viability Of Islamic Courtyard In Malaysia <i>Aisyah Mahmood, Noor Fatin Syakilla Zubir and Jasasikin Ab.Sani</i>	429
31. A Study On The Effectiveness And Utilization Of Courtyard In Kulliyyah Compound <i>Norsyahira Ariffin, Nik Nor Asiah Nik Nor Azman and Putri Haryati Ibrahim</i>	443

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PREFACE

In the recent years, ‘going green’ has been trending as a significant move towards handling issues pertaining environmental degradation and the effects of development. In order to create a built environment that meets the needs of the present without compromising the necessities of the future, it is crucial for us to reflect back on our responsibilities as a society, or ‘*ummah*’ while protecting the environment. Hence, UMRAN2014 with the theme ‘Fostering Ecosphere in the Built Environment’ aims to expand this discussion further through disseminating new findings and ideas from multidisciplinary perspectives. The seminar format was four sessions and one keynote speaker, within eight hour time frame (9 a.m. to 5 p.m.).

The first session dealt with the ecological approach involving the characterization on how the environment influences the abundance, availability of a given resource in creating sustainable design. The second session focused on innovation of technology in a way to improve living standards of all people. The third session deliberated on the interrelationship between spaces, inequality, ethnicity and well being to enrich the quality of life regards in their needs in supporting sustainable way. The last session presented the strategies in achieving the value of uniqueness of the character of physical and form of the community by embracing the environment through conserving and preserving the beauty of culture and arts. The speakers included staff, postgraduate students and undergraduate students from related background of the borders. Substantial time was allotted for interaction between the speakers and the audience. A major goal of this event was to raise awareness of ecological living environment as a whole where it is not only to cater the ‘environment’. Indeed, environmental protection focuses more on keeping our air, land and water clean and healthy.

The first session, titled *Exceeding the Norm of Sustainability in Built Environment* upon the dynamic concept in which it is related to the action taken from different fields in the built environment by taking extra cautions when dealing with the environment by understanding the impact of each design idea in lined with the guideline of having environmental-friendly living.

The second session, titled *Green Technology Innovation as an Indicator for Emerging Challenges* focused on the creative approaches based on a new idea that can enriched well-developed built environment. This enables us to meet the ways of solving the needs of society in the manner that can continue indefinitely into the future without damaging or depleting natural resources. Speakers addressed the application of knowledge in science and technology that will bring innovations and changes in daily life and healthy environment.

The third session, titled *Vitalizes Built Environment as Catalyst for Heartier Community* dealt with improving places and spaces, including buildings, parks, and transportation systems for community well-being. Speakers tend to observe, explore

and experiment the needs of the community in supporting their lives through sustainable way. Speakers also discussed on the built environment as valuable aesthetic dimension in the society and encourage critical self-reflection to create public realm throughout society.

The last session, titled *Culture and Art towards Enhancing the Quality of Life* where speakers highlighted on the impact of culture and arts values as the mean to create sense of well-being as well as by outlining the idea of enlivening the community value and enriching culture as strategies towards better quality of life.

In conclusion, as with most environmental issues, built environment can have significant positive and negative effects. It is man-made surroundings that provide the setting for human activities, ranging from large scale of surrounding to the small personal shelters which somehow impacted the natural environment. A good design in the built environment is those that can enhance the development and well-being of future generations and supports healthier and happier communities. Thus, *Fostering Ecosphere in the Built Environments* is an inspirational description of the theme for this seminar and is able to respond effectively on embedding sustainable environmentally design approach towards enriching the quality of life.

ACKNOWLEDGMENT

In the name of Allah, the Most Gracious and the Most Merciful

First of all, we want to express all praise and thankful to Allah because of His Grace, Power and Mercy that this seminar is finally completed.

As a final note and on behalf of the organizing UMRAN2014, we wish to thank all the people involved for their interests and stimulating contributions to the success of this seminar. A special thanks to IIUM Rector, Prof. Dato' Dr. Zaleha Kamarudin and Dean of Kulliyyah of Architecture and Environmental Design, Prof. Sr. Dr. Khairuddin Abdul Rashid for giving us support in conducting UMRAN2014 this year.

We would like to take this opportunity to extend our thanks to all those academicians, organizations and experts who contributed to the deliberations in this seminar either by presenting the papers or attending as a participant. We also acknowledge the efforts put in by the officers and staff of the Department of Landscape Architecture IIUM for putting considerable efforts to make this seminar a success under the supervision and guidance from Asst. Prof. Dr. Aniza Abu Bakar, the Chairman of UMRAN2014, with Asst. Prof Dr. Nor Zalina Harun, the Head, Department of Landscape Architecture, as the advisor.

We are indebted to all seminar paper reviewers for their prompt and devoted professional evaluations that are important in conducting this seminar. The organizers are also grateful to all participants, academicians and students from the department of Landscape Architecture, Architecture, Urban and Regional Planning, Applied Art and Design and Quantity Surveying. Our warm appreciation to researches, consultants from building environment, government officials and others associated with the built environment for their contribution in the organizing of UMRAN2014 seminar. We hope this publication will help to expand broad view towards handling issues pertaining environmental degradation and become the platform for new findings and ideas from a multidisciplinary perspective, organizations and individuals in the field.

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PROVISION OF SPACES AND SPACE QUALITY IN HOUSING AREA TOWARDS QUALITY OF LIFE: CASE STUDY OF TAMAN MELATI MASTIKA, GOMBAK

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ABSTRACT

Every successful housing space is fix upon its user satisfaction living in that space itself. The quality of house and the spaces within the unit can be said as the most compelling factors in scaling the user satisfaction in dwelling in the residential area that can lead to a better quality of life. Limitation of space following high land cost that affect the indoor and outdoor spaces needs to be studied as it affects the residents' satisfaction. Hence, this study concentrates on spaces within a housing area and their quality, as well as the opinion of the residents and their level of satisfaction and space utilization. The focus of the study is on double-storey terraced houses because it is among the most common and dominant form of housing in Malaysia. The techniques employed in collecting data are observation and survey questionnaire with the respondent rate of 25.2%. This study provides an insight on the types of outdoor spaces (front yard-front lane and backyard-back lane) and their elements and utilization, indoor spaces utilization, and quality of housing spaces toward users' quality of life in Taman Melati Mastika, Kuala Lumpur. The result of this study suggests that the residents are satisfied with the existing spaces within their compound and adjacent to it, and this lead towards the overall satisfaction living in the area. It can also be said that quality spaces and good utilization of housing spaces can lead towards a better quality of life in the terrace housing area.

Keywords: Housing spaces, space utilization and quality, user satisfaction, quality of life

INTRODUCTION

The basic need of human is a home and it works as shelter that protect people from any weather element, and provide a place to live, work and play. It is defined as "*a structure serving as a dwelling for one or more persons, especially for a family*" (The American Heritage Dictionary of English Language—online). Nowadays, the quality of house is an important factor that can determine provide a comfortable environment for the users. Lazenby (1988: 55) stated that "*housing quality can be defined as the level of satisfaction with the specific house within a chosen residential, physical and social environment, as well as its specific housing attributes*". One of the important elements in housing is to have a good space quality. Some of the residential area in Malaysia are lacking in this part. Space limitation and several other factors such as climate following intense solar

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radiation and high humidity; pollution such as haze; and safety might be among the reasons that hinder users from spending their time outdoors more. Hence, it is generally agreed that most of the time, users spend their time indoor rather than outdoor (Abu Bakar, 2007). Certain parts of the house are turned into space to park car and some residents would renovate and extend further to widen the indoor spaces. The back area of the house especially the back lane may not be seen as a potential quality space for daily activity and to certain extent it could be neglected or perceived as negative space. Good use of the space can encourage user to spend time with useful activities. Housing orientation is also an important factor in determining the best quality home for the users. Knowing the orientation of the house can give great advantage to the users in achieving thermal comfort as well as sustainable lifestyle. Living in quality environment is a key element in improving people's life. After understanding the physical factors that contribute towards a quality home, the next focus is to understand the satisfaction level of housing residents. User satisfaction and better quality of life is the answer to a great and quality house. The quality of life studies have been focusing on subjective well-being or life satisfaction (Donovan and Halpern, 2002). In achieving the aim of this study within the context of housing quality and residents' satisfaction towards achieving quality of life, there are three main focus which are the utilization of indoor spaces; types, utilization and quality of outdoor spaces, the orientation of the house in relation to energy consumption, and the perception of the residents on their quality of life.

SCENARIO OF HOUSING IN MALAYSIA

People spent most their time indoors – working in the office buildings, and staying at home. House plays very essential aspects for human being. The house itself is the crucial part of the study on housing and space as people spend most of their time indoor and/or within their unit. It is almost impossible to underestimate the importance of a house because it is a private place to relax, retreat and socialize during the leisure time. Research conducted in various countries had proved that having satisfactory accommodation is at the top of the hierarchy of human needs (Burns and Grebler, 1986; Kiel and Mieszkowski, 1990).

The Terrace Housing Scenario in Malaysia

Terraced housing is among the most preferred housing type to accommodate people in Malaysia nowadays. The terrace houses are a type of mass housing developed by private developers in the country, in order to meet the increasing demand for housing. Terrace housing dominate the residential scene in Malaysia as it is more culturally friendly and effective in preparing resident an ideal home. Terrace houses is known as 'row house' in some countries, and it was adopted from the British terraced house design (Hashim et al., 2006). Typical layout for terrace houses consist of rows of rectangular housing lot where boundaries are clearly defined by using chain-linked fence or brick perimeter wall, featuring repetitive



Figure 1 Layout of terrace house
(Source: bp.blogspot-online)

and monotonous design (Hashim and Rahim, 2008). Terrace house is being considered the densest form of landed property development. The typical lot varies such as 20 feet by 65 feet and 22 feet by 70 feet. The layout of common terrace house can be divided into two categories which are the indoor and outdoor spaces. The typical double storey terrace house indoor spaces include four bedrooms, three bathrooms, a kitchen, a dining and living space, meanwhile the outdoor spaces include the entrance area cum front yard and the back yard as shown in Figure 1. The entrance is the interface between the outdoor and indoor space, between public and private space.

Provision of Outdoor Spaces in Malaysia Terrace Housing Scheme

Typically, the terrace house would have a front yard and backyard and these spaces form the privately owned outdoor spaces or external spaces for each unit. The outdoor spaces has contradictory functions. It serves as the connection to and the separation from the surrounding community. The front yard and backyard can be the privacy buffer between the house and the outside world. Not only that, front and backyard should be carefully designed so that it would be appropriate space for particular use. Well-designed space will become a positive and functional space. A number of activities can be done including entertainment, recreation and utilitarian activities. The front yard normally comprises of porch and driveway and garden measuring 6.1 meters in length and width similar to the house lot. This is private space for family to garden, dry cloth and rest. Most of the terrace house in Malaysia has relatively small space for gardening- the front yard can be as small as 9m² and sometimes without the kitchen garden. Meanwhile, the backyard is the portion of lot behind the house which is used nowadays as the place to store things and dry clothes. Some residents do not spend long time there as they might be paying less attention to it leading towards it being unattended space. Among the common issues arise from the design and layout of the terrace is the limited space size in each unit especially the outdoor area. The front yard and back yard seem to be the least utilized spaces in a terrace house leading towards even lesser outdoor activity.

Extension of Front yard and Backyard

In Malaysia, to cater the need of extra indoor space, unit of terrace houses are being renovayed and extended. According to Dalila, (see Ahmad Hariza and Zaiton, 2010, Ministry of Housing and Local Government, 2004), as housing designs are not easily accepted in tandem with the changes in lifestyles of the people, housing modification became monotonous and acknowledged as a Malaysian culture. Generally, almost all changes made to the house are intended to increase the number of bedrooms, or widen the living room dining area, kitchen, and wash room and car porch.

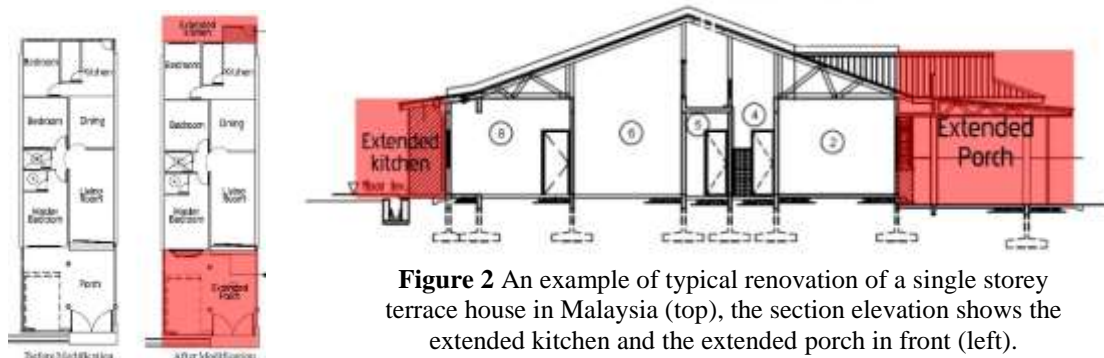


Figure 2 An example of typical renovation of a single storey terrace house in Malaysia (top), the section elevation shows the extended kitchen and the extended porch in front (left).

(Source: Nur Dalila, 2012)

Tipple and Tipple (1991) stated that the size of dwelling changes as time goes by because of the change in family lifestyle, the growing children and the expansion of the family, thus the current dwelling is subject to alteration and addition in order to support the growing number of occupants. Increase in the number of household actually affects the decision to modify and extend the house. The issues concerning to the extension of the front and back yard is that the size of the outdoor spaces is reduced. In addition, the outdoor spaces also include the front and back lane. The front lane in residential area commonly the road that link to the other houses. Meanwhile, the back lane is the street between rows of houses. The front lane is appreciated by the user because of its function meanwhile the backyard which are commonly under-appreciated by residents is characterized as less functional place.

The Orientation of House in Relation To Energy Consumption and Time Spend

Knowledge about sun orientation for any site is fundamental in the design of housing façades to let in light and passive solar gain, as well as to reduce glare and overheating the housing interior. Many homeowners does not realize that their house orientation is directly related to energy efficiency. Proper orientation allows the homeowners to take an advantage of a powerful source and utility cost: passive solar energy. Abdul Majid (2008) mentioned that the orientation of building must be suitable to avoid direct sunlight towards building. With a good amount of light received, less artificial lighting is used in a daily routine. Good orientation, particularly for a hot humid country like Malaysia, is critically important as it brings thermal comfort to the household. Climate affects the energy consumption in a building primarily by influencing the space cooling and heating requirements. The use of cooling devices will increase the energy consumption and also the electricity bill.

The Quality of Life in Urban Housing Scheme

Commonly, all definitions on quality of life is defined as a term to measure citizens satisfaction through understanding their actual needs and implementing most desired development in the future (Hikmatand Al-Betawi, 2009). In other words, quality of life appeared from the assessment of the multiple needs of the individuals, communities, and neighborhood. Satisfaction with physical features of the house tend to contribute to the overall satisfaction on the neighbourhood, which affects positively the overall feelings toward life satisfaction.

METHODOLOGY

The aim of the study is to investigate the the provision of space and quality of space towards the quality of life in Taman Melati Mastika (TMM). The technique identified to collect the data in the study area is through observation and survey questionnaire. The process of data collection can be divided into three stages as shown in Figure 3.

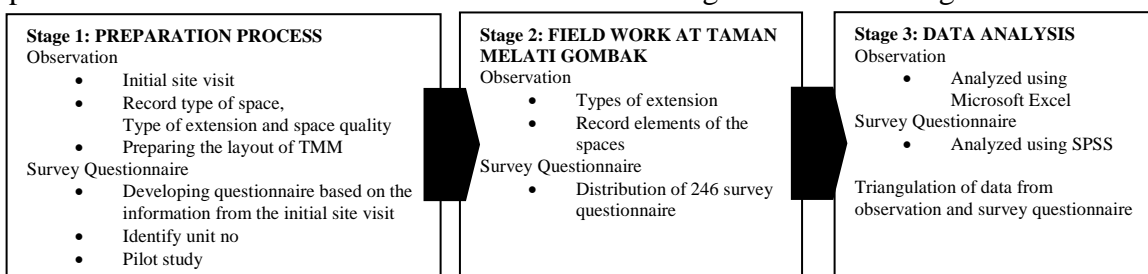


Figure 3 The flow of data collection process**The studied sites – Taman Melati Mastika, Kuala Lumpur**

Taman Melati is a township in Kuala Lumpur, Malaysia located between Gombak, Klang Gates and Taman Melawati. Taman Melati was developed during the 90s to accommodate the people in the Setapak area. The residential area at Taman Melati, comprises of residential and commercial development with a lot of facilities including an open space. The selected area for the study is Taman Melati Mastika (TMM), a terraced housing area because it fits the criteria for this study and the location is very strategic for the research. The housing area (indicated in red) is equipped with a playground and open space in the center as shown in Figure 4. The site was chosen because of all of the components of the study present in the site. In addition, the site is near and the chairman is reachable.

**Figure 4** Site location
(Source: Google Earth software)**Stage 1: Preparation Process**

The preparation process involved two types of identified techniques which are observation and survey questionnaire.

a) Preparation - observation

Initial site visit was conducted where observations were done to identify available spaces and types of house extension. The layout of TMM was also prepared based from the layout available/retrieved from Google Map, which was further refined using AutoCAD.

b) Preparation - survey questionnaire

Based on the data collected on the initial site visit, the questionnaire was prepared. The questionnaire prepared is divided into 3 sections which are the demography of the respondent, the quality of space and the quality of life of the respondent. A pilot study was done in TMM in order to test the effectiveness of the questionnaire. Six respondents had been chosen to answer the questionnaire. The questionnaire was refined with minor changes based on feedback from the pilot study.

Stage 2: Fieldwork

a) Fieldwork– observation:

The observation was conducted for three days from 15th of March until 17th March. During the observation, images of the spaces available and every unit of the house (front area and back area) were captured using a camera.

i. Identification of provision of spaces and their elements

To understand the provision of spaces within TMM housing area, a number of elements were observed for the front yard and front lane, and backyard and back lane. The elements observed are as follows:

- House type: corner unit, end unit and intermediate unit
- Type of extension/non-extension
- Spaces and their hardscape and softscape elements
- ii. Identification of house with shared back lane and orientation
 - Hardscape and softscape elements
- b) Fieldwork – Distribution of survey questionnaire

Based on figure 5, the units are grouped based on road number and shared back lane. Each group is identified based on coding prepared as follows:

Name of road	Back lane coding	No. of houses	Coding color
1/5A	a	10	Blue
	b	9	Green
	c	24	Red
	d	14	Cyan
2/5A	e	13	Orange
	f	18	Purple
3/5 A	e	13	Orange
	f	17	Purple
4/5 A	b	8	Green
	c	29	Red
	d	16	Cyan
	g	20	Yellow
	h	24	Blue
	i	15	Pink
5/5 A	j	15	White
	g	5	Yellow

Figure 5
The back lane coding according to housing layout



Two hundred and forty six copy of survey questionnaire were prepared according to the available unit number and they are coded accordingly (refer figure 5). The survey questionnaire was handed out to every house through the mailbox and the participants which are the residents of Taman Melati were asked to return the survey questionnaire in a box prepared and located at the TMM guardhouse. Help from Encik Alias bin Hasan - the chairman of the TMM Resident Association was sought to inform the residents on the research and to get them to participate in the survey conducted. The survey questionnaires were distributed on 15th of March 2014, and the residents were informed to return it by 19th of March 2014. However, following a very low response rate, the period was extended until 29th of March 2014. Between 19th of March and 29th of March 2014, notifications were sent to their mailbox on the intention of the researcher to collect the questionnaire door to door on 23rd of March 2014 – an extra initiative taken to ensure higher response rate.

Stage 3: Screening the data

The observation data was screened and Microsoft Excel software was used to analyse it. The data from the survey questionnaire are keyed-in to be analysed using a computer programme which is the Statistical Package for Social Science (SPSS).

ANALYSIS AND FINDINGS

The data is analysed using the Microsoft Excel and SPSS, and the results, discussions and findings are then arranged following the structure of the method employed for the study. The strategy of analysis the data is shown in .

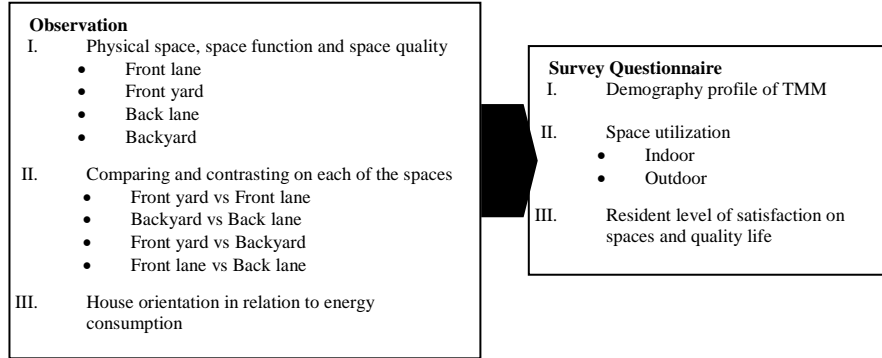


Figure 6 The flow of data analysis

House types of TMM

Figure 7 shows the types of unit in TMM and quantity of house. There are 250 units in TMM which can be divided into three types which are intermediate, corner lot and end lot.

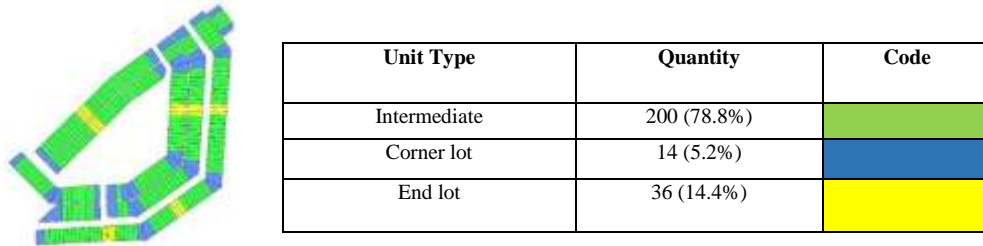


Figure 7 House type's layout and the housing quantity

Observation on physical space, space function and space quality

I. Frontlane of TMM

There are basically five road/lane exist in TMM which are 1/5A, 2/5A, 3/5A, 4/5A and 5/5A – refer to figure 8. The size of this lane is 8m and is normally used to park cars. Table 1 shows the current front lane in TMM.

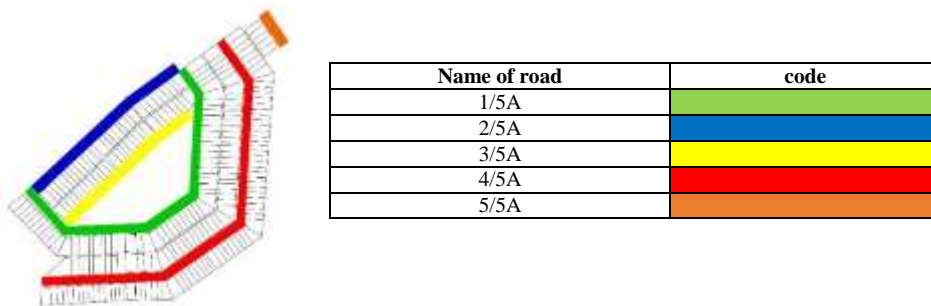




Figure 8 Front lane and road layout in TMM

II. Front yard and space quality

Table 1 Type of front yard



Type of Extension	Picture
100% extension	
Without green area	
With green area	
Non extension/original	

Table 1 shows some images of the first category in extension of house, which is 100% extended and without green space. This category involved indoor space being extended, be it the ground floor or first floor. The ground level spaces are normally turned into semi-outdoor space and used as car porch. The second category of house extension (without green space) does not involved indoor space extension, however the porch area are being widened until reaching the front gate. This spaces also seem to be turned into car porch. The third category is where the house is being extended (involving the porch area only – without indoor spaces being extended) and with green space. The first two categories have totally eliminated the green space.

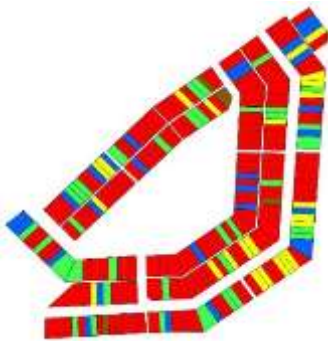


Figure 9 Types of front yard extension

Type	Category	Total	Percentages	Code
Extension Total = 216	100% extension	159/246	64.6%	
	Without landscape/green space	27/246	11%	
	With landscape/green space	24/246	9.8%	
Non Extension (original) Total = 36	-	36/246	14.6%	
In construction Total = 4	-	-	-	

Figure 9 above shows the type of unit based on level of extension and non-extension. For extended house category, it seems that 64.6% falls under fully extended (100% extension). The result also suggests that most of the extended houses do not seem to have landscape/green space, and this form 75.6%. Only 9.8% of the extended houses have landscape/green space. Hence, it can be said that for the front yard, once extended, the chances to have landscape/green space integrated with the extension is small.

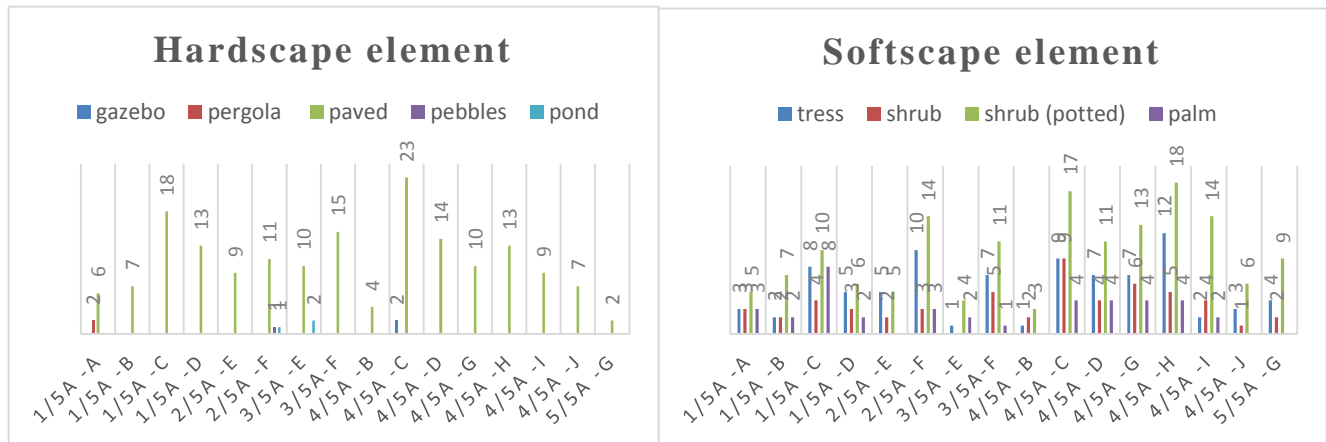


Figure 10 Hardscape element (left) and softscape element (right) in front yard area

Based on observation on all units, the result is presented in the above Figure 10. It is based on the backlane coding. In general, it can be said that that most of the house with landscape/green spaces have more softscape element rather than hardscape element. The front yard with the best space quality is the space that has a balance between hardscape and softscape element with the later having higher quantity. For houses that are fully extended and without green space, the residents tend to make use of put potted plant as an alternative to have a softscape since the house does not have green space.

III. Back lane of TMM

Referring to figure 11, there are two types of backlanes: type 1 – shared where the two rows of unit are facing each other (indicated in colors), and type 2 – shared but with only a row facing the backlane (uncoloured). Hence, there are six shared backlanes of type 1. The rear/kitchen of each row is facing the backlane. The rest of the units (uncoloured) do not have their rear/kitchen facing other unit. Table 2 indicates the two types of back lane.



Type of Back lane	Picture
Type 1	
Type 2	

Figure 11 Types of back lane and their location

IV. The backyard and space quality





Type of Extension	Picture
100% extension	
More than 50%	
Less than 50%	
Non extension	

Table 2Type of backyard extension

Referring to table 2, the first type of extension is 100% extension of the back yard area. The residents eliminate the back yard space into additional indoor space where the kitchen wall defined the boundary. The second type of extension where it is being extended for more than 50% of the total area – in which indoor space is extended covering the back yard space, and with outdoor space. The user changed the back yard into additional kitchen space. The third category which is less than 50% extension and with outdoor space. Meanwhile for the non extended house, they maintained the backyard but the space functions as drying area and storing item.



Type	Category	Total	Percentages	CODE
Extension Total = 188	100%	71/250	28.4%	
	More than 50%	101/250	40.4%	
	Less than 50%	16/250	6.4%	
Non Extension (original) Total = 56	-	56/250	22.4%	
In construction Total = 6	-	6/250	2.4%	

Figure 12Type of backyard extension and location

Figure 12 above shows the highest percentage of extension of the house in the backyard area which they extend their backyard area more than 50% of the area is 64.6%. On the other hands, the lowest percentages of extension of the house is 6.4% which they extend less than 50% of the area. House with the original layout at the backyard is 22.4%.

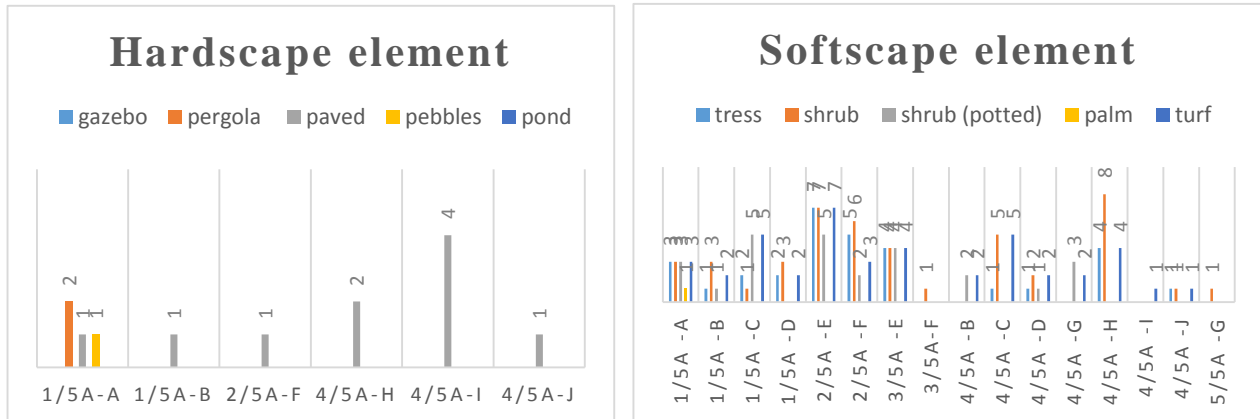


Figure 13 Hardscape element and softscape element in back yard

Figure 13 above show the hardscape element and softscape element in each of the house according to backlane coding. It is show that most of the house have more softscape element rather than hardscape element. The back yard with the best space quality is the space that have a softscape element that make the backyard more lively.

Comparing and contrasting the spaces

I. Front yard vs Front lane

Fronty yard have three types of extension. Mostly, the extension in the frontyard is to turn into car porch. It also becoming another spaces such as playing area, gardening area (for with landscape area extension) and drying area. Meanwhile the front lane is focusing on the road, the front lane becoming a second car park for the user.

II. Back yard vs back lane

Back yard area have three types of extension. The space is limited due to extension. Meanwhile the backlane have two types. There is less activities happen in the back lane area.

III. Front yard vs back yard

The front yard has more activities than back yard area. The extension of the front yard mostly bigger than back yard. Front yard also becoming an entrance before to get into the house. Meanwhile the backyard has less activities and the most of the extension of backyard was turned into indoor space.

IV. Front lane vs back lane

The frontlane has more activities than the backlane area. The front lane is functioning as the main road in TMM and it is the access to each of the road. The back lane has less activities due to low utilization and some of the backlane is shared.

House orientation in relation to energy consumption : rows and units facing the sunrise and sunset

Following the orientation of the rows, it can be classified into four categories as follows:

	Legend	Row	Remarks
E-W	Red	4/4A-g 4/4A-h	front/rear facing morning sun, and front/rear facing evening sun
N-S	Blue	1/5A-b 1/5A-c 4/4A-I 4/4A-j	Corner lot/end lot facing morning/evening sun
NE-SW	Yellow	1/5A-a, 1/5A-d, 4/5A-d, 4/5A-g, 5/5A-g.	front/rear facing morning sun, and front/rear facing evening sun but not in perpendicular angle
NW-SE	Orange	1/5A-c, 2/5A-e, 2/5A-f, 3/5A-e, 3/5A-f, 4/5A-I 4/5A-h.	front/rear facing morning sun, and front/rear facing evening sun but not in perpendicular angle

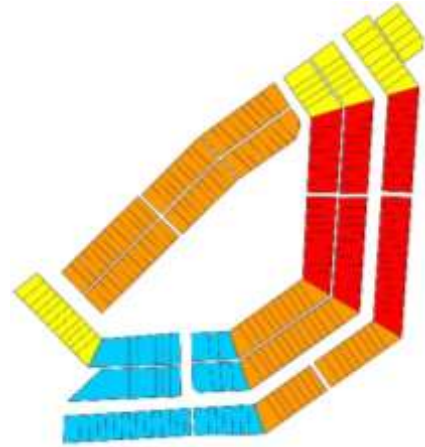


Figure 14 House orientation based on the sunrise and sunset

Figure 14 above shows that E-W orientation is the houses that located the row in 4/4A-g and 4/4A-h. N-S orientation houses located at row 1/5A-b, 1/5A-c, 4/4A-I and 4/4A-j. NE-SW orientation houses located at row 1/5A-a, 1/5A-d, 4/5A-d, 4/5A-g, and 5/5A-g. NW-SE orientation house located at row 1/5A-c, 2/5A-e, 2/5A-f, 3/5A-e, 3/5A-f, 4/5A-I and 4/5A-h.

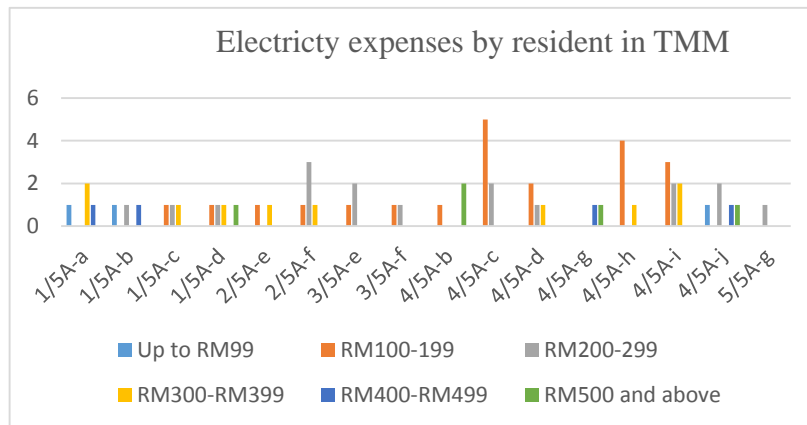


Figure 15 Electricity expenses by resident in TMM.

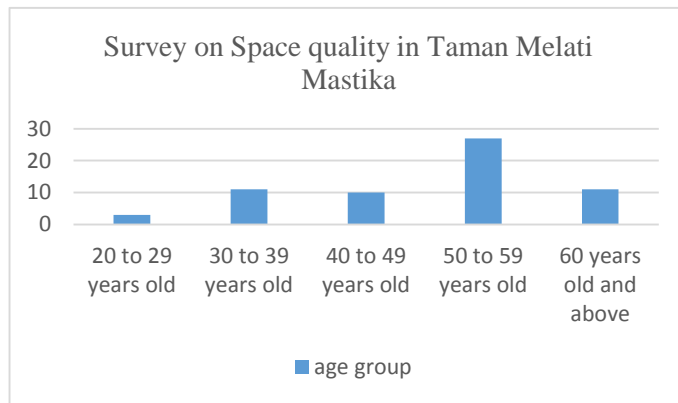
Figure 15 above shows that 14.5% pay more electricity bill which they pay more than RM400. 37.1% pay their electricity bill less than RM200 and 48.4% pay their electricity bill around rm200 up to rm399. From the figure 14 and figure 15, researcher anticipation was when the house is E-W orientation, the electricity is higher due to the house is facing the sun. N-S orientation have low electricity bill and NE-SW and NW-SE have a

moderate electricity bill. However, based on the result from the survey, it shows that the N-S, NE-SW and E-W/ NE-SW orientation pay more electricity bill. It could be the resident prefer to stay indoor rather than outdoor.

Analysis on Survey Questionnaire

Out of 246 survey questionnaire distributed, 62 residents responded which represent 25.2% of the total population. Survey has been conducted primarily to see the indoor and outdoor space utilization, to relate between the space utilization and electrical energy consumption, and to get the perception of the residents on the space preference and general perception on quality of life in TMM.

i. Demographic profile of respondents



Five age groups have been identified, ranging from 20 to 29 years old, 30 to 39 years old, 40 to 49 years old, and 50 to 59 years old and 60 years old and above – refer table 3. Most of the respondents falls under the age category between 50 to 59 years old (43.5%).

Figure 16: Respondent age group

ii. The quality of space

Table 2 below shows the residents' time spent in outdoor spaces on weekdays and weekend in TMM. It can be said that in the morning during weekdays, most user spent less than 1 hour in front area (front lane & front yard) than back area. About 75.8% user spent less than one hour in front lane area in the morning, same as in the evening. Meanwhile, at the back area, 69.4% user spent time less than one hour in the back lane area. In evening, 62.9% user spent time at the back lane. However, during weekend, most users spend less than one hour in the front and back area. In the morning, 66.1% users spent less than one hour in the frontlane area, meanwhile in the evening, 72.6% users spent their time in the frontlane. At the back area, 62.9% users spent less than one hour in the morning and in evening, 61.3% user spent less than one hour in the same spot. It can be said that the residents spend more time at the front area than the back area.

WEEKEND										
	Less than 1 hour		1-2 hour		2-3 hour		More than 3 hour		No respond	
	7am-7pm	7pm-7am	7am-7pm	7pm-7am	7am-7pm	7pm-7am	7am-7pm	7pm-7am	7am-7pm	7pm-7am
Frontyard / porch	32 (51.6%)	43 (69.4%)	21 (33.9%)	12 (19.4%)	3 (4.8%)	2 (3.2%)	6 (9.7%)	2 (3.2%)	-	3 (4.8%)
frontlane	41 (66.1%)	45 (72.6%)	11 (17.7%)	6 (9.7%)	2 (3.2%)	1 (1.6%)	5 (8.1%)	3 (4.8%)	3 (4.8%)	7 (11.3%)
backyard	23 (37.1%)	30 (48.4%)	14 (22.66%)	6 (9.7%)	3 (4.8%)	4 (6.5%)	1 (1.6%)	-	21 (33.9%)	22 (35.5%)

backlane	39 (62.9%)	38 (61.3%)	7 (11.3%)	3 (4.8%)	1 (1.6%)	1 (1.6%)	-	-	15(24.2%)	20 (32.3%)	62 (100%)
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WEEKDAYS											
	Less than 1 hour		1-2 hour		2-3 hour		More than 3 hour		No respond		TOTAL
	7am-7pm	7pm-7am	7am-7pm	7pm-7am	7am-7pm	7pm-7am	7am-7pm	7pm-7am	7am-7pm	7pm-7am	
Frontyard/ porch	46 (74.2%)	46 (74.2%)	7 (11.3%)	8 (12.9%)	5 (8.1%)	3 (4.8%)	3 (4.8%)	3 (3.2%)	1 (1.6%)	2 (3.2%)	62 (100%)
frontlane	47 (75.8%)	47 (75.8%)	6 (9.7%)	4 (6.5%)	2 (3.2%)	1 (1.6%)	3 (4.8%)	3 (3.2%)	4 (6.5%)	7 (11.3%)	62 (100%)
backyard	30 (48.4%)	31 (50.0%)	6 (9.7%)	5 (8.1%)	4 (6.5%)	3 (4.8%)	1 (1.6%)	-	21 (33.9%)	23 (37.1%)	62 (100%)
backlane	43 (69.4%)	39 (62.9%)	2 (3.2%)	2 (3.2%)	1 (1.6%)	1 (1.6%)	-	-	16 (25.8%)	20 (32.3%)	62 (100%)

Table 2 Usage of outdoor space during weekend and weekdays

Table 3 below shows the residents' time spent indoor on weekdays and weekend in TMM. It can be said that during weekend (daytime/nighttime), 58.1% respondent spent more than three hour in living area, 43.5% in master bedroom area and 35.5% in family hall area. 46.8% respondent spent one hour to two hour in the dining area, followed by 45.2% in kitchen area. Meanwhile, 33.9% respondent spent less than one hour in bedroom area. During weekdays, 38.7% respondent spent one hour to two hour in dining area and kitchen area during daytime. 75.8% respondentspent more than three hours in master bedroom area during night time. 35.5% respondent spent on one hour to two hour in the family hall during night time.

Table 3 Usage of indoor space during weekend and weekdays

WEEKDAYS												
	Living area		Dining area		Kitchen area		Master Bedroom		Family Hall		Bedroom	
	7am-7pm	7pm-7am	7am-7pm	7pm-7am	7am-7pm	7pm-7am	7am-7pm	7pm-7am	7am-7pm	7pm-7am	7am-7pm	7pm-7am
Less than 1 hour	19 (30.6%)	17 (27.4%)	24 (38.7%)	27 (43.5%)	18 (29.0%)	20 (32.3%)	21 (33.9%)	5 (8.1%)	18 (29.0%)	13 (21.0%)	25 (40.3%)	20 (32.3%)
1 hour – 2 hour	16 (25.8%)	14 (22.6%)	24 (38.7%)	20 (32.3%)	24 (38.7%)	27 (43.5%)	7 (11.3%)	4 (6.5%)	11 (17.7%)	22 (35.5%)	12 (19.4%)	7 (11.3%)
2 hour – 3 hour	7 (11.3%)	14 (22.6%)	6 (9.7%)	8 (12.9%)	8 (12.9%)	7 (11.3%)	6 (9.7%)	3 (4.8%)	15 (24.2%)	18 (29.0%)	7 (11.3%)	2 (3.2%)
More than 3 hour	18 (29.0%)	13 (21.0%)	4 (6.5%)	3 (4.8%)	6 (9.7%)	1 (1.6%)	21 (33.9%)	47 (75.8%)	12 (19.4%)	5 (8.1%)	7 (11.3%)	25 (40.3%)
No respond	2 (3.2%)	4 (6.5%)	4 (6.5%)	4 (6.5%)	6 (9.7%)	7 (11.3%)	7 (11.3%)	3 (4.8%)	6 (6.7%)	4 (6.5%)	11 (17.7%)	8 (12.9%)
TOTAL	62 (100%)	62 (100%)	62 (100%)	62 (100%)	62 (100%)	62 (100%)	62 (100%)	62 (100%)	62 (100%)	62 (100%)	62 (100%)	62 (100%)

WEEKEND												
	Living area		Dining area		Kitchen area		Master Bedroom		Family Hall		Bedroom	
	7am-7pm	7pm-7am	7am-7pm	7pm-7am	7am-7pm	7pm-7am	7am-7pm	7pm-7am	7am-7pm	7pm-7am	7am-7pm	7pm-7am
Less than 1 hour	6 (9.7%)	10 (16.1%)	8 (12.9%)	19 (30.6%)	3 (4.8%)	11 (17.7%)	11 (17.7%)	4 (6.5%)	12 (19.4%)	10 (16.1%)	21 (33.9%)	23 (37.1%)
1 hour – 2 hour	11 (17.7%)	14 (22.6%)	29 (46.8%)	22 (35.5%)	28 (45.2%)	26 (41.9%)	12 (19.4%)	10 (16.1%)	15 (24.2%)	22 (35.5%)	13 (21.0%)	10 (16.1%)
2 hour – 3 hour	9 (14.5%)	12 (19.4%)	14 (22.6%)	12 (19.4%)	15 (24.2%)	13 (21.0%)	8 (12.9%)	3 (4.8%)	10 (16.1%)	16 (25.8%)	8 (12.9%)	2 (3.2%)
More than 3 hour	36 (58.1%)	24 (38.7%)	10 (16.1%)	6 (9.7%)	14 (22.6%)	7 (11.3%)	27 (43.5%)	41 (66.1%)	22 (35.5%)	11 (17.7%)	14 (22.6%)	21 (33.9%)

No respond	-	2 (3.2%)	1 (1.6%)	3 (4.8%)	2 (3.2%)	5 (8.1%)	4 (6.5%)	4 (6.5%)	3 (4.8%)	3 (4.8%)	6 (9.7%)	6 (9.7%)
TOTAL	62 (100%)	62 (100%)	62 (100%)	62 (100%)	62 (100%)	62 (100%)	62 (100%)	62 (100%)	62 (100%)	62 (100%)	62 (100%)	62 (100%)

iii Residents' level of satisfaction on the spaces towards quality of life

Based on the table 4, about 77.4% of the respondents are satisfied with the condition of living space. About 12.9% said that they are dissatisfied with the condition of the living space. Meanwhile, based on the table 7, 43 respondents are satisfied with the quality of life in TMM with the rate 69.4%.

Table 4 Condition of living space (left) and rate of quality of life (right)

Condition of living space	Percentage	Rate for quality of life	Percentage
Dissatisfied	8 (12.9%)	Dissatisfied	8 (12.9%)
Neutral	4 (6.5%)	Neutral	5 (8.1%)
Satisfied	48 (77.4%)	Satisfied	43 (69.4%)
Very Satisfied	2 (3.2%)	Very Satisfied	6 (9.7%)
TOTAL	62 (100%)	TOTAL	62 (100%)

CONCLUSION

Based on the analysis of the data collected in TMM, a few results are achieved. In the context of space provision, many units are being extended, and this is very commonly done in terrace-housing areas. Most of the extension involved turning the front yard into paved and roofed surfaces which serve as car porches among others. Following the extension, the amount of landscape/green spaces becomes smaller. Hence, it can be suggested that more built area is seen, and this could lead towards an imbalanced environment. Urban areas are generally known for their limitation of green space. The need to extend indoor spaces or renovating exterior spaces to become semi-outdoor space can make the situation worse. The backlane is seen as a commonly ignored/neglected space. However, in TMM the type 2 backlane seems to be a functional place due to a lot of ongoing activities such as gardening. Type one backlane, on the other hand, is currently abandoned by some residents due to the small amount of space for activities.

RECOMMENDATION

In order to create a good and functional space, certain elements must be added to enhance the quality of space. By doing so, the user quality of life can be achieved. The front lane and front yard are the access to go inside the house. To create a good front lane, trees should be planted so not only can they give shades, but also improve the oxygen level. Meanwhile, the front yard in TMM undergoes renovation into a car porch area. However, in this case, the front yard area becomes a limited space for activities and interaction. In order to create a green environment in the house is to have a hanging potted plant, using interlocking pavement instead of using tiles and pavement, and of course plant a tree. By doing this, it gives a big benefit to the environment and it can help improve residents' quality of life.

health. Furthermore, the backyard and back lane is seen as a surplus space in TMM. The backyard in general, is extended into an additional kitchen and the outdoor space itself gone. In addition, the back lane is seen as negative space due to its size and less function. To solve this problem, particularly the back lane, redesigning the back lane is the best solution. To create a healthy and usable back lane, trees should be planted and not only that it can increase the privacy level in each home. For the shared back lane, interlocking pavement should be installed and much greenery is needed to make the backyard alive. Due to the small size back lane, potted plant is the best solution.

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